

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

FORM 10-K

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

For the fiscal year ended December 31, 2019

OR

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

For the transition period from ____ to ____

Commission file number 001-38935

ATRECA, INC.

(Exact name of registrant as specified in its charter)

Delaware
(State or other jurisdiction of
incorporation or organization)

27-3723255
(I.R.S. Employer
Identification No.)

450 East Jamie Court
South San Francisco, CA 94080
(Address of principal executive offices)
(Zip Code)

(650)-595-2595
(Registrant's telephone number, including area code)

Unchanged
(Former name, former address and former fiscal year, if changed since last report)

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

Title of each class	Trading Symbol(s)	Name of each exchange on which registered
Class A Common Stock	BCEL	The Nasdaq Global Select Market

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 during the preceding 12 months (or for such shorter period that the registrant was required to submit such files). Yes No

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

Large accelerated filer	<input type="checkbox"/>	Accelerated filer	<input type="checkbox"/>
Non-accelerated filer	<input checked="" type="checkbox"/>	Smaller reporting company	<input checked="" type="checkbox"/>
		Emerging growth company	<input checked="" type="checkbox"/>

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 Exchange Act). Yes No .

The aggregate market value of the voting and non-voting common equity held by non-affiliates of the registrant, based on the closing price of the registrant's shares of Class A common stock as reported by The Nasdaq Select Global Market on June 30, 2019 (the last business day of the registrant's second fiscal quarter), was approximately \$210.9 million. Shares of Class A common stock and Class B common stock held by each executive officer and director and stockholders known by the registrant to own 10% or more of the outstanding stock based on public filings and other information known to the registrant have been excluded since such persons may be deemed affiliates. This determination of affiliate status is not necessarily a conclusive determination for other purposes.

As of March 11, 2020, the registrant had 22,136,897 shares of Class A common stock, \$0.0001 par value per share and 5,934,191 shares of Class B common stock, \$0.0001 par value per share, outstanding.

DOCUMENTS INCORPORATED BY REFERENCE

Portions of the registrant's definitive proxy statement relating to its 2020 annual meeting of shareholders, or the 2020 Proxy Statement are incorporated by reference into Part III of this Annual Report on Form 10-K where indicated. The 2020 Proxy Statement will be filed with the U.S. Securities and Exchange Commission not later than 120 days after the end of the registrant's fiscal year ended December 31, 2019.

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Solely for convenience, trademarks and trade names referred to in this Form 10-K may appear without the ® or ™ symbols.

Special Note Regarding Forward-Looking Statements

This Annual Report on Form 10-K, or Form 10-K, and the information incorporated herein by reference, particularly in the sections captioned “Risk Factors,” “Management’s Discussion and Analysis of Financial Condition and Results of Operations” and “Business,” contains forward-looking statements within the meaning of Section 27A of the Securities Act of 1933, as amended, or the Securities Act, and Section 21E of the Securities Exchange Act of 1934, as amended, or the Exchange Act, that are based on our management’s beliefs and assumptions and on information currently available to our management. Forward-looking statements are inherently subject to risks and uncertainties, some of which cannot be predicted or quantified. All statements other than present and historical facts and conditions contained in this Form 10-K, including statements regarding our future results of operations and financial position, business strategy, plans and our objectives for future operations, are forward-looking statements. In some cases, you can identify forward-looking statements by terminology such as “anticipate,” “believe,” “can,” “continue,” “could,” “estimate,” “expect,” “intend,” “may,” “might,” “objective,” “ongoing,” “plan,” “potential,” “predict,” “project,” “should,” “will,” or “would,” or the negative of these terms or other comparable terminology. Actual events or results may differ from those expressed in these forward-looking statements, and these differences may be material and adverse. Forward-looking statements include, but are not limited to, statements about:

- § the initiation, timing, progress and results of our research and development programs, preclinical studies, any clinical trials and IND and other regulatory submissions;
- § our expectations regarding the activity of ATRC-101 or potential future product candidates once administered in a human subject;
- § our expectations and beliefs regarding the market for cancer therapies and development of the immunology industry;
- § our ability to identify and develop product candidates for treatment of additional disease indications;
- § our or a potential future collaborator's ability to obtain and maintain regulatory approval of any of our current or potential future product candidates;
- § the rate and degree of market acceptance of any approved product candidates;
- § the implementation of our business model and strategic plans for our business, technologies, and current or potential future product candidates;
- § our or any potential future collaborator's ability to obtain and maintain intellectual property protection for our discovery platform and current or potential future product candidates and our ability to operate our business without infringing the intellectual property rights of others; and
- § other factors discussed elsewhere in this report.

We have based the forward-looking statements contained in this Form 10-K primarily on our current expectations and projections about future events and trends that we believe may affect our business, financial condition, results of operations, prospects, business strategy and financial needs. The outcome of the events described in these forward-looking statements is subject to risks, uncertainties, assumptions and other factors described in the section titled “Risk Factors” and elsewhere in this Form 10-K. These risks are not exhaustive. Other sections of this Form 10-K include additional factors that could adversely affect our business and financial performance. Moreover, we operate in a very competitive and rapidly changing environment. New risks and uncertainties emerge from time to time and it is not possible for us to predict all risks and uncertainties that could have an impact on the forward-looking statements contained in this Form 10-K. We cannot assure you that the results, events and circumstances reflected in the forward-looking statements will be achieved or occur, and actual results, events or circumstances could differ materially from those described in the forward-looking statements. In light of the significant uncertainties in these forward-looking statements, you should not regard these statements as a representation or warranty by us or any other person that we will achieve our objectives and plans in any specified time frame or at all.

In addition, statements that “we believe” and similar statements reflect our beliefs and opinions on the relevant subject. These statements are based upon information available to us as of the date of this Form 10-K, and while we believe such information forms a reasonable basis for such statements, such information may be limited or incomplete, and our statements should not be read to indicate that we have conducted an exhaustive inquiry into, or review of, all potentially available relevant information. These statements are inherently uncertain and investors are cautioned not to unduly rely upon these statements.

The forward-looking statements made in this Form 10-K relate only to events as of the date on which such statements are made. We undertake no obligation to update any forward-looking statements after the date of this Form 10-K or to conform such statements to actual results or revised expectations, except as required by law. Unless the context otherwise indicates, references in this report to the terms “Atreca,” “the Company,” “we,” “our” and “us” refer to Atreca, Inc., its divisions and its subsidiary. All information presented herein is based on our fiscal calendar. Unless otherwise stated, references to particular years, quarters, months or periods refer to the Company’s fiscal years ended in December and the associated quarters, months and periods of those fiscal years.

This Form 10-K contains market data and industry forecasts that were obtained from industry publications. These data and forecasts involve a number of assumptions and limitations, and you are cautioned not to give undue weight to such information. We have not independently verified any third-party information. While we believe the market position, market opportunity and market size information included in this Form 10-K is generally reliable, such information is inherently imprecise.

PART I

Item 1. Business

Overview

We are a clinical-stage biopharmaceutical company utilizing our differentiated platform to discover and develop novel antibody-based immunotherapeutics to treat a range of solid tumor types. While more traditional oncology drug discovery approaches attempt to generate antibodies against known targets, our approach relies on the human immune system to direct us to unique antibody-target pairs from patients experiencing a clinically meaningful, active immune response against their tumors. These unique antibody-target pairs represent a potentially novel and previously unexplored landscape of immuno-oncology targets. We believe the fact that our approach has the potential to deliver novel, previously unexplored immuno-oncology targets provides us with a significant competitive advantage over traditional approaches which focus on known targets that many companies are aware of and can pursue. We have utilized our drug discovery approach to identify over 1,600 distinct human antibodies that bind preferentially to tumor tissue from patients who are not the source of the antibody. Our lead product candidate, ATRC-101, is a monoclonal antibody with a novel mechanism of action and target derived from an antibody identified using our discovery platform. ATRC-101 reacts in vitro with a majority of human ovarian, non-small cell lung, colorectal and breast cancer samples from multiple patients. It has demonstrated robust anti-tumor activity as a single agent in multiple preclinical models, including one model in which PD-1 checkpoint inhibitors typically display limited activity. We filed the Investigational New Drug, or IND, application for ATRC-101, which was cleared by the U.S. Food and Drug Administration, or FDA, in the fourth quarter of 2019 and have initiated a Phase 1b clinical trial in patients with select solid tumors in which the first patient was dosed in February 2020.

Although existing cancer therapies, including the evolving class of cancer immunotherapeutics, have advanced significantly over recent years, cancer remains the second leading cause of death in the United States. To address this unmet need, we pursue an open-aperture approach, which relies on the human immune system to direct us to antibody-target pairs that are present in patients who have experienced a clinically meaningful response to therapy.

We were incorporated in the State of Delaware on June 11, 2010.

Our Strategy

Our goal is to become a leading biopharmaceutical company by utilizing our differentiated platform to discover and develop antibody-based therapeutics against novel targets. In pursuit of that strategy, we intend to:

- § **Rapidly advance our lead product candidate, ATRC-101, into clinical trials in multiple types of solid tumors.** ATRC-101 is the first candidate identified using our discovery platform that has advanced into a clinical trial. ATRC-101 displays broad reactivity across a variety of human solid tumor samples and has demonstrated potent single-agent anti-tumor activity in preclinical models via a unique mechanism of action, which we term Driver Antigen Engagement. The IND application for ATRC-101 was filed with and cleared by the FDA in the fourth quarter of 2019. We have commenced clinical studies to evaluate ATRC-101 in a monotherapy setting and we plan to evaluate this candidate in combination with other agents in multiple solid tumors.
- § **Continue efforts to develop a pipeline of antibody-based product candidates for oncology.** While our only product candidate that is currently in clinical development is ATRC-101, we have utilized our differentiated drug discovery approach to identify over 1,600 distinct human antibodies targeting human tumors that can potentially provide the basis for additional product candidates. Our ongoing efforts are focused on identifying, analyzing and refining antibodies to generate clinical candidates that take advantage of various mechanisms of action and novel targets. We engineer some of our antibodies into various drug formats, such as bispecific antibodies, to drive anti-tumor activity. We intend to build out a proprietary pipeline of product candidates addressing large populations of patients across a range of solid tumors. We currently own worldwide rights to the oncology product candidates derived from our platform.
- § **Selectively enter into collaborations to enhance and expand our product pipeline as well as our drug development capabilities.** We believe that the single agent anti-tumor activity of many of the antibodies discovered using our platform could be enhanced by incorporating potential collaborator technologies. We intend to selectively form collaborations with partners to gain access to complementary technologies and expertise in order to develop product candidates with increased potential for anti-tumor activity.
- § **Continue to invest in our discovery platform to further enhance our ability to identify novel antibodies and to generate clinical candidates from our growing hit library.** A key pillar of our discovery platform is our proprietary sample repository, which includes over 1,300 blood-derived samples sourced from over 400 patients representing over 30 different types of solid tumors. We plan to expand the scope of our repository and enhance other portions of our platform in order to maintain our leadership position in the discovery of novel targets in non-autologous tumor tissue and antibodies that bind to them. We also plan to enhance our capabilities to translate these proprietary findings into product candidates such as through internal expansion of our target identification capabilities, as well as through external collaborations focused on giving us multiple approaches to identify the novel targets to which our antibodies are binding.
- § **Continue to expand our intellectual property portfolio to further protect our discovery platform and the novel product candidates it may generate.** The intellectual property surrounding our platform consists of patents and patent applications, trade secrets and know-how, and we plan to expand our intellectual property as we continue to develop our platform. We also intend to protect our product candidates by pursuing composition-of-matter and method-of-use patents typical for antibody-based therapeutics. Furthermore, as our platform identifies novel antibody-target pairs in which a human antibody may bind to a previously underappreciated target in a useful manner, we plan to pursue additional intellectual property supporting our candidates deriving from their interactions with targets.

Our Management Team

We are led by a highly experienced management team with deep scientific and technical expertise and broad experience in discovering, developing and commercializing antibody therapeutics in oncology. Members of our executive team have founded multiple biopharmaceutical companies and have experience in senior roles at leading oncology firms including Genentech, Amgen, Pfizer, MedImmune, Nektar and ARMO Biosciences. The breadth of our team's experience includes running clinical trials for novel antibody constructs at Amgen and leading the launch and commercialization of multiple products at Relyspa and the BioOncology Business Unit at Genentech. Additionally,

members of our team have served as faculty members, established new laboratories or led research initiatives at institutions including the University of California, Berkeley and the Fred Hutchinson Cancer Research Institute.

Our Lead Candidate: ATRC-101 for the Treatment of Solid Tumors

ATRC-101 is a monoclonal antibody derived from an antibody identified using our discovery platform in the active immune response of a patient. We believe that ATRC-101 may have broad potential as an immunotherapeutic agent in a range of solid tumors. ATRC-101 reacts in vitro with a majority of human ovarian, non-small cell lung, colorectal and breast cancer samples from multiple patients. It has also demonstrated robust anti-tumor activity as a single agent in multiple preclinical syngeneic tumor models, including one model in which PD-1 checkpoint inhibitors typically display limited activity. ATRC-101 has also demonstrated preclinical activity in combination with other immunotherapeutics, including PD-1 checkpoint inhibitors. Both the mechanism of action of ATRC-101, which we refer to as Driver Antigen Engagement, and its target appear unlike those of other anti-tumor antibodies that have been or are currently in clinical development. In histology studies, we did not observe binding above background levels across a range of normal human tissues. Additionally, in repeat-dose safety studies in both mice and non-human primates, we did not observe a safety signal. We have identified the target of ATRC-101 as a ribonucleoprotein (RNP) complex. ATRC-101 binds to target reconstituted in vitro using a single recombinant protein, polyadenylate-binding protein 1, and in vitro transcribed poly(A) RNA.

We obtained IND approval for ATRC-101 in late 2019 and launched an open-label dose escalation trial in patients with solid tumors in early 2020. Assuming we observe an acceptable safety profile, we then anticipate dosing ATRC-101 in expansion cohorts and in combination with other agents, including with potentially select chemotherapeutics as well as with a PD-1 checkpoint inhibitor. ATRC-101 demonstrates the ability of our platform to generate antibody candidates with novel targets and mechanisms of action.

We own worldwide rights to ATRC-101. We have filed multiple U.S. provisional patent applications relating to ATRC-101 and its variants. In February 2020, we filed a nonprovisional patent application in the U.S., an international patent application under the Patent Cooperation Treaty, and a patent application in Taiwan, each relating to ATRC-101 and its variants.

The Atreca Drug Discovery Platform

We believe we may be able to address certain key limitations of the current oncology drug discovery paradigm by focusing on the common phenomenon driving clinical responses in cancer immunotherapy—an active human anti-tumor immune response. Our platform allows us to interrogate an active B cell response within an individual cancer patient to identify novel and relevant antibody-target pairs, which may enable us to develop antibody-based product candidates to treat large populations of patients with solid tumors. We believe that the significant time and capital invested in developing, refining and applying our differentiated discovery platform have provided us with significant first-mover advantages and created barriers to entry.

For example, establishing our non-interventional clinical studies to obtain patient samples, enabling longitudinal analyses, required approximately 1 to 2 years per study. We built our bioinformatics expertise in assembling and analyzing our antibodies over seven years of operations. Our hit antibody generation process has been enhanced to deliver hits at a high rate, has already generated over 1,600 hit antibodies and is supported by a growing intellectual property portfolio. Additionally, our investments of capital and time to build industrialized wet-lab and supporting bioinformatics capacity across our platform, including the time required to identify and hire very qualified personnel, were substantial.

Our discovery process begins by gathering blood samples, mostly through company-sponsored non-interventional clinical studies, from cancer patients before, during and after they undergo treatment, which can induce an active anti-tumor immune response. Through this process, we have built a broad repository of over 1,300 samples from over 400 donors, representing over 30 different solid tumor types. We identify those patients with clinically meaningful responses to therapy, defined as those that reach validated surrogate endpoints of complete or partial response, stable disease for six months, or long-term progression-free survival. For those patients, we then examine their samples for rare antibody-producing B cells called plasmablasts that are elevated during an active immune response. We believe that these human immune responses, which often occur over an extended period of time, generate antibodies accessible with our platform that would be difficult to obtain through shorter term, non-human immunization or in vitro strategies.

If plasmablasts are elevated in a particular sample, we then employ a multi-step process to generate a potential product candidate. We start by isolating single plasmablasts and determining the sequences of the co-expressed antibody genes using our proprietary Immune Repertoire Capture® technology. We analyze these sequences to select antibodies, which we synthesize as recombinant proteins. We then test these antibodies to identify those that bind to tumor tissue from patients who are not the source of the antibody, referred to as non-autologous tumor tissue, preferentially over normal tissue. We then analyze these "hit" antibodies using a number of in vitro and in vivo assays, and often make structural changes to generate leads. A select number of these leads are refined further using protein engineering to enhance their drug-like properties as we identify and characterize their targets in parallel prior to initiating preclinical development and IND-enabling studies.

Key Attributes of Our Discovery Platform

We take an "open-aperture" approach to drug discovery, in which we are not limited by preconceptions of what constitutes a viable antibody or target. We instead allow the human immune system to direct our efforts. We believe this approach provides us access to a broad underexploited antibody and drug target space. Our approach may lead us to antibodies that are unlikely to have arisen via more traditional approaches with targets that otherwise may not have been discoverable. We believe our approach and discovery platform provide us with the ability to:

- § Generate antibodies made by the human immune system.
- § Deliver potentially useful antibodies at a high rate and in a scalable fashion.
- § Access a potentially large and underexploited tumor target space.
- § Identify antibody-target pairs.
- § Generate candidates that direct the immune system to attack tumor tissue.
- § Develop potential treatments for large populations of patients across multiple tumor types.

Our Lead Generation Programs

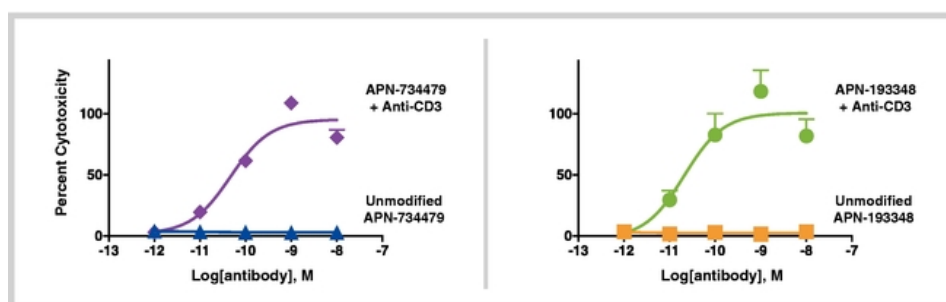
Driver Antigen Engagement

We believe the mechanism of action of ATRC-101 involves systemic delivery of an agent that causes remodeling of the tumor microenvironment and the destruction of tumor cells via both the innate and adaptive immune systems. With our knowledge of the target of ATRC-101, we believe other targets may exist that are capable of driving such activity when bound by an antibody. We are therefore working to discover and develop distinct antibodies binding other targets that utilize this novel mechanism of action.

T cell engagers

Our hit antibodies are defined by their ability to react with non-autologous tumor tissue preferentially over normal adjacent tissue. In principle, therefore, their Fv regions can be used to direct cells of the immune system, such as T cells, to tumor cells. Furthermore, if the T cells can be activated when they are brought to the tumor cell, then tumor cell killing can occur. This "T cell engagement" is a well-validated approach utilized in both approved and clinical stage products. In this approach, tumor-targeting domains derived from antibodies are linked to protein domains that typically bind to a particular protein (CD3) on the surface of T cells, both bringing the T cell to the tumor cell while simultaneously activating it. These antibody-derived biologics are sometimes termed "bispecific", in that they are capable of binding to two different targets: the tumor target and the T cell target.

We are pursuing the discovery and development of bispecifics using our proprietary collection of novel tumor-targeting antibodies. To screen for the potential utility of an antibody-target pair, we first use antibody sequence information to create a bispecific T cell engager in one or more formats. We then test this bispecific for activity in vitro in an industry-standard assay for T cell dependent cellular cytotoxicity (TDCC). In this assay, primary human T cells isolated from a patient blood sample are co-incubated with tumor cells. The bispecific, in which the antibody-derived portion from our hit library is known to interact with the tumor cell, is added into the assay, and tumor cell killing is assessed over time. In this assay, a number of our hit antibodies converted into bispecifics display significant tumor cell killing activity. Our data suggest that, using a single bispecific format, approximately 6% of our hit antibody Fv regions test positive in TDCC assays (>375 hit antibodies analyzed). In the figures below, two antibodies that have been converted into a bispecific T cell engager format display tumor cell killing activity, with approximately 100% cytotoxicity in the assay observed at a low nanomolar concentration of each bispecific, while the unmodified antibodies do not show cytotoxic activity in the assay at any concentrations tested.



In the future, we may selectively pursue partnerships to access additional bispecific formats, technologies and know-how in order to discover and develop T cell engagers based on novel antibody-target pairs discovered using our platform.

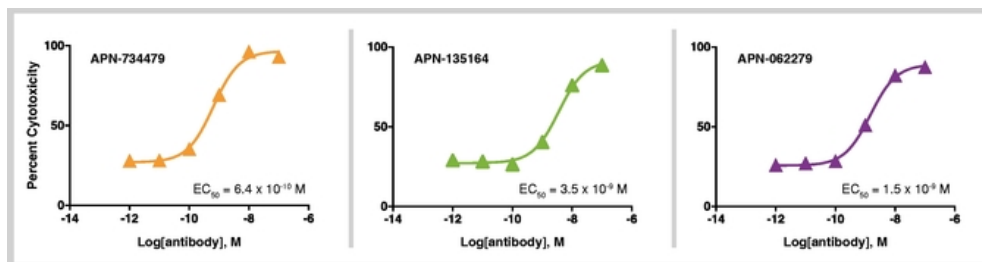
Directed killing

Antibody-Dependent Cellular Phagocytosis (ADCP) and Antibody-Dependent Cellular Cytotoxicity (ADCC) are two mechanisms of action through which antibodies that bind to tumor cells can direct innate immune system cells to

kill them. In both cases, the Fc portion of the antibody interacts with particular FcRs of innate immune system cells to mediate the killing. In ADCP, macrophages/monocytes engulf tumor cells bound by antibodies, while in ADCC, NK cells use particular cellular machinery to kill antibody-bound tumor cells. Both ADCP and ADCC are validated mechanisms of action that contribute to the anti-tumor activity observed for marketed antibody drugs.

We have established in vitro assays for ADCC and ADCP activity and use these assays to screen our antibodies for those capable of driving tumor cell killing via ADCC and ADCP mechanisms. In these assays, a number of our hit antibodies display tumor cell killing activity. Our data suggest that approximately 17% of our hit antibodies test positive in ADCC or ADCP assays (>375 hit antibodies analyzed). In the figure below, cell killing (cytotoxicity) activity in an ADCC assay as a function of antibody concentration is illustrated for three hit antibodies.

Given that ADCC and ADCP are thought to be more effective when a greater number of targets are bound on the surface of a tumor cell, we believe there may be utility in utilizing multiple antibodies from our hit library in combination, as separate entities or in bispecific formats, in order to drive activity via this mechanism of action. In the future, we may pursue partnerships to access particular technologies and know-how to discover and develop candidates with these mechanisms of action.



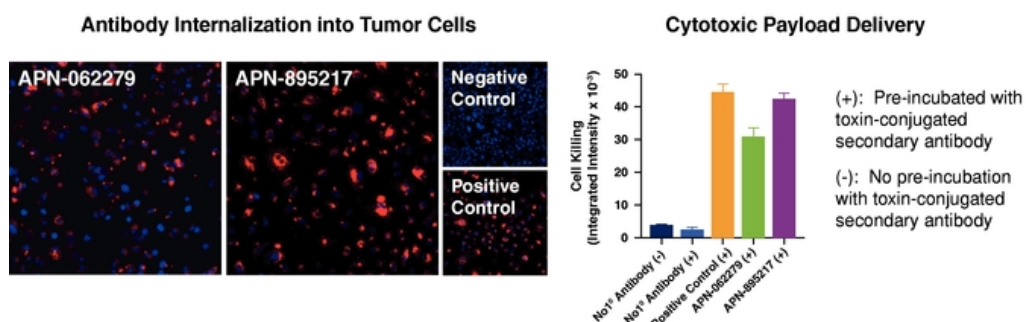
Toxin-conjugates (ADCs)

Cellular toxins can be conjugated to certain antibodies to generate cytotoxicity against tumor cells expressing their targets. Such antibody-drug conjugates (ADCs) require antibodies that internalize upon binding to their target. Once antibodies internalize, they also must be delivered to an intracellular compartment suitable for release of the toxin into the cell.

We have established in vitro assays to assess first whether our hit antibodies can internalize once they bind to their targets on tumor cells, and if they internalize, then whether they can deliver a toxin to an internal compartment such that the toxin is released to kill the cells. In our internalization assay, our data suggest that approximately 2% of hit antibodies test positive (>700 hit antibodies analyzed). Our second assay measures cytotoxicity as driven by release of toxin bound to an internalized antibody (a cytotoxic payload). In this assay, internalizing hit antibodies are pre-incubated with a second antibody that is both capable of binding the internalizing antibody and has a conjugated cytotoxin. The pre-incubated antibody mixture is then incubated with tumor cells for a period of time, and cell killing is measured.

The left portion of the figure below illustrates the activity of two hit antibodies in the internalization assay (red signal), relative to positive and negative control antibodies. These two internalizing hit antibodies can also deliver a

cytotoxic payload after internalization, as measured in the cytotoxicity assay, which is illustrated in the right portion of the figure below. The data indicate the amount of cell killing at the end of the period of incubation with tumor cells.



In the future, we are likely to pursue partnerships to access technologies and know-how to discover and develop product candidates with an ADC mechanism of action based on novel antibody-target pairs discovered using our platform.

Manufacturing

We use a third-party manufacturer to produce our antibodies and reagents for use in preclinical assessment of product candidates. We do not have, and we do not currently plan to acquire or develop, the infrastructure, facilities or capabilities to manufacture current Good Manufacturing Practices, or cGMP, bulk drug substance or filled drug product for use in human clinical trials. We intend to continue to utilize third-party manufacturers such as contract development manufacturing organizations, or CDMOs, to produce, test and release cGMP bulk drug substance and drug product for our planned clinical trials. We expect to continue to rely on such third parties to manufacture clinical trial material for the foreseeable future. We currently have a service agreement with a CDMO to develop and manufacture material in support of our Phase 1b clinical studies.

Our current and expected future contractual CDMOs have a long, successful track record of manufacturing products for other companies under cGMP compliance and have previously been inspected by regulatory authorities for compliance with cGMP standards.

Competition

We are aware of a number of companies that are developing antibodies for the treatment of cancer. Many of these companies are well-capitalized and, in contrast to us, have significant clinical experience, and may include our potential future partners. In addition, these companies compete with us in recruiting scientific and managerial talent. Our success will partially depend on our ability to obtain, maintain, enforce and defend patents and other intellectual property rights with respect to antibodies that are safer and more effective than competing products. Our commercial opportunity and success will be reduced or eliminated if competing products that are safer, more effective, or less expensive than the antibodies we develop are or become available.

We expect to compete with antibody, biologics and other therapeutic platforms and development companies who are also pursuing a similar discovery approach, including, but not limited to, companies such as Adaptive Biotechnologies Corporation, AIMM Therapeutics B.V., Neurimmune Holding AG, OncoResponse, Inc., and Vir Biotechnology, Inc. In addition, we expect to compete with large, multinational pharmaceutical companies that discover, develop and commercialize antibodies and other therapeutics for use in treating cancer such as AstraZeneca plc, Bristol-Myers Squibb Company, Genentech, Inc. and Merck & Co., Inc. If ATRC-101 or potential future product candidates are eventually approved, they will compete with a range of treatments that are either in development or currently marketed. For example, we expect that ATRC-101 and our potential future product candidates may compete against traditional cancer therapies, such as chemotherapy, as well as cell-based treatments for cancer, such as CAR-T therapies.

Intellectual Property

Our success will significantly depend upon our ability to obtain and maintain patent and other intellectual property and proprietary protection for our novel antibody-based immunotherapeutics to treat a range of solid tumors, as well as patent and other intellectual property and proprietary protection for our discovery platform, novel discoveries, and other important technology inventions and know-how. We rely, for example, on patents, trademarks, trade secrets, confidentiality agreements, and invention assignment agreements to protect our intellectual property and proprietary innovations.

As set out in the "Risk Factors—Risks Related to Our Intellectual Property," our intellectual property and proprietary rights may be challenged, invalidated, circumvented, infringed or misappropriated, or may be insufficient to permit us to preserve or improve our competitive position.

Our intellectual property includes a portfolio of in-licensed and Atreca-owned patents and patent applications, relating to our discovery platform and the novel immunotherapeutic product candidates developed using that platform, including compositions of matter, methods of use, methods of treatment, and kits. Our lead immunotherapeutic product candidate, ATRC-101, is a monoclonal antibody with preclinical anti-tumor activity and is a variant of an antibody identified using our discovery platform. We have filed multiple U.S. provisional patent applications relating to ATRC-101 and its variants. In February 2020, we filed a nonprovisional patent application in the U.S., an international patent application under the Patent Cooperation Treaty, and a patent application in Taiwan, each relating to ATRC-101 and its variants.

As of March 1, 2020, we own:

- § Issued patents in the U.S., Japan, and Singapore, and pending patent applications in the U.S. and in multiple foreign countries relating to our platform-related technology;
- § Pending U.S., Taiwan and international patent applications relating to ATRC-101 and other variants; and
- § Pending international patent application relating to our anti-malarial therapeutic antibodies.

As of March 1, 2020, we exclusively license from Stanford University relating to our platform-related technology:

- § Pending patent applications in the U.S. and in multiple foreign countries; and
- § Issued foreign patents in Europe, Japan, Korea, Australia, Mexico, New Zealand, Russia, Hong Kong, South Africa and Israel.

As of March 1, 2020, we co-own:

- § Pending international patent applications with collaborators relating to anti-HIV antibodies; and
- § Pending U.S. and European patent applications with a collaborator relating to anti-malarial antibodies.

Government Regulation

In the United States, biological products are subject to regulation under the Federal Food, Drug, and Cosmetic Act, and the Public Health Service Act, and other federal, state, local and foreign statutes and regulations. These laws and their corresponding regulations govern, among other things, the research, development, clinical trial, testing, manufacturing, safety, efficacy, labeling, packaging, storage, record keeping, distribution, reporting, advertising and other promotional practices involving biological products. FDA approval must be obtained before the marketing of biological products. The process of obtaining regulatory approvals and the subsequent compliance with appropriate federal, state, local and foreign statutes and regulations require the expenditure of substantial time and financial resources.

U.S. biological products development process

The process required by the FDA before a biological product may be marketed in the United States generally involves the following:

- § completion of nonclinical laboratory tests and animal studies according to Good Laboratory Practices, or GLP, and applicable requirements for the humane use of laboratory animals or other applicable regulations;
- § submission to the FDA of an application for an investigational new drug, or IND, which must become effective before human clinical trials may begin;
- § approval of the protocol and related documentation by an independent institutional review board, or IRB, or ethics committee at each clinical trial site before each study may be initiated;
- § performance of adequate and well-controlled human clinical trials according to the FDA's regulations commonly referred to as Good Clinical Practices, or GCPs, and any additional requirements for the protection of human research subjects and their health information, to establish the safety and efficacy of the proposed biological product for its intended use;
- § submission to the FDA of a Biologics License Application, or BLA, for marketing approval that includes substantive evidence of safety, purity, and potency from results of nonclinical testing and clinical trials;
- § payment of user fees for FDA review of the BLA (unless a fee waiver applies);
- § a determination by the FDA within 60 days of its receipt of a BLA whether or not to accept the filing for review;
- § satisfactory completion of an FDA inspection of the manufacturing facility or facilities where the biological product is produced to assess compliance with current Good Manufacturing Practices, or cGMP, to assure that the facilities, methods and controls are adequate to preserve the biological product's identity, strength, quality and purity;
- § potential FDA audit of the clinical trial sites or of the Sponsor that generated the data in support of the BLA; and
- § FDA review and approval, or licensure, including consideration of the views of any FDA advisory committee, of the BLA.

Before testing any biological product candidate in humans, the product candidate enters the preclinical testing stage. Preclinical tests, also referred to as nonclinical studies, include laboratory evaluations of product biological characteristics, chemistry, toxicity and formulation, as well as animal studies to assess the potential safety and activity of the product candidate. The conduct of the preclinical tests must comply with federal regulations and requirements including GLP.

The clinical trial sponsor must submit the results of the preclinical tests, together with manufacturing information, analytical data, any available clinical data or literature and a proposed clinical protocol, to the FDA as part of the IND. Some preclinical testing may continue even after the IND is submitted. An IND is a request for authorization from the FDA to ship an unapproved, investigational product in interstate commerce and to administer it to humans and must become effective before clinical trials may begin. The IND automatically becomes effective 30 days after receipt by the FDA, unless the FDA places the clinical trial on a clinical hold within that 30-day time period. In such a case, the IND sponsor and the FDA must resolve any outstanding concerns before the clinical trial can begin. The FDA also may impose clinical holds or partial clinical holds on a biological product candidate at any time before or during clinical trials due to, among other considerations, unreasonable and significant safety risk, inability to assess safety risk, lack of qualified investigators, a misleading or materially incomplete investigator brochure, or study design deficiencies. If the FDA imposes a clinical hold, studies may not recommence without FDA authorization and then only under terms authorized by the FDA. Accordingly, we cannot be sure that submission of an IND will result in the FDA allowing clinical trials to begin, or that, once begun, issues or circumstances will not arise that delay, suspend or terminate such studies.

Clinical trials involve the administration of the biological product candidate to healthy volunteers or patients under the supervision of qualified investigators, generally physicians not employed by or under the study sponsor's control. Clinical trials are conducted under protocols detailing, among other things, the objectives of the clinical trial,

dosing procedures, subject selection and exclusion criteria, and the parameters to be used to monitor subject safety, including stopping rules that assure a clinical trial will be stopped if certain adverse events should occur. Each protocol and any amendments to the protocol must be submitted to the FDA as part of the IND. Clinical trials must be conducted and monitored in accordance with the FDA's regulations comprising the GCP requirements, including the requirement that all research subjects provide informed consent. Further, each clinical trial and its related documentation must be reviewed and approved by an IRB at or servicing each institution at which the clinical trial will be conducted. An IRB is charged with protecting the welfare and rights of study participants and considers such items as whether the risks to individuals participating in the clinical trials are minimized and are reasonable in relation to anticipated benefits. The IRB also approves the form and content of the informed consent that must be signed by each clinical trial subject or his or her legal representative and must monitor the clinical trial until completed.

Clinical trials typically are conducted in three sequential phases that may overlap or be combined:

- § Phase 1. The biological product is initially introduced into healthy human subjects or patients and assessed for safety, side effect tolerability, biological activity, and early signs of efficacy.
- § Phase 2. The biological product is evaluated in a limited patient population to identify possible adverse effects and safety risks, to preliminarily evaluate the efficacy of the product for specific targeted diseases and to determine dosage tolerance, optimal dosage and dosing schedule.
- § Phase 3. Clinical trials are undertaken to further evaluate dosage, clinical efficacy, potency, and safety in an expanded patient population at geographically dispersed clinical trial sites. These randomized clinical trials are intended to establish the overall risk/benefit ratio of the product and provide an adequate basis for approval and physician labeling.

Post-approval clinical trials, sometimes referred to as Phase 4 clinical trials, may be conducted after initial marketing approval. These clinical trials are used to gain additional experience from the treatment of patients in the intended therapeutic indication, particularly for long-term safety follow-up.

During all phases of clinical development, the FDA requires extensive monitoring and auditing of all clinical activities, clinical data, and clinical trial investigators. Annual progress reports detailing the results of the clinical trials must be submitted to the FDA. Written IND safety reports must be promptly submitted to the FDA and the investigators for serious and unexpected adverse events, any findings from other studies, tests in laboratory animals or in vitro testing that suggest a significant risk for human subjects, or any clinically important increase in the rate of a serious suspected adverse reaction over that listed in the protocol or investigator brochure. The sponsor must submit an IND safety report within 15 calendar days after the sponsor determines that the information qualifies for reporting. The sponsor also must notify the FDA of any unexpected fatal or life-threatening suspected adverse reaction within seven calendar days after the sponsor's initial receipt of the information. Phase 1, Phase 2 and Phase 3 clinical trials may not be completed successfully within any specified period, if at all. The FDA or the sponsor, acting on its own or based on a recommendation from the sponsor's data safety monitoring board, may suspend a clinical trial at any time on various grounds, including a finding that the research subjects or patients are being exposed to an unacceptable health risk. Similarly, an IRB can suspend or terminate approval of a clinical trial at its institution if the clinical trial is not being conducted in accordance with the IRB's requirements or if the biological product has been associated with unexpected serious harm to patients.

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

U.S. review and approval processes

After the completion of clinical trials of a biological product, FDA approval of a BLA must be obtained before commercial marketing of the biological product. The BLA must include results of product development, laboratory and animal studies, human studies, information on the manufacture and composition of the product, proposed labeling and other relevant information.

Within 60 days following submission of the application, the FDA reviews a BLA submitted to determine if it is substantially complete before the FDA accepts it for filing. The FDA may refuse to file any BLA that it deems incomplete or not properly reviewable at the time of submission and may request additional information. In this event, the BLA must be resubmitted with the additional information. The resubmitted application also is subject to review before the FDA accepts it for filing. In most cases, the submission of a BLA is subject to a substantial application user fee, although the fee may be waived under certain circumstances. Under the performance goals and policies implemented by the FDA under the Prescription Drug User Fee Act, or PDUFA, for original BLAs, the FDA targets ten months from the filing date in which to complete its initial review of a standard application and respond to the applicant, and six months from the filing date for an application with priority review. The FDA does not always meet its PDUFA goal dates, and the review process is often significantly extended by FDA requests for additional information or clarification. This review in total typically takes twelve months from the date the BLA is submitted to the FDA because the FDA has approximately two months to make a filing decision. The review process and the PDUFA goal date may be extended by three months if the FDA requests or the BLA sponsor otherwise provides additional information or clarification regarding information already provided in the submission within the last three months before the PDUFA goal date.

Once the submission is accepted for filing, the FDA begins an in-depth substantive review of the BLA. The FDA reviews the BLA to determine, among other things, whether the proposed product is safe and potent, or effective, for its intended use, and has an acceptable purity profile, and whether the product is being manufactured in accordance with cGMP to assure and preserve the product's identity, safety, strength, quality, potency and purity. The FDA may refer applications for novel biological products or biological products that present difficult or novel questions of safety or efficacy to an advisory committee, typically a panel that includes clinicians and other experts, for review, evaluation and a recommendation as to whether the application should be approved and under what conditions. The FDA is not bound by the recommendations of an advisory committee, but it considers such recommendations carefully when making decisions. During the biological product approval process, the FDA also will determine whether a Risk Evaluation and Mitigation Strategy, or REMS, is necessary to assure the safe use of the biological product. If the FDA concludes a REMS is needed, the sponsor of the BLA must submit a proposed REMS; the FDA will not approve the BLA without a REMS, if required.

Before approving a BLA, the FDA typically will inspect the facilities at which the product is manufactured. The FDA will not approve the product unless it determines that the manufacturing processes and facilities are in compliance with cGMP requirements and adequate to assure consistent production of the product within required specifications. Additionally, before approving a BLA, the FDA will typically inspect one or more clinical sites to assure that the clinical trials were conducted in compliance with IND study requirements and GCP requirements. To assure cGMP and GCP compliance, an applicant must incur significant expenditure of time, money and effort in the areas of training, record keeping, production and quality control.

Under the Pediatric Research Equity Act, or PREA, as amended, a BLA or supplement to a BLA for a novel product (e.g., new active ingredient, new indication, etc.) must contain data to assess the safety and effectiveness of the biological product for the claimed indications in all relevant pediatric subpopulations and to support dosing and administration for each pediatric subpopulation for which the product is safe and effective. The FDA may grant deferrals for submission of data or full or partial waivers.

Notwithstanding the submission of relevant data and information, the FDA may ultimately decide that the BLA does not satisfy its regulatory criteria for approval and deny approval. Data obtained from clinical trials are not always conclusive and the FDA may interpret data differently than we interpret the same data. If the FDA decides not to approve the BLA in its present form, the FDA will issue a complete response letter that usually describes all of the

specific deficiencies in the BLA identified by the FDA. The deficiencies identified may be minor, for example, requiring labeling changes, or major, for example, requiring additional clinical trials. Additionally, the complete response letter may include recommended actions that the applicant might take to place the application in a condition for approval. If a complete response letter is issued, the applicant may either resubmit the BLA, addressing all of the deficiencies identified in the letter, or withdraw the application.

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

Expedited development and review programs

The FDA has various programs, including fast track designation, breakthrough therapy designation, accelerated approval and priority review, that are intended to expedite or simplify the process for the development and FDA review of drugs and biologics that are intended for the treatment of serious or life-threatening diseases or conditions. These programs do not change the standards for approval but may help expedite the development or approval process. To be eligible for fast track designation, new drugs and biological products must be intended to treat a serious or life-threatening condition and demonstrate the potential to address unmet medical needs for the condition. Fast track designation applies to the combination of the product and the specific indication for which it is being studied. The sponsor of a new drug or biologic may request the FDA to designate the drug or biologic as a fast track product at any time during the clinical development of the product. One benefit of fast track designation, for example, is that the FDA may consider for review sections of the marketing application for a product that has received fast track designation on a rolling basis before the complete application is submitted.

Under the FDA's breakthrough therapy program, products may be eligible for designation as a breakthrough therapy if they are intended, alone or in combination with one or more other drugs or biologics, to treat a serious or life-threatening disease or condition and preliminary clinical evidence demonstrates that such product may have substantial improvement on one or more clinically significant endpoints over existing therapies. The benefits of breakthrough therapy designation include the same benefits as fast track designation plus the FDA will seek to ensure the sponsor of a breakthrough therapy product receives timely advice and interactive communications to help the sponsor design and conduct a development program as efficiently as possible.

Any product is eligible for priority review if it has the potential to provide safe and effective therapy where no satisfactory alternative therapy exists or a significant improvement in the treatment, diagnosis or prevention of a disease compared to marketed products. The FDA will attempt to direct additional resources to the evaluation of an application for a new drug or biological product designated for priority review in an effort to facilitate the review. Under priority review, the FDA's goal is to review an application in six months once it is filed, compared to ten months for a standard review.

Additionally, a product may be eligible for accelerated approval. Drug or biological products studied for their safety and effectiveness in treating serious or life-threatening illnesses and that provide meaningful therapeutic benefit over existing treatments may receive accelerated approval, which means that they may be approved on the basis of adequate and well-controlled clinical trials establishing that the product has an effect on a surrogate endpoint that is reasonably likely to predict a clinical benefit, or on the basis of an effect on an intermediate clinical endpoint other than survival or irreversible morbidity. As a condition of approval, the FDA may require that a sponsor of a drug or biological product receiving accelerated approval perform adequate and well-controlled post-marketing clinical trials. In addition, the FDA currently requires as a condition for accelerated approval pre-approval of promotional materials, which could adversely impact the timing of the commercial launch of the product.

Post-approval requirements

Maintaining substantial compliance with applicable federal, state, and local statutes and regulations requires the expenditure of substantial time and financial resources. Rigorous and extensive FDA regulation of biological products continues after approval, particularly with respect to cGMP. As the manufacturer of our products we are required to comply with applicable requirements in the cGMP regulations, including quality control and quality assurance and maintenance of records and documentation. Other post-approval requirements applicable to biological products include reporting of cGMP deviations that may affect the identity, potency, purity and overall safety of a distributed product, record-keeping requirements, reporting of adverse effects, reporting updated safety and efficacy information, and complying with electronic record and signature requirements. After a BLA is approved, the product also may be subject to official lot release. As part of the manufacturing process, we are required to perform certain tests on each lot of the product before it is released for distribution. If the product is subject to official release by the FDA, we shall submit samples of each lot of product to the FDA together with a release protocol showing a summary of the history of manufacture of the lot and the results of all of the tests performed on the lot. The FDA also may perform certain confirmatory tests on lots of some products, such as viral vaccines, before releasing the lots for distribution. In addition, the FDA conducts laboratory research related to the regulatory standards on the safety, purity, potency, and effectiveness of biological products.

We also must comply with the FDA's advertising and promotion requirements, such as those related to direct-to-consumer advertising, the prohibition on promoting products for uses or in patient populations that are not described in the product's approved labeling (known as "off-label use"), industry-sponsored scientific and educational activities, and promotional activities involving the internet. Discovery of previously unknown problems or the failure to comply with the applicable regulatory requirements may result in restrictions on the marketing of a product or withdrawal of the product from the market as well as possible civil or criminal sanctions. Failure to comply with the applicable U.S. requirements at any time during the product development process, approval process or after approval may subject an applicant or manufacturer to administrative or judicial actions, civil or criminal sanctions and adverse publicity. FDA sanctions could include refusal to approve pending applications, withdrawal of an approval, license revocation, clinical holds, warning or untitled letters, product recalls, product seizures, total or partial suspension of production or distribution, injunctions, fines, refusals of government contracts, mandated corrective advertising or communications with doctors or other stakeholders, debarment, restitution, disgorgement of profits, or civil or criminal penalties. Any agency or judicial enforcement action could have a material adverse effect on us.

Biological product manufacturers and other entities involved in the manufacture and distribution of approved biological products are required to register their establishments with the FDA and certain state agencies, and are subject to periodic unannounced inspections by the FDA and certain state agencies for compliance with cGMP and other laws. Accordingly, manufacturers must continue to expend time, money, and effort in the area of production and quality control to maintain cGMP compliance. Discovery of problems with a product after approval may result in restrictions on a product, manufacturer, or holder of an approved BLA, including withdrawal of the product from the market. In addition, changes to the manufacturing process or facility generally require prior FDA approval before being implemented and other types of changes to the approved product, such as adding new indications and additional labeling claims, are also subject to further FDA review and approval.

Government regulation outside of the United States

Whether or not we obtain FDA approval for a product, we must obtain the requisite approvals from regulatory authorities in foreign countries prior to the commencement of clinical trials or marketing of the product in those countries. Certain countries outside of the United States have a similar process that requires the submission of a clinical trial application, or CTA, much like the IND prior to the commencement of human clinical trials. In the European Union, for example, a CTA must be submitted for each clinical trial to each country's national health authority and an independent ethics committee, much like the FDA and an IRB, respectively. Once the CTA is approved in accordance with a country's requirements, the corresponding clinical trial may proceed.

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

Other Healthcare Laws

In addition to FDA restrictions on marketing of pharmaceutical and biological products, several other types of state and federal laws have been applied to restrict certain general business and marketing practices in the biopharmaceutical industry in recent years. These laws include, among others, anti-kickback statutes, false claims statutes and other healthcare laws and regulations, some of which are described below.

The federal Anti-Kickback Statute prohibits, among other things, knowingly and willfully offering, paying, soliciting or receiving remuneration to induce, or in return for, purchasing, leasing, ordering or arranging for the purchase, lease or order of any healthcare item or service reimbursable under Medicare, Medicaid, or other federally financed healthcare programs. The Patient Protection and Affordable Care Act as amended by the Health Care and Education Reconciliation Act, collectively, the ACA, amended the intent element of the federal statute so that a person or entity no longer needs to have actual knowledge of the statute or specific intent to violate it in order to commit a violation. This statute has been interpreted to apply to arrangements between pharmaceutical manufacturers on the one hand and prescribers, purchasers and formulary managers, among others, on the other. Although there are a number of statutory exceptions and regulatory safe harbors protecting certain common activities from prosecution or other regulatory sanctions, the exceptions and safe harbors are drawn narrowly, and practices that involve remuneration intended to induce prescribing, purchases or recommendations may be subject to scrutiny if they do not qualify for an exception or safe harbor.

Federal civil and criminal false claims laws, including the federal civil False Claims Act, prohibit any person or entity from knowingly presenting, or causing to be presented, a false claim for payment to the federal government, or knowingly making, or causing to be made, a false statement to have a false claim paid. This includes claims made to programs where the federal government reimburses, such as Medicare and Medicaid, as well as programs where the federal government is a direct purchaser, such as when it purchases off the Federal Supply Schedule. Recently, several pharmaceutical and other healthcare companies have been prosecuted under these laws for allegedly inflating drug prices they report to pricing services, which in turn were used by the government to set Medicare and Medicaid reimbursement rates, and for allegedly providing free product to customers with the expectation that the customers would bill federal programs for the product. In addition, certain marketing practices, including off-label promotion, may also violate false claims laws. Additionally, the ACA amended the federal Anti-Kickback Statute such that a violation of that statute can serve as a basis for liability under the federal civil False Claims Act. Most states also have statutes or regulations similar to the federal Anti-Kickback Statute and civil False Claims Act, which apply to items and services reimbursed under Medicaid and other state programs, or, in several states, apply regardless of the payor.

Other federal statutes pertaining to healthcare fraud and abuse include the civil monetary penalties statute, which prohibits, among other things, the offer or payment of remuneration to a Medicaid or Medicare beneficiary that the offeror or payor knows or should know is likely to influence the beneficiary to order a receive a reimbursable item or service from a particular supplier, and the additional federal criminal statutes created by the Health Insurance Portability and Accountability Act of 1996, or HIPAA, which prohibits, among other things, knowingly and willfully executing or attempting to execute a scheme to defraud any healthcare benefit program or obtain by means of false or fraudulent pretenses, representations or promises any money or property owned by or under the control of any healthcare benefit program 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 of 2009, or HITECH, and their respective implementing regulations, including the Final Omnibus Rule published on January 25, 2013, impose obligations on certain healthcare providers, health plans, and healthcare clearinghouses, known as covered entities, as well as their business associates that perform certain services involving the storage, use or disclosure of individually identifiable health information, including mandatory contractual terms, with respect to safeguarding the privacy, security, and transmission of individually identifiable health information, and require notification to affected individuals and regulatory authorities of certain breaches of security of individually identifiable health information.

HITECH increased the civil and criminal penalties that may be imposed against covered entities, business associates and possibly other persons, and gave state attorneys general new authority to file civil actions for damages or injunctions in federal courts to enforce the federal HIPAA laws and seek attorneys' fees and costs associated with pursuing federal civil actions. In addition, many state laws govern the privacy and security of health information in certain circumstances, many of which differ from each other in significant ways and may not have the same effect, and often are not pre-empted by HIPAA.

Further, pursuant to the federal Physician Payments Sunshine Act, created as part of the ACA, certain manufacturers of prescription drugs are required to collect and report annually to the Centers for Medicare & Medicaid Services, or CMS, information on certain payments or transfers of value to physicians and teaching hospitals, as well as investment interests held by physicians and their immediate family members. Failure to submit required information may result in civil monetary penalties. Effective January 1, 2022, reporting on transfers of value to physician assistants, nurse practitioners or clinical nurse specialists, certified registered nurse anesthetists, and certified nurse-midwives will also be required.

In addition, several states now require biopharmaceutical manufacturers to report certain expenses relating to the marketing and promotion of drug products and to report gifts and payments to individual healthcare practitioners in these states. Other states prohibit various marketing-related activities, such as the provision of certain kinds of gifts or meals. Still other states require the posting of information relating to clinical studies and their outcomes. Some states require the reporting of certain drug pricing information, including information pertaining to and justifying price increases, or prohibit prescription drug price gouging. In addition, some states require pharmaceutical companies to implement compliance programs or marketing codes. Certain states and local jurisdictions also require the registration of pharmaceutical sales representatives.

Efforts to ensure that business arrangements with third parties comply with applicable healthcare laws and regulations involve substantial costs. If a biopharmaceutical manufacturer's operations are found to be in violation of any such requirements, it may be subject to significant penalties, including civil, criminal and administrative penalties, damages, fines, disgorgement, imprisonment, the curtailment or restructuring of its operations, loss of eligibility to obtain approvals from the FDA, exclusion from participation in government contracting, healthcare reimbursement or other federal or state government healthcare programs, including Medicare and Medicaid, integrity oversight and reporting obligations, and reputational harm. Although effective compliance programs can mitigate the risk of investigation and prosecution for violations of these laws, these risks cannot be entirely eliminated. Any action for an alleged or suspected violation can cause a drug company to incur significant legal expenses and divert management's attention from the operation of the business, even if such action is successfully defended.

U.S. healthcare reform

In the United States there have been, and continue to be, proposals by the federal government, state governments, regulators and third party payors to control or manage the increased costs of healthcare and, more generally, to reform the U.S. healthcare system. The biopharmaceutical industry has been a particular focus of these efforts and has been significantly affected by major legislative initiatives. For example, in March 2010, the ACA was enacted, which intended to broaden access to health insurance, reduce or constrain the growth of healthcare spending, enhance remedies against fraud and abuse, add new transparency requirements for the healthcare and health insurance industries, impose new taxes and fees on the health industry and impose additional health policy reforms, substantially changed the way healthcare is financed by both governmental and private insurers, and significantly impacts the U.S. pharmaceutical industry. The ACA, among other things, (i) subjected therapeutic biologics to potential competition by lower-cost biosimilars by creating a licensure framework for follow-on biologic products, (ii) proscribed a new methodology by which rebates owed by manufacturers under the Medicaid Drug Rebate Program are calculated for drugs and therapeutic biologics that are inhaled, infused, instilled, implanted or injected, (iii) increased the minimum Medicaid rebates owed by manufacturers under the Medicaid Drug Rebate Program and extended the rebate program to individuals enrolled in Medicaid managed care organizations, (iv) established annual nondeductible fees and taxes on manufacturers of certain branded prescription drugs and therapeutic biologics, apportioned among these entities according to their market share in certain government healthcare programs (v) established a new Medicare Part D coverage gap discount program, in which manufacturers must agree to offer 50% (now 70%) point-of-sale discounts off

negotiated prices of applicable brand drugs and therapeutic biologics to eligible beneficiaries during their coverage gap period, as a condition for the manufacturer's outpatient drugs and therapeutic biologics to be covered under Medicare Part D, (vi) expanded eligibility criteria for Medicaid programs by, among other things, allowing states to offer Medicaid coverage to additional individuals and by adding new mandatory eligibility categories for individuals with income at or below 133% of the federal poverty level, thereby potentially increasing manufacturers' Medicaid rebate liability, (vii) expanded the entities eligible for discounts under the Public Health program (viii) created a new Patient-Centered Outcomes Research Institute to oversee, identify priorities in, and conduct comparative clinical effectiveness research, along with funding for such research, and (ix) established a Center for Medicare Innovation at CMS to test innovative payment and service delivery models to lower Medicare and Medicaid spending, potentially including prescription drug spending.

The Trump administration and Congress have, and we expect they will continue to, seek to modify, repeal, or otherwise invalidate all, or certain provisions of, the ACA. Since January 2017, the Trump administration has issued two executive orders and other directives designed to delay the implementation of certain provisions of the ACA or otherwise circumvent some of the requirements for health insurance mandated by the ACA. For example, on October 12, 2017, the Trump administration issued an executive order that expands the use of association health plans and allows anyone to purchase short-term health plans that provide temporary, limited insurance. This executive order also calls for the halt of federal payments to health insurers for cost-sharing reductions previously available to lower-income Americans to afford coverage. There is still uncertainty with respect to the impact this executive order could have on coverage and reimbursement for healthcare items and services covered by plans that were authorized 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 the Tax Act, among other things, included a provision that 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". Additionally, on January 22, 2018, the current U.S. presidential administration signed a continuing resolution on appropriations for fiscal year 2018 that delayed the implementation of certain ACA-mandated fees, including the so-called "Cadillac" tax on certain high cost employer-sponsored insurance plans, the annual fee imposed on certain health insurance providers based on market share, and the medical device excise tax on non-exempt medical devices. Further, the Bipartisan Budget Act of 2018, or the BBA, among other things, amended the ACA, effective January 1, 2019, to increase from 50% to 70% the point-of-sale discount that is owed by pharmaceutical manufacturers who participate in Medicare Part D and to close the coverage gap in most Medicare drug plans, commonly referred to as the "donut hole". More recently, 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.

In addition, other legislative changes have been proposed and adopted in the United States since the ACA was enacted to reduce healthcare expenditures. On August 2, 2011, the Budget Control Act of 2011 among other things, created measures for spending reductions by Congress. A joint select committee on deficit reduction, tasked with recommending a targeted deficit reduction of at least \$1.2 trillion for the years 2013 through 2021, was unable to reach required goals, thereby triggering the legislation's automatic reduction to several government programs. This includes aggregate reductions of Medicare payments to providers of 2% per fiscal year. These reductions went into effect on April 1, 2013 and, due to subsequent legislative amendments to the statute, including the BBA, will remain in effect through 2027 unless additional Congressional action is taken. Moreover, on January 2, 2013, the American Taxpayer Relief Act of 2012 was signed into law, which, among other things, further reduced Medicare payments to several types of providers, including hospitals, imaging centers and cancer treatment centers, and increased the statute of limitations period for the government to recover overpayments to providers from three to five years.

Payment methodologies also may be subject to changes in healthcare legislation and regulatory initiatives. For example, the Medicare Prescription Drug, Improvement, and Modernization Act of 2003, or MMA, changed the way Medicare covers and pays for pharmaceutical products. The legislation expanded Medicare coverage for drug purchases by the elderly and introduced a new reimbursement methodology based on average sales prices for physician-administered drugs. In addition, this legislation provided authority for limiting the number of drugs that will be covered in any therapeutic class. While the MMA only applies to drug benefits for Medicare beneficiaries, private payors often follow Medicare coverage policy and payment limitations in setting their own reimbursement rates. Therefore, any reduction in reimbursement that results from the MMA may result in a similar reduction in payments from private payors.

Recently there has been heightened governmental scrutiny over the manner in which biopharmaceutical manufacturers set prices for their marketed products, which has resulted in several Congressional inquiries and proposed and enacted federal and state legislation designed to, among other things, bring more transparency to product pricing, review the relationship between pricing and manufacturer patient programs, and reform government program reimbursement methodologies for drug products. At the federal level, the Trump administration's budget proposal for fiscal year 2019 contains further drug price control measures that could be enacted during the 2019 budget process or in other future legislation, including, for example, measures to permit Medicare Part D plans to negotiate the price of certain drugs under Medicare Part B, to allow some states to negotiate drug prices under Medicaid, and to eliminate cost sharing for generic drugs for low-income patients. Additionally, on May 11, 2018, the Trump administration laid out the administration's "Blueprint" to reduce the cost of prescription medications while preserving innovation and cures. While the Department of Health and Human Services, or HHS, is soliciting feedback on some of these measures, other actions may be immediately implemented by HHS under existing authority. Further, on January 31, 2019, the HHS Office of Inspector General, proposed modifications to the federal Anti-Kickback Statute discount safe harbor for the purpose of reducing the cost of drug products to consumers which, among other things, if finalized, will affect discounts paid by manufacturers to Medicare Part D plans, Medicaid managed care organizations and pharmacy benefit managers working with these organizations. Although a number of these, and other potential, proposals will require additional authorization to become effective, Congress and the Trump administration have each indicated that it will continue to seek new legislative or administrative measures to control drug costs. At the state level, legislatures are increasingly passing legislation and implementing regulations designed to control pharmaceutical and biological product pricing, including price or patient reimbursement constraints, discounts, restrictions on certain product access and marketing cost disclosure and transparency measures, and, in some cases, designed to encourage importation from other countries and bulk purchasing.

Coverage, pricing and reimbursement

Significant uncertainty exists as to the coverage and reimbursement status of biopharmaceutical products approved by the FDA and other government authorities. Sales of any approved products will depend, in part, on the extent to which the costs of the products will be covered by third-party payors, including government health programs in the United States such as Medicare and Medicaid, commercial health insurers and managed care organizations. The process for determining whether a payor will provide coverage for a product may be separate from the process for setting the price or reimbursement rate that the payor will pay for the product once coverage is approved. Third-party payors are increasingly challenging the prices charged, examining the medical necessity and reviewing the cost-effectiveness of medical products and services and imposing controls to manage costs. Third-party payors may also limit coverage to specific products on an approved list, or formulary, which might not include all of the approved products for a particular indication.

In the United States, no uniform policy of coverage and reimbursement for products exists among third-party payors. Third-party payors often rely upon Medicare coverage policy and payment limitations in setting their reimbursement rates, but also have their own methods and approval process apart from Medicare determinations. Therefore, coverage and reimbursement for products in the United States can differ significantly from payor to payor. In order to secure coverage and reimbursement for any biological product that is approved for sale, a biopharmaceutical manufacturer may need to conduct expensive pharmacoeconomic studies in order to demonstrate the medical necessity and cost-effectiveness of the product. A payor's decision to provide coverage for a drug or biological product does not

imply that an adequate reimbursement rate will be approved. Third-party reimbursement may not be sufficient to maintain price levels high enough to realize an appropriate return on investment in product development.

The containment of healthcare costs also has become a priority of federal, state and foreign governments and the prices of drugs have been a focus in this effort. Governments have shown significant interest in implementing cost-containment programs, including price controls, restrictions on reimbursement and requirements for substitution of generic products. Adoption of price controls and cost-containment measures, and adoption of more restrictive policies in jurisdictions with existing controls and measures, could further limit a company's revenue generated from the sale of any approved drug or biological product. Coverage policies and third-party reimbursement rates may change at any time. Even if favorable coverage and reimbursement status is attained for one or more drug or biological products for which a company or its collaborators receive marketing approval, less favorable coverage policies and reimbursement rates may be implemented in the future.

Employees

As of December 31, 2019, we had 113 full-time employees, 81 of whom were primarily engaged in research and development activities and 41 of whom had an M.D. or Ph.D. degree. None of our employees are represented by a labor union or covered by a collective bargaining agreement.

Corporate Information

We were incorporated under the laws of the state of Delaware in 2010 under the name Atreca, Inc. Our principal executive offices are located at 450 East Jamie Court, South San Francisco, CA 94080. Our telephone number is (650) 595-2595. Our website address is www.atreca.com. Information contained on, or that can be accessed through, our website is not incorporated by reference into this report, and you should not consider information on our website to be part of this report.

The Atreca design logo, "Atreca" and our other registered or common law trademarks, service marks, or trade names appearing in this Form 10-K are the property of Atreca, Inc. Other trade names, trademarks and service marks used in this Form 10-K are the property of their respective owners. Solely for convenience, trademarks and trade names referred to in this Form 10-K may appear without the ® or ™ symbols.

Legal Proceedings

From time to time, we may become involved in litigation relating to claims arising from the ordinary course of business. Our management believes that there are currently no claims or actions pending against us, the ultimate disposition of which would have a material adverse effect on our results of operations, financial condition or cash flows.

Available Information

Our Annual Report on Form 10-K, Quarterly Reports on Form 10-Q, Current Reports on Form 8-K, and amendments to reports filed pursuant to Sections 13(a) and 15(d) of the Exchange Act are filed with the U.S. Securities and Exchange Commission, or SEC. We are subject to the informational requirements of the Exchange Act and file or furnish reports, proxy statements and other information with the SEC. Such reports and other information filed by us with the SEC are available free of charge on our website at ir.atreca.com when such reports are available on the SEC's website. The SEC maintains an internet site that contains reports, proxy and information statements and other information regarding issuers that file electronically with the SEC at www.sec.gov. The information contained on the websites referenced in this Form 10-K is not incorporated by reference into this filing. Further, our references to website URLs are intended to be inactive textual references only.

Item 1A. Risk Factors

Our business and investing in our Class A common stock involves a high degree of risk. You should consider and read carefully all of the risks and uncertainties described below, as well as other information included in this Annual Report on Form 10-K, including our consolidated financial statements and related notes and “Management’s Discussion and Analysis of Financial Condition and Results of Operations,” before deciding whether to invest in our Class A common stock. The risks described below are not the only ones facing us. The occurrence of any of the following risks or additional risks and uncertainties not presently known to us or that we currently believe to be immaterial could materially and adversely affect our business, financial condition, results of operations, prospects and stock price. In such case, the market price of our Class A common stock could decline, and you may lose all or part of your original investment. Additional risks and uncertainties not presently known to us or that we currently deem immaterial may also impair our business operations and the market price of our common stock. This Annual Report on Form 10-K also contains forward-looking statements and estimates that involve risks and uncertainties. Our actual results could differ materially from those anticipated in the forward-looking statements as a result of specific factors, including the risks and uncertainties described below.

Risks Related to Our Business

We are a clinical-stage biopharmaceutical company with a history of losses. We expect to continue to incur significant losses for the foreseeable future and may never achieve or maintain profitability, which could result in a decline in the market value of our Class A common stock.

We are a clinical-stage biopharmaceutical company with a history of losses. Since our inception, we have devoted substantially all of our resources to research and development, raising capital, building our management team and building our intellectual property portfolio, and we have incurred significant operating losses. As of December 31, 2019, and 2018, we had accumulated deficits of \$164.1 million and \$96.6 million, respectively. For the years ended December 31, 2019 and 2018, our net losses were \$67.5 million and \$37.9 million, respectively. Substantially all of our losses have resulted from expenses incurred in connection with our research and development programs and from general and administrative costs associated with our operations. To date, we have not generated any revenue from product sales, and we have not sought or obtained regulatory approval for any product candidate. Furthermore, we do not expect to generate any revenue from product sales for the foreseeable future, and we expect to continue to incur significant operating losses for the foreseeable future due to the cost of research and development, preclinical studies and clinical trials and the regulatory approval process for our current and potential future product candidates.

We expect our net losses to increase substantially as we enter into clinical development of our lead product candidate, ATRC-101. However, the amount of our future losses is uncertain. Our ability to achieve or sustain profitability, if ever, will depend on, among other things, successfully developing product candidates, obtaining regulatory approvals to market and commercialize product candidates, manufacturing any approved products on commercially reasonable terms, entering into potential future partnerships, establishing a sales and marketing organization or suitable third-party alternatives for any approved product and raising sufficient funds to finance business activities. If we, or our potential future partners, are unable to commercialize one or more of our product candidates, or if sales revenue from any product candidate that receives approval is insufficient, we will not achieve or sustain profitability, which could have a material and adverse effect on our business, financial condition, results of operations and prospects. Any predictions you make about our future success or viability may not be as accurate as they could be if we had a history of successfully developing and commercializing pharmaceutical products.

ATRC-101 is in clinical trials. It may fail in development or suffer delays that materially and adversely affect its commercial viability.

In February 2020, we initiated a Phase 1b clinical trial for ATRC-101 in patients with solid tumors. We have no products on the market or that have gained regulatory approval. Other than ATRC-101, we currently have no product candidates and none of our potential future product candidates have ever been tested in humans. Our ability to achieve and sustain profitability depends on obtaining regulatory approvals for and successfully commercializing product candidates, either alone or with partners.

Before obtaining regulatory approval for the commercial distribution of product candidates, we or a partner must conduct extensive preclinical studies, followed by clinical trials to demonstrate the safety and efficacy of our product candidates in humans. We cannot be certain of the timely completion or outcome of our preclinical studies and cannot predict if the FDA or other regulatory authorities will accept our proposed clinical programs or if the outcome of our preclinical studies will ultimately support the further development of our preclinical programs. As a result, we cannot be sure that we will be able to submit INDs or similar applications for our preclinical programs on the timelines we expect, if at all, and we cannot be sure that submission of INDs or similar applications will result in the FDA or other regulatory authorities allowing clinical trials to begin.

ATRC-101 is in early clinical development, and we are subject to the risks of failure inherent in the development of product candidates based on novel approaches, targets and mechanisms of action. Accordingly, you should consider our prospects in light of the costs, uncertainties, delays and difficulties frequently encountered by clinical stage biopharmaceutical companies such as ours.

We may not have the financial resources to continue development of, or to enter into new collaborations for, ATRC-101 or any potential future product candidates. This may be exacerbated if we experience any issues that delay or prevent regulatory approval of, or our ability to commercialize, a product candidate, such as:

- § negative or inconclusive results from our clinical trials or the clinical trials of others for product candidates similar to ours, leading to a decision or requirement to conduct additional preclinical studies or clinical trials or abandon a program;
- § product-related side effects experienced by participants in our clinical trials or by individuals using drugs or therapeutic antibodies similar to ours;
- § delays in submitting IND applications or comparable foreign applications, or delays or failure in obtaining the necessary approvals from regulators to commence a clinical trial, or a suspension or termination of a clinical trial once commenced;
- § conditions imposed by the FDA, or other regulatory authorities regarding the scope or design of our clinical trials;
- § delays in enrolling research subjects in clinical trials;
- § high drop-out rates of research subjects;
- § inadequate supply or quality of product candidate components or materials or other supplies necessary for the conduct of our clinical trials;
- § greater-than-anticipated clinical trial costs;
- § poor effectiveness of our product candidates during clinical trials;
- § unfavorable FDA or other regulatory agency inspection and review of a clinical trial or manufacture site;
- § failure of our third-party contractors or investigators to comply with regulatory requirements or otherwise meet their contractual obligations in a timely manner, or at all;
- § delays and changes in regulatory requirements, policies and guidelines; or
- § the FDA or other regulatory agencies interpreting our data differently than we do.

Further, we and our potential future partners may never receive approval to market and commercialize any product candidate. Even if we or a potential future partner obtains regulatory approval, the approval may be for targets, disease indications or patient populations that are not as broad as we intended or desired or may require labeling that includes significant use or distribution restrictions or safety warnings. We or a potential future partner may be subject to post-marketing testing requirements to maintain regulatory approval.

ATRC-101 may not demonstrate the combination of safety and efficacy necessary to become approvable or commercially viable.

We may ultimately discover that ATRC-101 does not possess certain properties that we currently believe are helpful for therapeutic effectiveness and safety. For example, although ATRC-101 has exhibited encouraging results in animal studies, including anti-tumor activity and safety, it may not demonstrate the same properties in humans and may interact with human biological systems in unforeseen, ineffective or harmful ways. As a result, we may never succeed in developing a marketable product based on ATRC-101. If ATRC-101 or any of our potential future product candidates

prove to be ineffective, unsafe or commercially unviable, our entire pipeline could have little, if any, value, which could require us to change our focus and approach to antibody discovery and development, which would have a material and adverse effect on our business, financial condition, results of operations and prospects.

Failure to successfully validate, develop and obtain regulatory approval for companion diagnostics for our product candidates could harm our drug development strategy and operational results.

As one of the elements of our clinical development approach, we may seek to develop lab-based tests to screen and identify subsets of patients who are more likely to benefit from our product candidates, more commonly referred to as companion diagnostics. To achieve this, we may seek to develop and commercialize such companion diagnostics ourselves or through third-party collaborators. Companion diagnostics are generally developed in conjunction with clinical programs for the associated product and can be helpful in enrolling patients in clinical studies who are more likely to respond to the specific therapeutic being developed. The approval of a companion diagnostic as part of the product label could limit the use of the product candidate to those patients who are more likely to benefit from our product candidate.

Companion diagnostics are subject to regulation by the FDA and other regulatory authorities as medical devices and require separate clearance or approval prior to their commercialization. To date, the FDA has required premarket approval of all companion diagnostics for oncology therapies. We and our third-party collaborators may encounter difficulties in developing and obtaining approval for these companion diagnostics. Any delay or failure by us or third-party collaborators to develop or obtain regulatory approval of a companion diagnostic could delay or prevent approval of our related product candidates. The time and cost associated with developing a companion diagnostic may not prove to have been necessary in order to successfully market the product.

We may not be successful in our efforts to use and expand our discovery platform to build a pipeline of product candidates.

A key element of our strategy is to use and expand our discovery platform to build a pipeline of product candidates and progress these product candidates through clinical development for the treatment of various diseases. Although our research and development efforts to date have resulted in our discovery and preclinical development of ATRC-101, ATRC-101 may not be safe or effective as a cancer treatment, and we may not be able to develop any other product candidates. Our discovery platform is evolving and may not reach a state at which building a pipeline of product candidates is possible. Even if we are successful in building our pipeline of product candidates, the potential product candidates that we identify may not be suitable for clinical development or generate acceptable clinical data, including as a result of being shown to have unacceptable toxicity or other characteristics that indicate that they are unlikely to be products that will receive marketing approval from the FDA or other regulatory authorities or achieve market acceptance. If we do not successfully develop and commercialize product candidates, we will not be able to generate product revenue in the future.

Our approach to developing and identifying our antibodies using our discovery platform is novel and unproven and may not result in marketable products.

We plan to develop a pipeline of product candidates using our discovery platform. We believe that we may be able to overcome certain key limitations of the current oncology drug discovery paradigm by focusing on an active human anti-tumor immune response that develops over time. However, our scientific research that forms the basis of our efforts to discover product candidates based on our discovery platform is ongoing. Further, the scientific evidence to support the feasibility of developing therapeutic antibodies based on our platform has not been established. We may not be correct in our beliefs about the differentiated nature of our platform to competing technologies, and our platform may not prove to be superior. If our discovery platform is not able to develop approved antibody constructs that are effective at the necessary speed or scale, it could have a material and adverse effect on our business, financial condition, results of operations and prospects.

The market may not be receptive to our current or potential future product candidates, and we may not generate any revenue from the sale or licensing of our product candidates.

Even if regulatory approval is obtained for a product candidate, including ATRC-101, we may not generate or sustain revenue from sales of the product. Market acceptance of our current and potential future product candidates will depend on, among other factors:

- § the timing of our receipt of any marketing and commercialization approvals;
- § the terms of any approvals and the countries in which approvals are obtained;
- § the safety and efficacy of our product candidates;
- § the prevalence and severity of any adverse side effects associated with our product candidates;
- § limitations or warnings contained in any labeling approved by the FDA or other regulatory authority;
- § relative convenience and ease of administration of our product candidates;
- § the success of our physician education programs;
- § the availability of coverage and adequate government and third-party payor reimbursement;
- § the pricing of our products, particularly as compared to alternative treatments; and
- § availability of alternative effective treatments for the disease indications our product candidates are intended to treat and the relative risks, benefits and costs of those treatments.

If any product candidate we commercialize fails to achieve market acceptance, it could have a material and adverse effect on our business, financial condition, results of operations and prospects.

If there are undesirable side effects caused by ATRC-101 or any potential future product candidate in clinical trials or after receiving marketing approval, our ability to market and derive revenue from the product candidate could be compromised.

Undesirable side effects caused by ATRC-101 or any potential future product candidate could cause regulatory authorities to interrupt, delay or halt clinical trials and could result in a more restrictive label or the delay or denial of regulatory approval by the FDA or other regulatory authorities. It is likely that there will be side effects associated with the use of ATRC-101 or any potential future product candidate. Results of our clinical trials could reveal a high and unacceptable severity and prevalence of these side effects. In such an event, our trials could be suspended or terminated and the FDA or other regulatory authorities could order us to cease further development of or deny approval of a product candidate for any or all targeted indications. Such side effects could also affect patient recruitment or the ability of enrolled patients to complete the trial or result in potential product liability claims. Any of these occurrences may materially and adversely affect our business and financial condition and impair our ability to generate revenues.

Further, clinical trials by their nature utilize a sample of the potential patient population. With a limited number of patients and limited duration of exposure, rare and severe side effects of a product candidate may only be uncovered when a significantly larger number of patients are exposed to the product candidate or when patients are exposed for a longer period of time.

In the event that any of our current or potential future product candidates receive regulatory approval and we or others identify undesirable side effects caused by one of these products, any of the following adverse events could occur, which could result in the loss of significant revenue to us and materially and adversely affect our results of operations and business:

- § regulatory authorities may withdraw their approval of the product or seize the product;
- § we may be required to recall the product or change the way the product is administered to patients;
- § additional restrictions may be imposed on the marketing of the particular product or the manufacturing processes for the product or any component thereof;
- § we may be subject to fines, injunctions or the imposition of civil or criminal penalties;
- § regulatory authorities may require the addition of labeling statements, such as a “black box” warning or a contraindication;

- § we may be required to create a Medication Guide outlining the risks of such side effects for distribution to patients;
- § we could be sued and held liable for harm caused to patients;
- § the product may become less competitive; and
- § our reputation may suffer.

We will need substantial additional funds to advance development of product candidates and our discovery platform, and we cannot guarantee that we will have sufficient funds available in the future to develop and commercialize our current or potential future product candidates.

The development of biopharmaceutical product candidates is capital-intensive. If ATRC-101 or potential future product candidates advance through preclinical studies and clinical trials, we will need substantial additional funds to expand our development, regulatory, manufacturing, marketing and sales capabilities. We have used substantial funds to develop our discovery platform and ATRC-101 and will require significant funds to continue to develop our discovery platform and conduct further research and development, including preclinical studies and clinical trials of ATRC-101 and additional potential future product candidates, to seek regulatory approvals for ATRC-101 and potential future product candidates and to manufacture and market products, if any, that are approved for commercial sale. In addition, we expect to incur additional costs associated with operating as a public company.

As of December 31, 2019, we had \$183.4 million in cash, cash equivalents, and investments. Based on our current operating plan, we believe that our cash and cash equivalents as of December 31, 2019 will be sufficient to fund our operations through the end of 2021. Our future capital requirements and the period for which we expect our existing resources to support our operations may vary significantly from what we expect. Our monthly spending levels vary based on new and ongoing research and development and other corporate activities. Because the length of time and activities associated with successful research and development of product candidates is highly uncertain, we are unable to estimate the actual funds we will require for development and any approved marketing and commercialization activities. The timing and amount of our operating expenditures will depend largely on:

- § the timing and progress of preclinical and clinical development activities;
- § the timing and progress of our development of our discovery platform;
- § the price and pricing structure that we are able to obtain from our third-party contract manufacturers to manufacture our preclinical study and clinical trial materials and supplies;
- § the number and scope of preclinical and clinical programs we decide to pursue;
- § our ability to maintain our current licenses and research and development programs and to establish new collaborations;
- § the progress of the development efforts of parties with whom we may in the future enter into collaboration and research and development agreements;
- § the costs involved in obtaining, maintaining, enforcing and defending patents and other intellectual property rights;
- § the cost and timing of regulatory approvals; and
- § our efforts to enhance operational systems, secure sufficient laboratory space and hire additional personnel, including personnel to support development of our product candidates and satisfy our obligations as a public company.

To date, we have primarily financed our operations through the sale of equity securities and payments and other income received under discovery services agreements not related to our primary business. We may seek to raise any necessary additional capital through a combination of public or private equity offerings, debt financings, collaborations, strategic alliances, licensing arrangements and other marketing and distribution arrangements. We cannot assure you that we will be successful in acquiring additional funding at levels sufficient to fund our operations or on terms favorable to us. If we are unable to obtain adequate financing when needed, we may have to delay, reduce the scope of or suspend one or more of our preclinical studies, clinical trials, research and development programs or commercialization efforts. Because of the numerous risks and uncertainties associated with the development and commercialization of our current and potential future product candidates and the extent to which we may enter into collaborations with third parties to participate in their development and commercialization, we are unable to estimate the amounts of increased capital

outlays and operating expenditures associated with our current and anticipated preclinical studies and clinical trials. To the extent that we raise additional capital through collaborations, strategic alliances or licensing arrangements with third parties, we may have to relinquish valuable rights to our current and potential future product candidates, future revenue streams or research programs or to grant licenses on terms that may not be favorable to us. If we do raise additional capital through public or private equity or convertible debt offerings, the ownership interest of our existing stockholders will be diluted, and the terms of these securities may include liquidation or other preferences that adversely affect our stockholders' rights. If we raise additional capital through debt financing, we may be subject to covenants limiting or restricting our ability to take specific actions, such as incurring additional debt, making capital expenditures or declaring dividends.

We do not expect to realize revenue from product sales or royalties from licensed products in the foreseeable future, if at all, and unless and until our current and potential future product candidates are clinically tested, approved for commercialization and successfully marketed.

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

Because we have limited financial and managerial resources, we intend to focus our efforts on specific research and development programs, including clinical development of ATRC-101. As a result, we may forgo or delay pursuit of other opportunities, including with potential future product candidates that later prove to have greater commercial potential. Our resource allocation decisions may cause us to fail to capitalize on viable commercial products or profitable market opportunities. Our spending on current and future research and development programs and product candidates for specific indications may not yield any commercially viable product candidates. If we do not accurately evaluate the commercial potential or target market for a particular product candidate, we may relinquish valuable rights to that product candidate through partnership, licensing or other royalty arrangements in cases in which it would have been more advantageous for us to retain sole development and commercialization rights to such product candidate.

We have obtained rights to use human samples in furtherance of our research and development of our current and potential future product candidates. However, if we fail to obtain appropriate consent or exceed the scope of the permission to use these samples, we may become liable for monetary damages for, obligated to pay continuing royalties for or required to cease usage of the samples.

We begin our discovery process by gathering samples from patients. While we attempt to ensure that we, our study site partners or other providers have obtained these samples with informed consent and all necessary permissions, there is a risk that one or more patients or their representatives may assert that we have either failed to obtain informed consent or exceeded the scope of permission to use the patient's sample. We cannot guarantee that we would succeed in establishing that we had informed consent or appropriate permission, if a patient or patient representative contested the matter. In such circumstances, we could be required to pay monetary damages, to pay a continuing royalty on any products created or invented by analyzing the patient's sample or even to cease using the sample and any and all materials derived from or created through analysis of the sample, any of which could result in a change to our business plan and materially harm our business, financial condition, results of operations and prospects.

We may not be able to enter into strategic transactions on acceptable terms, if at all, which could adversely affect our ability to develop and commercialize current and potential future product candidates, impact our cash position, increase our expense, and present significant distractions to our management.

From time to time, we may consider strategic transactions, such as collaborations, acquisitions of companies, asset purchases, joint ventures and out- or in-licensing of product candidates or technologies. For example, we will evaluate and, if strategically attractive, seek to enter into collaborations, including with biotechnology or biopharmaceutical companies or hospitals. The competition for partners is intense, and the negotiation process is time-consuming and complex. If we are not able to enter into strategic transactions, we may not have access to required liquidity or expertise to further develop our potential future product candidates or our discovery platform. Any such collaboration, or other strategic transaction, may require us to incur non-recurring or other charges, increase our near- and long-term expenditures and pose significant integration or implementation challenges or disrupt our management or

business. We may acquire additional technologies and assets, form strategic alliances or create joint ventures with third parties that we believe will complement or augment our existing business, but we may not be able to realize the benefit of acquiring such assets. Conversely, any new collaboration that we do enter into may be on terms that are not optimal for us. These transactions would entail numerous operational and financial risks, including:

- § exposure to unknown liabilities;
- § disruption of our business and diversion of our management's time and attention in order to manage a collaboration or develop acquired products, product candidates or technologies;
- § incurrence of substantial debt or dilutive issuances of equity securities to pay transaction consideration or costs;
- § higher-than-expected collaboration, acquisition or integration costs, write-downs of assets or goodwill or impairment charges, increased amortization expenses;
- § difficulty and cost in facilitating the collaboration or combining the operations and personnel of any acquired business;
- § impairment of relationships with key suppliers, manufacturers or customers of any acquired business due to changes in management and ownership; and
- § the inability to retain key employees of any acquired business.

Accordingly, although there can be no assurance that we will undertake or successfully complete any transactions of the nature described above, any transactions that we do complete may be subject to the foregoing or other risks and our business could be materially harmed by such transactions. Conversely, any failure to enter any collaboration or other strategic transaction that would be beneficial to us could delay the development and potential commercialization of our product candidates and have a negative impact on the competitiveness of any product candidate that reaches market.

In addition, to the extent that any of our future partners were to terminate a collaboration agreement, we may be forced to independently develop our current and future product candidates, including funding preclinical studies or clinical trials, assuming marketing and distribution costs and maintaining, enforcing and defending intellectual property rights, or, in certain instances, abandon product candidates altogether, any of which could result in a change to our business plan and materially harm our business, financial condition, results of operations and prospects.

If third parties on which we intend to rely to conduct certain preclinical studies, or any future clinical trials, do not perform as contractually required, fail to satisfy regulatory or legal requirements or miss expected deadlines, our development program could be delayed with material and adverse impacts on our business and financial condition.

We intend to rely on third-party clinical investigators, contract research organizations, or CROs, clinical data management organizations and consultants to design, conduct, supervise and monitor certain preclinical studies and any clinical trials. Because we intend to rely on these third parties and will not have the ability to conduct certain preclinical studies or clinical trials independently, we will have less control over the timing, quality and other aspects of such preclinical studies and clinical trials than we would have had we conducted them on our own. These investigators, CROs and consultants will not be our employees and we will have limited control over the amount of time and resources that they dedicate to our programs. These third parties may have contractual relationships with other entities, some of which may be our competitors, which may draw time and resources from our programs. The third parties with which we may contract might not be diligent, careful or timely in conducting our preclinical studies or clinical trials, resulting in the preclinical studies or clinical trials being delayed or unsuccessful.

If we cannot contract with acceptable third parties on commercially reasonable terms, or at all, or if these third parties do not carry out their contractual duties, satisfy legal and regulatory requirements for the conduct of preclinical studies or clinical trials or meet expected deadlines, our clinical development programs could be delayed and otherwise adversely affected. In all events, we will be responsible for ensuring that each of our preclinical studies and clinical trials are conducted in accordance with the general investigational plan and protocols for the trial. The FDA may require preclinical studies to be conducted in accordance with good laboratory practices and clinical trials to be conducted in accordance with good clinical practices, including for designing, conducting, recording and reporting the results of preclinical studies and clinical trials to ensure that data and reported results are credible and accurate and that the rights,

integrity and confidentiality of clinical trial participants are protected. Our reliance on third parties that we do not control will not relieve us of these responsibilities and requirements. Any adverse development or delay in our clinical trials could have a material and adverse impact on our commercial prospects and may impair our ability to generate revenue.

Clinical trials are expensive, time-consuming and difficult to design and implement.

Human clinical trials are expensive and difficult to design and implement, in part because they are subject to rigorous regulatory requirements. Because our current and potential future product candidates are based on new technologies and discovery approaches, we expect that they will require extensive research and development and have substantial manufacturing and processing costs. In addition, costs to treat patients and to treat potential side effects that may result from our product candidates may be significant. Accordingly, our clinical trial costs are likely to be high and could have a material and adverse effect on our business, financial condition, results of operations and prospects.

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

We may not be able to initiate or continue clinical trials for our current or potential future product candidates if we are unable to locate and enroll a sufficient number of eligible patients to participate in these trials as required by the FDA or other regulatory authorities. In particular, we initiated a Phase 1b clinical trial for ATRC-101 in patients with a limited number of tumor types. We cannot predict how difficult it will be to enroll patients for trials in these indications. We may experience difficulties in patient enrollment in our clinical trials for a variety of reasons. The enrollment of patients depends on many factors, including:

- § the severity of the disease under investigation;
- § the patient eligibility criteria defined in the clinical trial protocol;
- § the size of the patient population required for analysis of the trial's primary endpoints;
- § the proximity and availability of clinical trial sites for prospective patients;
- § the patient referral practices of physicians;
- § our ability to recruit clinical trial investigators with the appropriate competencies and experience;
- § clinicians' and patients' perceptions as to the potential advantages of the product candidate being studied in relation to other available therapies, including any new drugs that may be approved for the indications we are investigating;
- § our ability to obtain and maintain patient consents; and
- § the risk that patients enrolled in clinical trials will drop out of the trials before completion.

In addition, our future clinical trials will compete with other clinical trials for product candidates that are in the same therapeutic areas as our product candidates, and this competition will reduce the number and types of patients available to us, because some patients who might have opted to enroll in our trials may instead opt to enroll in a trial being conducted by one of our competitors. Since the number of qualified clinical investigators is limited, we expect to conduct some of our clinical trials at the same clinical trial sites that some of our competitors use, which will reduce the number of patients who are available for our clinical trials at such clinical trial sites. Additionally, because some of our clinical trials will be in patients with advanced solid tumors, the patients are typically in the late stages of the disease and may experience disease progression or adverse events independent from our product candidates, making them unevaluable for purposes of the trial and requiring additional enrollment. Delays in patient enrollment may result in increased costs or may affect the timing or outcome of the planned clinical trials, which could prevent completion of these trials and adversely affect our ability to advance the development of our product candidates.

We may not be able to conduct, or contract others to conduct, animal testing in the future, which could harm our research and development activities.

Certain laws and regulations relating to drug development require us to test our product candidates on animals before initiating clinical trials involving humans. Animal testing activities have been the subject of controversy and adverse publicity. Animal rights groups and other organizations and individuals have attempted to stop animal testing activities by pressing for legislation and regulation in these areas and by disrupting these activities through protests and

other means. To the extent the activities of these groups are successful, our research and development activities may be interrupted or delayed.

Because we may rely on third parties for manufacturing and supply of our product candidates, some of which are or may be sole source vendors, for preclinical and clinical development materials and commercial supplies, our supply may become limited or interrupted or may not be of satisfactory quantity or quality.

We currently rely on third-party contract manufacturers for our preclinical and future clinical trial product materials and supplies. We do not produce any meaningful quantity of our product candidates for preclinical and clinical development, and we do not currently own manufacturing facilities for producing such supplies. Furthermore, some of our manufacturers represent our sole source of supplies of preclinical and future clinical development materials, including our source for the manufacture of ATRC-101. We cannot assure you that our preclinical or future clinical development product supplies and commercial supplies will not be limited or interrupted, especially with respect to our sole source third-party manufacturing and supply partners, or will be of satisfactory quality or continue to be available at acceptable prices. In particular, any replacement of our manufacturers could require significant effort and expertise because there may be a limited number of qualified replacements. For our current and future sole source third-party manufacturing and supply partners, we may be unable to negotiate binding agreements with them or find replacement manufacturers to support our preclinical and future clinical activities at commercially reasonable terms in the event that their services to us becomes interrupted for any reason. We do not currently have arrangements in place for a redundant or second-source supply for our sole source vendors in the event they cease to provide their products or services to us or do not timely provide sufficient quantities to us. Establishing additional or replacement sole source vendors, if required, may not be accomplished quickly. Any delays resulting from manufacturing or supply interruptions associated with our reliance on third-party manufacturing and supply partners, including those that are sole source, could impede, delay, limit or prevent our drug development efforts, which could harm our business, result of operations, financial condition and prospects.

The manufacturing process for a product candidate is subject to FDA and other regulatory authority review. Suppliers and manufacturers must meet applicable manufacturing requirements and undergo rigorous facility and process validation tests required by regulatory authorities in order to comply with regulatory standards, such as current Good Manufacturing Practices, or cGMP. In the event that any of our manufacturers fails to comply with such requirements or to perform its obligations to us in relation to quality, timing or otherwise, or if our supply of components or other materials becomes limited or interrupted for other reasons, we may be forced to manufacture the materials ourselves, for which we currently do not have the capabilities or resources, or enter into an agreement with another third party, which we may not be able to do on reasonable terms, or at all. In some cases, the technical skills or technology required to manufacture our current and future product candidates may be unique or proprietary to the original manufacturer and we may have difficulty transferring such skills or technology to another third party and a feasible alternative may not exist. These factors would increase our reliance on such manufacturer or require us to obtain a license from such manufacturer in order to have another third party manufacture our product candidates. If we are required to change manufacturers for any reason, we will be required to verify that the new manufacturer maintains facilities and procedures that comply with quality standards and with all applicable regulations and guidelines. The delays associated with the verification of a new manufacturer could negatively affect our ability to develop product candidates in a timely manner or within budget.

We also expect to rely on third-party manufacturers if we receive regulatory approval for any product candidate. We have existing, and may enter into future, manufacturing arrangements with third parties. We will depend on these third parties to perform their obligations in a timely manner consistent with contractual and regulatory requirements, including those related to quality control and assurance. If we are unable to obtain or maintain third-party manufacturing for any product candidate, or to do so on commercially reasonable terms, we may not be able to develop and commercialize our product candidates successfully. Our or a third party's failure to execute on our manufacturing requirements and comply with cGMP could adversely affect our business in a number of ways, including:

- § an inability to initiate or continue clinical trials of product candidates under development;
- § delay in submitting regulatory applications, or receiving regulatory approvals, for product candidates;
- § loss of the cooperation of a potential future partner;

- § subjecting third-party manufacturing facilities or our potential future manufacturing facilities to additional inspections by regulatory authorities;
- § requirements to cease distribution or to recall batches of product candidates; and
- § in the event of approval to market and commercialize a product candidate, an inability to meet commercial demands for our products.

Our third-party manufacturers may be unable to successfully scale manufacturing of ATRC-101 or potential future product candidates in sufficient quality and quantity, which would delay or prevent us from developing product candidates and commercializing approved products, if any.

In order to conduct clinical trials for ATRC-101 as well as any potential future product candidates, we will need to manufacture large quantities of these product candidates. We may continue to and currently expect to use third parties for our manufacturing needs. Our manufacturing partners may be unable to successfully increase the manufacturing capacity for any current or potential future product candidate in a timely or cost-effective manner, or at all. In addition, quality issues may arise during scale-up activities. If our manufacturing partners are unable to successfully scale the manufacture of any current or potential future product candidate in sufficient quality and quantity, the development, testing and clinical trials of that product candidate may be delayed or infeasible, and regulatory approval or commercial launch of any potential resulting product may be delayed or not obtained, which could significantly harm our business.

If the market opportunities for our current and potential future product candidates, including ATRC-101, are smaller than we believe they are, our future product revenues may be adversely affected and our business may suffer.

Our understanding of the number of people who suffer from certain types of cancers and tumors that may be able to be treated with antibodies that have been and may in the future be identified by our discovery platform, including ATRC-101, is based on estimates. These estimates may prove to be incorrect, and new studies may reduce the estimated incidence or prevalence of these diseases. The number of patients in the United States or elsewhere may turn out to be lower than expected, may not be otherwise amenable to treatment with our current or potential future product candidates or patients may become increasingly difficult to identify and access, all of which would adversely affect our business prospects and financial condition. In particular, the treatable population for ATRC-101 may further be reduced if our estimates of addressable populations are erroneous or sub-populations of patients do not derive benefit from ATRC-101.

Further, there are several factors that could contribute to making the actual number of patients who receive our current or potential future product candidates less than the potentially addressable market. These include the lack of widespread availability of, and limited reimbursement for, new therapies in many underdeveloped markets.

We face competition from entities that have developed or may develop product candidates for the treatment of the diseases that we may target, including companies developing novel treatments and technology platforms. If these companies develop technologies or product candidates more rapidly than we do, or if their technologies or product candidates are more effective, our ability to develop and successfully commercialize product candidates may be adversely affected.

The development and commercialization of drugs and therapeutic biologics is highly competitive. We compete with a variety of large pharmaceutical companies, multinational biopharmaceutical companies, other biopharmaceutical companies and specialized biotechnology companies, as well as technology being developed at universities and other research institutions. Our competitors are often larger and better funded than we are. Our competitors have developed, are developing or will develop product candidates and processes competitive with ours. Competitive therapeutic treatments include those that have already been approved and accepted by the medical community and any new treatments that are currently in development or that enter the market. We believe that a significant number of products are currently under development, and may become commercially available in the future, for the treatment of conditions for which we may try to develop product candidates. There is intense and rapidly evolving competition in the biotechnology, biopharmaceutical and antibody and immuno-oncology fields. We believe that while our discovery platform, its associated intellectual property, the characteristics of ATRC-101 and potential future product candidates and our scientific and technical know-how together give us a competitive advantage in this space, competition from many sources remains.

We are aware of a number of companies that are developing antibodies for the treatment of cancer. Many of these companies are well-capitalized and, in contrast to us, have significant clinical experience, and may include our future partners. In addition, these companies compete with us in recruiting scientific and managerial talent. Our success will partially depend on our ability to obtain, maintain, enforce and defend patents and other intellectual property rights with respect to antibodies that are safer and more effective than competing products. Our commercial opportunity and success will be reduced or eliminated if competing products that are safer, more effective, or less expensive than the antibodies we develop are or become available.

We expect to compete with antibody, biologics and other therapeutic platforms and development companies, including, but not limited to, companies such as Adaptive Biotechnologies Corporation, AIMM Therapeutics B.V., Neurimmune Holding AG, OncoReponse, Inc., and Vir Biotechnology, Inc. In addition, we expect to compete with large, multinational pharmaceutical companies that discover, develop and commercialize antibodies and other therapeutics for use in treating cancer such as AstraZeneca plc, Bristol-Myers Squibb Company, Genentech, Inc. and Merck & Co., Inc. If ATRC-101 or potential future product candidates are eventually approved, they will compete with a range of treatments that are either in development or currently marketed. For example, we expect that ATRC-101 and our potential future product candidates may compete against traditional cancer therapies, such as chemotherapy, as well as cell-based treatments for cancer, such as CAR-T therapies.

Many of our competitors have significantly greater financial, technical, manufacturing, marketing, sales and supply resources or experience than we do. If we successfully obtain approval for any product candidate, we will face competition based on many different factors, including the safety and effectiveness of our products, the ease with which our products can be administered, the timing and scope of regulatory approvals for these products, the availability and cost of manufacturing, marketing and sales capabilities, price, reimbursement coverage and patent position. Competing products could present superior treatment alternatives, including by being more effective, safer, less expensive or marketed and sold more effectively than any products we may develop. Competitive products may make any product we develop obsolete or noncompetitive before we recover the expense of developing and commercializing such product. Such competitors could also recruit our employees, which could negatively impact our level of expertise and our ability to execute our business plan.

Any inability to attract and retain qualified key management, technical personnel and employees would impair our ability to implement our business plan.

Our success largely depends on the continued service of key management, advisors and other specialized personnel, including John A. Orwin, our president and chief executive officer, and Tito A. Serafini, our chief strategy officer and founder. We have a written employment agreement with each of Mr. Orwin and Dr. Serafini. The loss of one or more members of our executive team, management team or other key employees or advisors could delay our research and development programs and have a material and adverse effect on our business, financial condition, results of operations and prospects.

The relationships that our key managers have cultivated within our industry make us particularly dependent upon their continued employment with us. We are dependent on the continued service of our technical personnel because of the highly technical nature of our product candidates and technologies and the specialized nature of the regulatory approval process. Because our management team and key employees are not obligated to provide us with continued service, they could terminate their employment with us at any time without penalty. Our future success will depend in large part on our continued ability to attract and retain other highly qualified scientific, technical and management personnel, as well as personnel with expertise in clinical testing, manufacturing, governmental regulation and commercialization. We face competition for personnel from other companies, universities, public and private research institutions, government entities and other organizations.

As of December 31, 2019, we had 113 full-time employees. Our focus on the development of ATRC-101 and potential future product candidates will require adequate staffing. We may need to hire and retain new employees to execute our future clinical development and manufacturing plans. We cannot provide assurance that we will be able to hire or retain adequate staffing levels to develop our current and potential future product candidates or run our operations or to accomplish all of our objectives.

We may experience difficulties in managing our growth and expanding our operations.

We have limited experience in product development. As our current and potential future product candidates enter and advance through preclinical studies and any clinical trials, we will need to expand our development, regulatory and manufacturing capabilities or contract with other organizations to provide these capabilities for us. We may also experience difficulties in the discovery and development of new potential future product candidates using our discovery platform if we are unable to meet demand as we grow our operations. In the future, we also expect to have to manage additional relationships with collaborators, suppliers and other organizations. Our ability to manage our operations and future growth will require us to continue to improve our operational, financial and management controls, reporting systems and procedures and secure adequate facilities for our operational needs. We may not be able to implement improvements to our management information and control systems in an efficient or timely manner and may discover deficiencies in existing systems and controls.

If any of our product candidates is approved for marketing and commercialization in the future and we are unable to develop sales, marketing and distribution capabilities on our own or enter into agreements with third parties to perform these functions on acceptable terms, we will be unable to successfully commercialize any such future products.

We currently have no sales, marketing or distribution capabilities or experience. We will need to develop internal sales, marketing and distribution capabilities to commercialize each current and potential future product candidate that gains FDA approval, which would be expensive and time-consuming, or enter into partnerships with third parties to perform these services. If we decide to market any approved products directly, we will need to commit significant financial and managerial resources to develop a marketing and sales force with technical expertise and supporting distribution, administration and compliance capabilities. If we rely on third parties with such capabilities to market any approved products or decide to co-promote products with partners, we will need to establish and maintain marketing and distribution arrangements with third parties, and there can be no assurance that we will be able to enter into such arrangements on acceptable terms or at all. In entering into third-party marketing or distribution arrangements, any revenue we receive will depend upon the efforts of the third parties and we cannot assure you that such third parties will establish adequate sales and distribution capabilities or be successful in gaining market acceptance for any approved product. If we are not successful in commercializing any product approved in the future, either on our own or through third parties, our business and results of operations could be materially and adversely affected.

Our future growth may depend, in part, on our ability to operate in foreign markets, where we would be subject to additional regulatory burdens and other risks and uncertainties.

Our future growth may depend, in part, on our ability to develop and commercialize product candidates in foreign markets for which we may rely on partnership with third parties. We will not be permitted to market or promote any product candidate before we receive regulatory approval from the applicable regulatory authority in a foreign market, and we may never receive such regulatory approval for any product candidate. To obtain separate regulatory approval in foreign countries, we generally must comply with numerous and varying regulatory requirements of such countries regarding safety and efficacy and governing, among other things, clinical trials and commercial sales, pricing and distribution of a product candidate, and we cannot predict success in these jurisdictions. If we obtain approval of any of our current or potential future product candidates and ultimately commercialize any such product candidate in foreign markets, we would be subject to risks and uncertainties, including the burden of complying with complex and changing foreign regulatory, tax, accounting and legal requirements and the reduced protection of intellectual property rights in some foreign countries.

Price controls imposed in foreign markets may adversely affect our future profitability.

In some countries, particularly member states of the European Union, the pricing of prescription drugs is subject to governmental control. In these countries, pricing negotiations with governmental authorities can take considerable time after receipt of marketing approval for a product. In addition, there can be considerable pressure exerted by governments and other stakeholders on prices and reimbursement levels, including as part of cost-containment measures. Political, economic and regulatory developments, in the United States or internationally, may

further complicate pricing negotiations, and pricing negotiations may continue after reimbursement has been obtained. Reference pricing used by various European Union member states and parallel distribution, or arbitrage between low-priced and high-priced member states, can further reduce prices. In some countries, we or future partners may be required to conduct clinical trials or other studies that compare the cost-effectiveness of a product candidate to other available therapies in order to obtain or maintain reimbursement or pricing approval. Publication of discounts by third-party payors or authorities may lead to further pressure on the prices or reimbursement levels within the country of publication and other countries. If reimbursement of any current or potential future product candidate that is approved for marketing in the future is unavailable or limited in scope or amount, or if pricing is set at unsatisfactory levels, our business and results of operations or prospects could be materially and adversely affected and our ability to commercialize such product candidate could be materially impaired.

Our business entails a significant risk of product liability, and our inability to obtain sufficient insurance coverage could have a material and adverse effect on our business, financial condition, results of operations and prospects.

As we move into conducting clinical trials of ATRC-101 or potential future product candidates, we will be exposed to significant product liability risks inherent in the development, testing, manufacturing and marketing of antibody treatments. Product liability claims could delay or prevent completion of our development programs. If we succeed in marketing products, such claims could result in an FDA investigation of the safety and effectiveness of our products, our manufacturing processes and facilities or our marketing programs and potentially a recall of our products or more serious enforcement action, limitations on the approved indications for which they may be used or suspension or withdrawal of approvals. Regardless of the merits or eventual outcome, liability claims may also result in decreased demand for our products, injury to our reputation, costs to defend the related litigation, a diversion of management's time and our resources, substantial monetary awards to trial participants or patients and a decline in our stock price. Any insurance we have or may obtain may not provide sufficient coverage against potential liabilities. Furthermore, clinical trial and product liability insurance is becoming increasingly expensive. As a result, our partners or we may be unable to obtain sufficient insurance at a reasonable cost to protect us against losses caused by product liability claims that could have a material and adverse effect on our business, financial condition, results of operations and prospects.

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

We are exposed to the risk of fraud or other misconduct by our employees, principal investigators, consultants and commercial partners. Misconduct by employees could include intentional failures to comply with FDA regulations, provide accurate information to the FDA, comply with manufacturing standards we may establish, comply with federal and state healthcare fraud and abuse laws and regulations, report financial information or data accurately or disclose unauthorized activities to us. In particular, sales, marketing and business arrangements in the healthcare industry are subject to extensive laws and regulations intended to prevent fraud, kickbacks, self-dealing and other abusive practices. These laws and regulations may restrict or prohibit a wide range of pricing, discounting, marketing and promotion, sales commission, customer incentive programs and other business arrangements. Such misconduct could also involve the improper use of information obtained in the course of clinical trials, which could result in regulatory sanctions and serious harm to our reputation. For example, individuals conducting the non-interventional clinical studies that we sponsor through which we obtain antibodies for development into potential antibody-based therapeutics may violate applicable laws and regulations regarding patients' personal data. It is not always possible to identify and deter misconduct, and the precautions we take to detect and prevent this activity may not be effective in controlling unknown or unmanaged risks or losses or in protecting us from governmental investigations or other actions or lawsuits stemming from a failure to be in compliance with such laws or regulations. If any such actions are instituted against us, and we are not successful in defending ourselves or asserting our rights, those actions could have a material and adverse effect on our business and financial condition, including the imposition of significant criminal, civil, and administrative fines or other sanctions, such as monetary penalties, damages, fines, disgorgement, imprisonment, exclusion from participation in government-funded healthcare programs, such as Medicare and Medicaid, integrity obligations, reputational harm and the curtailment or restructuring of our operations.

Failure to comply with health and data protection laws and regulations could lead to government enforcement actions (which could include civil or criminal penalties), private litigation or adverse publicity and could negatively affect our operating results and business.

We and our current and potential collaborators may be subject to federal, state and foreign data protection laws and regulations (*i.e.*, laws and regulations that address privacy and data security). In the United States, numerous federal and state laws and regulations, including federal health information privacy laws (*e.g.*, the Health Insurance Portability and Accountability Act, or HIPAA, as amended by the Health Information Technology for Economic and Clinical Health Act, or HITECH), state data breach notification laws, state health information privacy laws and federal and state consumer protection laws (*e.g.*, Section 5 of the Federal Trade Commission Act), that govern the collection, use, disclosure and protection of health-related and other personal information could apply to our operations or the operations of our collaborators. In addition, we may obtain health information from third parties (including research institutions from which we obtain clinical trial data) that are subject to privacy and security requirements under the HIPAA, as amended by HITECH, or other privacy and data security laws. Depending on the facts and circumstances, we could be subject to criminal penalties if we knowingly obtain, use, or disclose individually identifiable health information maintained by a HIPAA-covered entity in a manner that is not authorized or permitted by HIPAA.

International data protection laws, including Regulation 2016/679, known as the General Data Protection Regulation (GDPR) may also apply to health-related and other personal information obtained outside of the United States. The GDPR went into effect on May 25, 2018. The GDPR introduced new data protection requirements in the European Union, as well as potential fines for noncompliant companies of up to the greater of e20 million or 4% of annual global revenue. The regulation imposes numerous new requirements for the collection, use and disclosure of personal information, including more stringent requirements relating to consent and the information that must be shared with data subjects about how their personal information is used, the obligation to notify regulators and affected individuals of personal data breaches, extensive new internal privacy governance obligations and obligations to honor expanded rights of individuals in relation to their personal information (*e.g.*, the right to access, correct and delete their data). In addition, the GDPR includes restrictions on cross-border data transfers. The GDPR will increase our responsibility and liability in relation to personal data that we process where such processing is subject to the GDPR, and we may be required to put in place additional mechanisms to ensure compliance with the GDPR, including as implemented by individual countries. Further, the United Kingdom's vote in favor of exiting the EU, often referred to as Brexit, has created uncertainty with regard to data protection regulation in the United Kingdom. In particular, it is unclear how data transfers to and from the United Kingdom will be regulated.

In addition, California recently enacted the California Consumer Privacy Act (CCPA), which creates new individual privacy rights for California consumers (as defined in the law) and places increased privacy and security obligations on entities handling personal data of consumers or households. The CCPA will require covered companies to provide new disclosure to consumers about such companies' data collection, use and sharing practices, provide such consumers new ways to opt-out of certain sales or transfers of personal information, and provide consumers with additional causes of action. The CCPA goes into effect on January 1, 2020, and the California Attorney General may bring enforcement actions for violations beginning July 1, 2020. The CCPA was amended on September 23, 2018, and it remains unclear what, if any, further modifications will be made to this legislation or how it will be interpreted. As currently written, the CCPA may impact our business activities and exemplifies the vulnerability of our business to the evolving regulatory environment related to personal data and protected health information.

Compliance with U.S. and international data protection laws and regulations could require us to take on more onerous obligations in our contracts, restrict our ability to collect, use and disclose data, or in some cases, impact our ability to operate in certain jurisdictions. Failure to comply with U.S. and international data protection laws and regulations could result in government enforcement actions (which could include civil or criminal penalties), private litigation or adverse publicity and could negatively affect our operating results and business. Moreover, clinical trial subjects about whom we or our potential collaborators obtain information, as well as the providers who share this information with us, may contractually limit our ability to use and disclose the information. Claims that we have violated individuals' privacy rights, failed to comply with data protection laws, or breached our contractual obligations, even if we are not found liable, could be expensive and time consuming to defend and could result in adverse publicity that could harm our business.

If we experience security or data privacy breaches or other unauthorized or improper access to, use of, or destruction of our proprietary or confidential data, employee data or personal data, we may face costs, significant liabilities, harm to our brand and business disruption.

In connection with our discovery platform and efforts, we may collect and use a variety of personal data, such as name, mailing address, email addresses, phone number and clinical trial information. Although we have extensive measures in place to prevent the sharing and loss of patient data in our sample collection process associated with our discovery platform, any failure to prevent or mitigate security breaches or improper access to, use of, or disclosure of our clinical data or patients' personal data could result in significant liability under state (*e.g.*, state breach notification laws), federal (*e.g.*, HIPAA, as amended by HITECH), and international law (*e.g.*, the GDPR). Any failure to prevent or mitigate security breaches or improper access to, use of, or disclosure of our clinical data or patients' personal data may cause a material adverse impact to our reputation, affect our ability to conduct new studies and potentially disrupt our business. We may also rely on third-party service providers to host or otherwise process some of our data and that of users, and any failure by such third party to prevent or mitigate security breaches or improper access to or disclosure of such information could have similarly adverse consequences for us. If we are unable to prevent or mitigate the impact of such security or data privacy breaches, we could be exposed to litigation and governmental investigations, which could lead to a potential disruption to our business.

We depend on sophisticated information technology systems to operate our business and a cyber-attack or other breach of these systems could have a material adverse effect on our business.

We rely on information technology systems that we or our third-party vendors operate to process, transmit and store electronic information in our day-to-day operations. The size and complexity of our information technology systems makes them vulnerable to a cyber-attack, malicious intrusion, breakdown, destruction, loss of data privacy or other significant disruption. A successful attack could result in the theft or destruction of intellectual property, data, or other misappropriation of assets, or otherwise compromise our confidential or proprietary information and disrupt our operations. Cyber-attacks are becoming more sophisticated and frequent. We have invested in our systems and the protection and recoverability of our data to reduce the risk of an intrusion or interruption, and we monitor and test our systems on an ongoing basis for any current or potential threats. There can be no assurance that these measures and efforts will prevent future interruptions or breakdowns. If we or our third-party vendors fail to maintain or protect our information technology systems and data integrity effectively or fail to anticipate, plan for or manage significant disruptions to these systems, we or our third-party vendors could have difficulty preventing, detecting and controlling such cyber-attacks and any such attacks could result in losses described above as well as disputes with physicians, patients and our partners, regulatory sanctions or penalties, increases in operating expenses, expenses or lost revenues or other adverse consequences, any of which could have a material adverse effect on our business, results of operations, financial condition, prospects and cash flows.

Our information technology systems could face serious disruptions that could adversely affect our business.

Our information technology and other internal infrastructure systems, including corporate firewalls, servers, leased lines and connection to the internet, face the risk of systemic failure that could disrupt our operations. A significant disruption in the availability of our information technology and other internal infrastructure systems could cause interruptions and delays in our research and development work.

If we do not comply with laws regulating the protection of the environment and health and human safety, our business could be adversely affected.

Our research, development and manufacturing involves the use of hazardous materials and various chemicals. We maintain quantities of various flammable and toxic chemicals in our facilities that are required for our research, development and manufacturing activities. We are subject to federal, state and local laws and regulations governing the use, manufacture, storage, handling and disposal of these hazardous materials. We believe our procedures for storing, handling and disposing of these materials in our facilities comply with the relevant guidelines of the state of California and the Occupational Safety and Health Administration of the U.S. Department of Labor. Although we believe that our safety procedures for handling and disposing of these materials comply with the standards mandated by applicable

regulations, the risk of accidental contamination or injury from these materials cannot be eliminated. If an accident occurs, we could be held liable for resulting damages, which could be substantial. We are also subject to numerous environmental, health and workplace safety laws and regulations, including those governing laboratory procedures, exposure to blood-borne pathogens and the handling of animals and biohazardous materials. Although we maintain workers' compensation insurance to cover us for costs and expenses we may incur due to injuries to our employees resulting from the use of these materials, this insurance may not provide adequate coverage against potential liabilities. Although we have some environmental liability insurance covering certain of our facilities, we may not maintain adequate insurance for all environmental liability or toxic tort claims that may be asserted against us in connection with our storage or disposal of biological or hazardous materials. Additional federal, state and local laws and regulations affecting our operations may be adopted in the future. We may incur substantial costs to comply with, and substantial fines or penalties if we violate, any of these laws or regulations.

Our current operations are concentrated in one location, and we or the third parties upon whom we depend may be adversely affected by natural or other disasters and our business continuity and disaster recovery plans may not adequately protect us from a serious disaster.

Our current operations are concentrated in the San Francisco Bay Area. Any unplanned event, such as flood, fire, explosion, extreme weather condition, medical epidemics, power shortage, telecommunication failure or other natural or manmade accidents or incidents that result in us being unable to fully utilize our facilities or the manufacturing facilities of our third-party contract manufacturers, or lose our repository of blood-based and other valuable laboratory samples, may have a material and adverse effect on our ability to operate our business, particularly on a daily basis, and have significant negative consequences on our financial and operating conditions. Loss of access to these facilities may result in increased costs, delays in the development of our product candidates or interruption of our business operations. Natural disasters such as earthquakes or wildfires, both of which are prevalent in Northern California, floods or tsunamis could further disrupt our operations, and have a material negative impact on our business, financial condition, results of operations and prospects. If a natural disaster, power outage or other event occurred that prevented us from using all or a significant portion of our headquarters, that damaged critical infrastructure, such as our research facilities or the manufacturing facilities of our third-party contract manufacturers, or that otherwise disrupted operations, it may be difficult or, in certain cases, impossible, for us to continue our business for a substantial period of time. The disaster recovery and business continuity plans we have in place may prove inadequate in the event of a serious disaster or similar event. We may incur substantial expenses as a result of the limited nature of our disaster recovery and business continuity plans, which could have a material adverse effect on our business. As part of our risk management policy, we maintain insurance coverage at levels that we believe are appropriate for our business. However, in the event of an accident or incident at these facilities, we cannot assure you that the amounts of insurance will be sufficient to satisfy any damages and losses. If our facilities, or the manufacturing facilities of our third-party contract manufacturers, are unable to operate because of an accident or incident or for any other reason, even for a short period of time, any or all of our research and development programs may be harmed. Any business interruption may have a material and adverse effect on our business and financial condition.

Risks Related to Our Intellectual Property

If we are unable to obtain or protect intellectual property rights related to our technology and current or future product candidates, or if our intellectual property rights are inadequate, we may not be able to compete effectively.

Our success depends in part on our ability to obtain and maintain protection for our owned and in-licensed intellectual property rights and proprietary technology. We rely on patents and other forms of intellectual property rights, including in-licenses of intellectual property rights and biologic materials of others, to protect our current or future discovery platform, product candidates, methods used to manufacture our current or future product candidates, and methods for treating patients using our current or future product candidates.

We in-license exclusive rights, including patents and patent applications relating to our discovery platform, from the Board of Trustees of the Leland Stanford Junior University, or Stanford University. Patent applications for this in-licensed technology are still pending before the U.S. Patent and Trademark Office and other national patent offices.

There is no guarantee that such patent applications will issue as patents, nor any guarantee that issued patents will provide adequate protection for the in-licensed technology or any meaningful competitive advantage.

We also own several patents and applications on our own technology relating to our discovery platform. There is no guarantee that any patents covering this technology will issue from the patent applications we own, or, if they do, that the issued claims will provide adequate protection for our discovery platform or any meaningful competitive advantage.

We own pending nonprovisional patent applications in connection with ATRC-101 and related antibody variants. However, there is no guarantee that any current or future patent applications will result in the issuance of patents that will effectively protect ATRC-101 or other product candidates or will effectively prevent others from commercializing competitive products.

We may also file provisional patent applications in the United States related to our product candidates. A provisional patent application is not eligible to become an issued patent until, among other things, we file a non-provisional patent application within 12 months of the filing date of the provisional patent application. If we do not timely file non-provisional patent applications for our potential future provisional patent applications, we may lose our priority date with respect to our provisional patent applications and any patent protection on the inventions disclosed in our provisional patent applications.

The patent prosecution process is expensive, complex and time-consuming. Patent license negotiations also can be complex and protracted, with uncertain results. We may not be able to file, prosecute, maintain, enforce or license all necessary or desirable patents and patent applications at a reasonable cost or in a timely manner. It is also possible that we will fail to identify patentable aspects of our research and development output before it is too late to obtain patent protection. The patent applications that we own or in-license may fail to result in issued patents, and, even if they do issue as patents, such patents may not cover our current or future technologies or product candidates in the United States or in other countries or provide sufficient protection from competitors. In addition, the coverage claimed in a patent application can be significantly reduced before the patent is issued and its scope can be reinterpreted after issuance. Accordingly, we also rely on our ability to preserve our trade secrets, to prevent third parties from infringing, misappropriating or violating our proprietary rights and to operate without infringing, misappropriating, or violating the proprietary rights of others.

Further, although we make reasonable efforts to ensure patentability of our inventions, we cannot guarantee that all of the potentially relevant prior art relating to our owned or in-licensed patents and patent applications has been found. For example, publications of discoveries in scientific literature often lag behind the actual discoveries, and patent applications in the United States and other jurisdictions are typically not published until 18 months after filing, and in some cases not at all. Additionally, pending patent applications that have been published can, subject to certain limitations, be later amended in a manner that could cover our discovery platform, our product candidates, or the use of our technologies. We thus cannot know with certainty whether we or our licensors were the first to make the inventions claimed in our owned or in-licensed patents or pending applications, or that we or our licensors were the first to file for patent protection of such inventions. There is no assurance that all potentially relevant prior art relating to our owned or in-licensed patents and patent applications has been found. For this reason, and because there is no guarantee that any prior art search is absolutely correct and comprehensive, we may be unaware of prior art that could be used to invalidate an issued patent or to prevent our owned or in-licensed pending patent applications from issuing as patents. Invalidation of any of our patent rights, including in-licensed patent rights, could materially harm our business.

Moreover, the patent positions of biopharmaceutical companies are generally uncertain because they may involve complex legal and factual considerations that have, in recent years, been the subject of legal development and change. As a result, the issuance, scope, validity, enforceability and commercial value of our pending patent rights is uncertain. The standards applied by the United States Patent and Trademark Office, or USPTO, and foreign patent offices in granting patents are not always certain and moreover, are not always applied uniformly or predictably. For example, there is no uniform worldwide policy regarding patentable subject matter or the scope of claims allowable in patents. Changes in either the patent laws or interpretation of the patent laws in the United States and other countries may diminish the value of our owned or in-licensed patents or narrow the scope of our patent protection.

Even if patents do successfully issue and even if such patents cover our current or any future technologies or product candidates, third parties may challenge their validity, enforceability or scope, which may result in such patents being narrowed, invalidated, or held unenforceable. Any successful challenge to these patents or any other patents owned by or licensed to us could deprive us of rights necessary for the successful commercialization of any current or future technologies or product candidates that we may develop. Likewise, if patent applications we own or have in-licensed with respect to our development programs and current or future technologies or product candidates fail to issue, if their breadth or strength is threatened, or if they fail to provide meaningful exclusivity, other companies could be dissuaded from collaborating with us to develop current or future technologies or product candidates. Lack of valid and enforceable patent protection could threaten our ability to commercialize current or future products and could prevent us from maintaining exclusivity with respect to the invention or feature claimed in the patent applications. Any failure to obtain or any loss of patent protection could have a material adverse impact on our business and ability to achieve profitability. We may be unable to prevent competitors from entering the market with a product that is similar to or the same as ATRC-101 or future product candidates.

The filing of a patent application or the issuance of a patent is not conclusive as to its ownership, inventorship, scope, patentability, validity or enforceability. Issued patents and patent applications may be challenged in the courts and in the patent office in the United States and abroad. For example, our applications or applications filed by our licensors may be challenged through third-party submissions, opposition or derivation proceedings. By further example, our issued patents or the issued patents we in-license may be challenged through reexamination, *inter partes* review or post-grant review proceedings before the patent office, or in declaratory judgment actions or counterclaims. An adverse determination in any such submission, proceeding or litigation could prevent the issuance of, reduce the scope of, invalidate or render unenforceable our owned or in-licensed patent rights; limit our ability to stop others from using or commercializing similar or identical platforms and products; allow third parties to compete directly with us without payment to us; or result in our inability to manufacture or commercialize products without infringing third-party patent rights. In addition, if the breadth or strength of protection provided by our owned or in-licensed patents and patent applications is threatened, it could dissuade companies from collaborating with us to license, develop or commercialize current or future platforms or product candidates. Any of the foregoing could have a material adverse effect on our business, financial condition, results of operations and prospects.

Moreover, some of our owned and in-licensed patents and patent applications are or may in the future be co-owned with third parties. If we are unable to obtain an exclusive license to any such third party co-owners' interest in such patents or patent application, such co-owners may be able to license their rights to other third-parties, including our competitors, and our competitors could market competing products and technology. We may need the cooperation of any such co-owners of our patents to enforce such patents against third parties, and such cooperation may not be provided to us. Any of the foregoing could have a material adverse effect on our competitive position, business prospects and financial conditions.

Our in-licensed patent rights may be subject to a reservation of rights by one or more third parties. For example, we in-license certain patent rights from Stanford University, which co-owns rights with a governmental entity. As a result, the U.S. government may have certain rights, including so-called march-in rights, to such patent rights and any products or technology developed from such patent rights. When new technologies are developed with U.S. government funding, the U.S. government generally obtains certain rights in any resulting patents, including a nonexclusive license authorizing the U.S. government to use the invention for non-commercial purposes. These rights may permit the U.S. government to disclose our confidential information to third parties and to exercise march-in rights to use or to allow third parties to use our licensed technology. The U.S. government can exercise its march-in rights if it determines that action is necessary because we fail to achieve the practical application of government-funded technology, because action is necessary to alleviate health or safety needs, to meet requirements of federal regulations, or to give preference to U.S. industry. In addition, our rights in such inventions may be subject to certain requirements to manufacture products embodying such inventions in the United States. Any exercise by the U.S. government of such rights could harm our competitive position, business, financial condition, results of operations and prospects.

If we fail to comply with our obligations under any license, collaboration or other intellectual property-related agreements, we may be required to pay damages and could lose intellectual property rights that may be necessary for developing, commercializing and protecting our current or future technologies or product candidates or we could lose certain rights to grant sublicenses.

We are heavily reliant upon in-licenses to certain patent rights and proprietary technology from third parties that are important or necessary to our discovery platform and development of product candidates. For example, we rely on an intellectual property license from Stanford University for our discovery platform.

Our current license agreements impose, and any future license agreements we enter into are likely to impose, various development, commercialization, funding, milestone, royalty, diligence, sublicensing, insurance, patent prosecution and enforcement or other obligations on us. If we breach any of these obligations, or use the intellectual property licensed to us in an unauthorized manner, we may be required to pay damages and the licensor may have the right to terminate the license. License termination could result in our inability to develop, manufacture and sell products that are covered by the licensed technology or could enable a competitor to gain access to the licensed technology. In certain circumstances, our licensed patent rights are subject to our reimbursing our licensors for their patent prosecution and maintenance costs. For example, our license agreement with Stanford University requires us to bear the costs of filing and maintaining patent applications.

Furthermore, we may not have the right to control the preparation, filing, prosecution, maintenance, enforcement and defense of patents and patent applications that we license from third parties. For example, pursuant to our license agreement with Stanford University, while we direct and are responsible for the preparation, filing, prosecution and maintenance, and, in certain circumstances, enforcement and defense of the patents and patent applications, all of these actions are subject to Stanford University's final approval. Given Stanford University's right of final approval, we therefore cannot be certain that these patents and patent applications will be prepared, filed, prosecuted, maintained, enforced and defended in a manner consistent with the best interests of our business. If our licensors and future licensors fail to prosecute, maintain, enforce and defend patents we may license, or lose rights to licensed patents or patent applications, our license rights may be reduced or eliminated. In such circumstances, our right to develop and commercialize any of our products or product candidates that is the subject of such licensed rights could be materially adversely affected.

Moreover, our licensors may own or control intellectual property that has not been licensed to us and, as a result, we may be subject to claims, regardless of their merit, that we are infringing, misappropriating or otherwise violating the licensor's intellectual property rights. In addition, while we cannot currently determine the amount of the royalty obligations we would be required to pay on sales of future products if infringement or misappropriation were found, those amounts could be significant. The amount of our future royalty obligations will depend on the technology and intellectual property we use in products that we successfully develop and commercialize, if any. Therefore, even if we successfully develop and commercialize products, we may be unable to achieve or maintain profitability.

In addition, the agreements under which we currently license intellectual property or technology from third parties are complex, and certain provisions in such agreements may be susceptible to multiple interpretations. The resolution of any contract interpretation disagreement that may arise could narrow what we believe to be the scope of our rights to the relevant intellectual property or technology, or increase what we believe to be our financial or other obligations under the relevant agreement, either of which could have a material adverse impact on our business and ability to achieve profitability. Moreover, if disputes over intellectual property that we have licensed prevent or impair our ability to maintain our current licensing arrangements on commercially acceptable terms, we may be unable to successfully develop and commercialize any affected product candidates, which could have a material adverse effect on our business and financial conditions.

Patent terms may not be able to protect our competitive position for an adequate period of time with respect to our current or future technologies or product candidates.

Patents have a limited lifespan. In the United States, the standard patent term is typically 20 years after filing. Various extensions may be available. Even so, the life of a patent and the protection it affords are limited. As a result,

our owned and in-licensed patent portfolio provides us with limited rights that may not last for a sufficient period of time to exclude others from commercializing products similar or identical to ours. For example, given the large amount of time required for the research, development, testing and regulatory review of new product candidates, patents protecting such candidates might expire before or shortly after such candidates are commercialized.

Extensions of patent term are available, but there is no guarantee that we would succeed in obtaining any particular extension—and no guarantee any such extension would confer patent term for a sufficient period of time to exclude others from commercializing products similar or identical to ours. In the United States, the Drug Price Competition and Patent Term Restoration Act of 1984 permits a patent term extension of up to five years beyond the normal expiration of the patent, which is limited to the approved indication (or any additional indications approved during the period of extension). A patent term extension cannot extend the remaining term of a patent beyond 14 years from the date of product approval; only one patent may be extended; and extension is available for only those claims covering the approved drug, a method for using it, or a method for manufacturing it. The applicable authorities, including the FDA and the USPTO in the United States, and any equivalent regulatory authority in other countries, may not agree with our assessment of whether such extensions are available, and may refuse to grant extensions to our patents, or may grant more limited extensions than we request. An extension may not be granted or may be limited where there is, for example, a failure to exercise due diligence during the testing phase or regulatory review process, failure to apply within applicable deadlines, failure to apply before expiration of relevant patents, or some other failure to satisfy applicable requirements. If this occurs, our competitors may be able to launch their products earlier by taking advantage of our investment in development and clinical trials along with our clinical and preclinical data. This could have a material adverse effect on our business and ability to achieve profitability.

Changes in U.S. patent law or the patent law of other countries or jurisdictions could diminish the value of patents in general, thereby impairing our ability to protect our current or any future technologies or product candidates.

Changes in either the patent laws or interpretation of the patent laws in the United States or elsewhere could increase the uncertainties and costs surrounding the prosecution of patent applications and the enforcement or defense of issued patents. The United States has enacted and implemented wide-ranging patent reform legislation. On September 16, 2011, the Leahy-Smith America Invents Act, or the Leahy-Smith Act, was signed into law, which could increase the uncertainties and costs surrounding the prosecution of our owned or in-licensed patent applications and the enforcement or defense of our owned or in-licensed issued patents. The Leahy-Smith Act includes a number of significant changes to U.S. patent law. These include provisions that affect the way patent applications are prosecuted, redefine prior art, may affect patent litigation and switch the U.S. patent system from a “first-to-invent” system to a “first-to-file” system. Under a first-to-file system, assuming the other requirements for patentability are met, the first inventor to file a patent application generally will be entitled to the patent on an invention regardless of whether another inventor had made the invention earlier. These provisions also allow third-party submission of prior art to the USPTO during patent prosecution and set forth additional procedures to challenge the validity of a patent by the USPTO administered post grant proceedings, including derivation, reexamination, *inter partes* review, post-grant review and interference proceedings. The USPTO developed additional regulations and procedures to govern administration of the Leahy-Smith Act, and many of the substantive changes to patent law associated with the Leahy-Smith Act, and, in particular, the first-to-file provisions, became effective on March 16, 2013. Accordingly, it is not clear what, if any, impact the Leahy-Smith Act will have on the operation of our business. The Leahy-Smith Act and its implementation could increase the uncertainties and costs surrounding the prosecution of our owned or in-licensed patent applications and the enforcement or defense of our issued owned or in-licensed patents, all of which could have a material adverse impact on our business prospects and financial condition.

As referenced above, for example, courts in the U.S. continue to refine the heavily fact-and-circumstance-dependent jurisprudence defining the scope of patent protection available for therapeutic antibodies, narrowing the scope of patent protection available in certain circumstances or weakening the rights of patent owners in certain situations. This creates uncertainty about our ability to obtain patents in the future and the value of such patents. We cannot provide assurance that future developments in U.S. Congress, the federal courts and the USPTO will not adversely impact our owned or in-licensed patents or patent applications. The laws and regulations governing patents could change in unpredictable ways that could weaken our and our licensors’ ability to obtain new patents or to enforce our existing owned or in-licensed patents and patents that we might obtain or in-license in the future. Similarly, changes in patent law

and regulations in other countries or jurisdictions or changes in the governmental bodies that enforce them or changes in how the relevant governmental authority enforces patent laws or regulations may have a material adverse effect on our and our licensors' ability to obtain new patents or to protect and enforce our owned or in-licensed patents or patents that we may obtain or in-license in the future.

Other companies or organizations may challenge our or our licensors' patent rights or may assert patent rights that prevent us from developing and commercializing our current or future products.

As the field of antibody-based immunotherapeutics matures, patent applications are being processed by national patent offices around the world. There is uncertainty about which patents will issue, and, if they do, there is uncertainty as to when, to whom, and with what claims. In addition, third parties may attempt to invalidate our or our licensors' intellectual property rights. Even if such rights are not directly challenged, disputes could lead to the weakening of our or our licensors' intellectual property rights. Our defense against any attempt by third parties to circumvent or invalidate our intellectual property rights could be costly to us, could require significant time and attention of our management, and could have a material and adverse impact on our profitability, financial condition and prospects or ability to successfully compete.

There are many issued and pending patents that claim aspects of our current or potential future product candidates and modifications that we may need to apply to our current or potential future product candidates. There are also many issued patents that claim antibodies or portions of antibodies that may be relevant for products we wish to develop.

Further, we cannot guarantee that we are aware of all of patents and patent applications potentially relevant to our technology or products. We may not be aware of potentially relevant third-party patents or applications for several reasons. For example, U.S. applications filed before November 29, 2000, and certain U.S. applications filed after that date that will not be filed outside the U.S. remain confidential until patents issue. Patent applications in the United States and elsewhere are published approximately 18 months after the earliest filing for which priority is claimed, with such earliest filing date being commonly referred to as the priority date. Therefore, patent applications covering our product candidates or platform technologies could have been filed by others without our knowledge. Additionally, pending patent applications that have been published can, subject to certain limitations, be later amended in a manner that could cover our platform, our product candidates or the use of our technologies.

Thus, it is possible that one or more third parties will hold patent rights to which we will need a license, which may not be available on reasonable terms or at all. If such third parties refuse to grant us a license to such patent rights on reasonable terms or at all, we may be required to expend significant time and resources to redesign our technology, product candidates or the methods for manufacturing our product candidates, or to develop or license replacement technology, all of which may not be commercially or technically feasible. In such case, we may not be able to market such technology or product candidates and may not be able to perform research and development or other activities covered by these patents. This could have a material adverse effect on our ability to commercialize our product candidates and our business and financial condition.

We may not be able to protect our intellectual property rights throughout the world, which could negatively impact our business.

Filing, prosecuting and defending patents on current or future technologies or product candidates in all countries throughout the world would be prohibitively expensive. Competitors or other third parties may use our technologies in jurisdictions where we have not obtained patent protection to develop their own products and, further, may export infringing products to territories where we have patent protection or licenses but enforcement is not as strong as that in the United States. These products may compete with our products, and our patents or other intellectual property rights may not be effective or sufficient to prevent them from competing.

Additionally, the laws of some foreign jurisdictions do not protect intellectual property rights to the same extent as the laws in the United States. Many companies have encountered significant difficulties in protecting and defending such rights in such jurisdictions. The legal systems of certain countries, including certain developing countries, do not

favor the enforcement of patents and other intellectual property protection, particularly those relating to biotechnology, which could make it difficult for us to stop the infringement of our owned and in-licensed patents or the marketing of competing products in violation of our intellectual property and proprietary rights generally. Proceedings to enforce our owned or in-licensed intellectual property and proprietary rights in foreign jurisdictions could result in substantial costs and could divert our efforts and attention from other aspects of our business. Such proceedings could also put our owned or in-licensed patents at risk of being invalidated or interpreted narrowly, could put our owned or in-licensed patent applications at risk of not issuing, and could provoke third parties to assert claims against us or our licensors. We or our licensors may not prevail in any lawsuits or other adversarial proceedings that we or our licensors initiate, and the damages or other remedies awarded, if any, may not be commercially meaningful. Accordingly, our and our licensors' efforts to enforce such intellectual property and proprietary rights around the world may be inadequate to obtain a significant commercial advantage from the intellectual property that we develop or in-license.

Further, many countries have compulsory licensing laws under which a patent owner may be compelled to grant licenses to third parties. In addition, many countries limit the enforceability of patents against government agencies or government contractors. In these countries, the patent owner may have limited remedies, which could materially diminish the value of its patents. If we or any of our licensors are forced to grant a license to third parties with respect to any patents relevant to our business, our competitive position in the relevant jurisdiction may be impaired and our business prospects may be materially adversely affected.

Third parties may initiate legal proceedings alleging that we are infringing, misappropriating or violating their intellectual property rights, the outcome of which would be uncertain and could have a material adverse impact on the success of our business.

Our commercial success depends, in part, upon our ability or the ability of our potential future collaborators to develop, manufacture, market and sell our current or any future product candidates and to use our proprietary technologies without infringing, misappropriating or violating the proprietary and intellectual property rights of third parties. The biotechnology and pharmaceutical industries are characterized by extensive and complex litigation regarding patents and other intellectual property rights.

We or our licensors, or any future strategic partners, may be party to, or be threatened with, adversarial proceedings or litigation regarding intellectual property rights with respect to our current or any potential future product candidates and technologies, including derivation, reexamination, *inter partes* review, post-grant review or interference proceedings before the USPTO and similar proceedings in jurisdictions outside of the United States such as opposition proceedings. In some instances, we may be required to indemnify our licensors for the costs associated with any such adversarial proceedings or litigation. For example, we are obligated under our license agreement with Stanford University to indemnify, hold harmless and defend Stanford University for damages from any claim of any kind arising out of or related to the license agreement with Stanford University. Third parties may assert infringement claims against us, our licensors or our strategic partners based on existing patents or patents that may be granted in the future, regardless of their merit. There is a risk that third parties may choose to engage in litigation or other adversarial proceedings with us, our licensors or our strategic partners to enforce or otherwise assert their patent rights. Even if we believe such claims are without merit, a court of competent jurisdiction could hold that these third-party patents are valid, enforceable and infringed, which could have a material adverse impact on our ability to utilize our discovery platform or to commercialize our current or any future product candidates. In order to successfully challenge the validity of any such U.S. patent in federal court, we would need to overcome a presumption of validity by presenting clear and convincing evidence of invalidity. There is no assurance that a court of competent jurisdiction, even if presented with evidence we believe to be clear and convincing, would invalidate the claims of any such U.S. patent.

Further, we cannot guarantee that we will be able to successfully settle or otherwise resolve such adversarial proceedings or litigation. If we are unable to successfully settle future claims on terms acceptable to us, we may be required to engage in or to continue costly, unpredictable and time-consuming litigation and may be prevented from or experience substantial delays in marketing our product candidates. If we, or our licensors, or any future strategic partners are found to infringe, misappropriate or violate a third-party patent or other intellectual property rights, we could be required to pay damages, including treble damages and attorney's fees, if we are found to have willfully infringed. In addition, we, or our licensors, or any future strategic partners may choose to seek, or be required to seek, a license from a

third party, which may not be available on commercially reasonable terms, if at all. Even if a license can be obtained on commercially reasonable terms, the rights may be non-exclusive, which could give our competitors access to the same technology or intellectual property rights licensed to us, and we could be required to make substantial licensing and royalty payments. We also could be forced, including by court order, to cease utilizing, developing, manufacturing and commercializing our discovery platform or product candidates deemed to be infringing. We may be forced to redesign current or future technologies or products. Any of the foregoing could have a material adverse effect on our ability to generate revenue or achieve profitability and possibly prevent us from generating revenue sufficient to sustain our operations.

In addition, we or our licensors may find it necessary to pursue claims or to initiate lawsuits to protect or enforce our owned or in-licensed patent or other intellectual property rights. The cost to us in defending or initiating any litigation or other proceeding relating to our owned or in-licensed patent or other intellectual property rights, even if resolved in our favor, could be substantial, and any litigation or other proceeding would divert our management's attention. Such litigation or proceedings could materially increase our operating losses and reduce the resources available for development activities or any future sales, marketing or distribution activities. Some of our competitors may be able to more effectively to sustain the costs of complex patent litigation because they have substantially greater resources. Uncertainties resulting from the initiation and continuation of patent litigation or other proceedings could delay our research and development efforts and materially limit our ability to continue our operations. Furthermore, because of the substantial amount of discovery required in connection with certain such proceedings, there is a risk that some of our confidential information could be compromised by disclosure. In addition, there could be public announcements of the results of hearings, motions or other interim proceedings or developments and if securities analysts or investors perceive these results to be negative, such announcements could have a material adverse effect on the price of our Class A common stock.

If we or our licensors were to initiate legal proceedings against a third party to enforce a patent covering one of our product candidates or our technology, the defendant could counterclaim that such patent is invalid or unenforceable. In patent litigation in the United States, defendant counterclaims alleging invalidity or unenforceability are commonplace. Grounds for a validity challenge could be an alleged failure to meet any of several statutory requirements, for example, claiming patent-ineligible subject matter, lack of novelty, indefiniteness, lack of written description, non-enablement, anticipation or obviousness. Grounds for an unenforceability assertion could be an allegation that someone connected with prosecution of the patent withheld relevant information from the USPTO or made a misleading statement during prosecution. The outcome of such invalidity and unenforceability claims is unpredictable. With respect to the validity question, for example, we cannot be certain that there is no invalidating prior art of which we or our licensors and the patent examiner were unaware during prosecution. If a defendant were to prevail on a legal assertion of invalidity or unenforceability, we could lose at least part, and perhaps all, of the patent protection for one or more of our product candidates or certain aspects of our platform technology. Such a loss of patent protection could have a material adverse effect on our business, financial condition, results of operations and prospects. Patents and other intellectual property rights also will not protect our product candidates and technologies if competitors or third parties design around such product candidates and technologies without legally infringing, misappropriating or violating our owned or in-licensed patents or other intellectual property rights.

Intellectual property rights of third parties could adversely affect our ability to commercialize our current or future technologies or product candidates, and we might be required to litigate or obtain licenses from third parties to develop or market our current or future technologies or product candidates, which may not be available on commercially reasonable terms or at all.

Because the antibody landscape is still evolving, it is difficult to conclusively assess our freedom to operate without infringing, misappropriating or violating third-party rights. There are numerous companies that have pending patent applications and issued patents broadly covering antibodies generally or covering antibodies directed against the same targets as, or targets similar to, those we are pursuing. Our competitive position may materially suffer if patents issued to third parties or other third-party intellectual property rights cover our current or future technologies product candidates or elements thereof or our manufacture or uses relevant to our development plans. In such cases, we may not be in a position to develop or commercialize current or future technologies, product candidates unless we successfully pursue litigation to nullify or invalidate the third-party intellectual property right concerned, or enter into a license

agreement with the intellectual property right holder, if available on commercially reasonable terms. There may be issued patents of which we are not aware, held by third parties that, if found to be valid and enforceable, could be alleged to be infringed by our current or future technologies or product candidates. There also may be pending patent applications of which we are not aware that may result in issued patents, which could be alleged to be infringed by our current or future technologies or product candidates. If such an infringement claim should successfully be brought, we may be required to pay substantial damages or be forced to abandon our current or future technologies or product candidates or to seek a license from any patent holders. No assurances can be given that a license will be available on commercially reasonable terms, if at all.

Third party intellectual property right holders may also actively bring infringement, misappropriation or violation or other claims alleging violations of intellectual property rights against us. We cannot guarantee that we will be able to successfully settle or otherwise resolve such claims. If we are unable to successfully settle future claims on terms acceptable to us, we may be required to engage in or to continue costly, unpredictable and time-consuming litigation and may be prevented from or experience substantial delays in marketing our product candidates. If we fail in any such dispute, in addition to being forced to pay damages, we may be temporarily or permanently prohibited from commercializing any of our current or future technologies or product candidates that are held to be infringing, misappropriating or otherwise violating third-party intellectual property rights. We might, if possible, also be forced to redesign current or future technologies or product candidates so that we no longer infringe, misappropriate or violate the third-party intellectual property rights. Any of these events, even if we were ultimately to prevail, could require us to divert substantial financial and management resources that we would otherwise be able to devote to our business, which could have a material adverse effect on our financial condition and results of operations.

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

As referenced above, in addition to seeking patent protection for certain aspects of our current or future technologies and product candidates, we also consider trade secrets, including confidential and unpatented know-how, important to the maintenance of our competitive position. However, trade secrets and know-how can be difficult to protect. We protect and plan to protect trade secrets and confidential and unpatented know-how, in part, by entering into non-disclosure and confidentiality agreements with parties who have access to such knowledge, such as our employees, corporate collaborators, outside scientific collaborators, CROs, contract manufacturers, consultants, advisors and other third parties. We also enter into confidentiality and invention or patent assignment agreements with our employees and consultants under which they are obligated to maintain confidentiality and to assign their inventions to us. Despite these efforts, we may not obtain these agreements in all circumstances. Moreover, individuals with whom we have such agreements may not comply with their terms. Any of these parties may breach such agreements and disclose our proprietary information, including our trade secrets, and we may not be able to obtain adequate remedies for any such breaches. We may also become involved in inventorship disputes relating to inventions and patents developed by our employees or consultants under such agreements. Enforcing a claim that a party illegally disclosed or misappropriated a trade secret, or securing title to an employee- or consultant-developed invention if a dispute arises, is difficult, expensive and time-consuming, and the outcome is unpredictable. In addition, some courts in the United States and certain foreign jurisdictions disfavor or are unwilling to protect trade secrets. Further, if any of our trade secrets were to be lawfully obtained or independently developed by a competitor, we would have no right to prevent that competitor from using the technology or information to compete with us. If any of our trade secrets were to be disclosed to or independently developed by a competitor, our competitive position would be materially and adversely harmed.

We may be subject to claims that we or our employees or consultants have wrongfully used or disclosed alleged trade secrets or other proprietary information of our employees' or consultants' former employers or their clients.

Many of our employees or consultants and our licensors' employees or consultants were previously employed at universities or biotechnology or biopharmaceutical companies, including our competitors or potential competitors. We may be subject to claims that one or more of these employees or consultants or we have inadvertently or otherwise used or disclosed trade secrets or other proprietary information of former employers. Litigation or arbitration may be necessary to defend against these claims. If we fail in defending such claims, in addition to paying monetary damages, we may lose valuable intellectual property rights or personnel or may be enjoined from using such intellectual property.

Any such proceedings and possible aftermath would likely divert significant resources from our core business, including distracting our technical and management personnel from their normal responsibilities. A loss of key research personnel or their work product could limit our ability to commercialize, or prevent us from commercializing, our current or future technologies or product candidates, which could materially harm our business. Even if we are successful in defending against any such claims, litigation or arbitration could result in substantial costs and could be a distraction to management.

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

Periodic maintenance fees, renewal fees, annuity fees and various other government fees on patents or applications will be due to be paid to the USPTO and various government patent agencies outside of the United States over the lifetime of our owned and in-licensed patents or applications and any patent rights we may own or in-license in the future. The USPTO and various non-U.S. government patent agencies require compliance with several procedural, documentary, fee payment and other similar provisions during the patent application process. We employ reputable law firms and other professionals to help us comply with these requirements, and we are also dependent on our licensors to take the necessary action to comply with these requirements with respect to our in-licensed intellectual property. In many cases, an inadvertent lapse can be cured by payment of a late fee or by other means in accordance with the applicable rules. There are situations, however, in which non-compliance can result in abandonment or lapse of the patent or patent application, resulting in partial or complete loss of patent rights in the relevant jurisdiction. In such an event, potential competitors might be able to enter the market with similar or identical products or platforms, which could have a material adverse effect on our business prospects and financial condition.

If our trademarks and trade names are not adequately protected, then we may not be able to build name recognition in our markets of interest and our business may be adversely affected.

Our trademarks or trade names may be challenged, infringed, circumvented, declared generic or determined to be infringing on other marks. We may not be able to protect our rights to these trademarks and trade names or may be forced to stop using these names, which we use for name recognition by potential partners or customers in our markets of interest. If we are unable to establish name recognition based on our trademarks and trade names, we may not be able to compete effectively and our business may be materially adversely affected.

Intellectual property rights do not necessarily address all potential threats to our business.

The degree of future protection afforded by our intellectual property rights is uncertain because intellectual property rights have limitations, and may not adequately protect our business. The following examples are illustrative:

- § others may be able to make compounds or formulations that are similar to our product candidates, but that are not covered by the claims of any patents that we own, license or control;
- § we or any strategic partners might not have been the first to make the inventions covered by the issued patents or pending patent applications that we own, license or control;
- § we or our licensors might not have been the first to file patent applications covering certain of our owned and in-licensed inventions;
- § others may independently develop the same, similar, or alternative technologies without infringing, misappropriating or violating our owned or in-licensed intellectual property rights;
- § it is possible that our owned or in-licensed pending patent applications will not lead to issued patents;
- § issued patents that we own, in-license, or control may not provide us with any competitive advantages, or may be narrowed or held invalid or unenforceable, including as a result of legal challenges;
- § our competitors might conduct research and development activities in the United States and other countries that provide a safe harbor from patent infringement claims for certain research and development activities, as well as in countries where we do not have patent rights, and may then use the information learned from such activities to develop competitive products for sale in our major commercial markets;

- § we may choose not to file a patent in order to maintain certain trade secrets or know-how, and a third party may subsequently file a patent covering such trade secrets or know-how; and
- § the patents of others may have an adverse effect on our business.

Should any of these events occur, they could have a material adverse impact on our business and financial condition.

Risks Related to Government Regulation

Clinical development includes a lengthy and expensive process with an uncertain outcome, and results of earlier studies and trials may not be predictive of future trial results.

Our only product candidate, ATRC-101, is in early clinical development and its risk of failure is high. It is impossible to predict when or if ATRC-101 or any potential future product candidates will prove effective and safe in humans or will receive regulatory approval. Before obtaining marketing approval from regulatory authorities for the sale of any product candidate, we must complete preclinical studies and then conduct extensive clinical trials to demonstrate the safety and efficacy of that product candidate in humans. Clinical testing is expensive and can take many years to complete, and its outcome is inherently uncertain. Failure can occur at any time during the development process. The results of preclinical studies and early clinical trials of any of our current or potential future product candidates may not be predictive of the results of later-stage clinical trials. Product candidates in later stages of clinical trials may fail to show the desired safety and efficacy traits despite having progressed through preclinical studies and initial clinical trials. A number of companies in the pharmaceutical industry have suffered significant setbacks in advanced clinical trials due to lack of efficacy or safety profiles, notwithstanding promising results in earlier trials.

We may experience delays in completing our preclinical studies and initiating or completing clinical trials of ATRC-101 or potential future product candidates. We do not know whether planned preclinical studies and clinical trials will be completed on schedule or at all, or whether planned clinical trials will begin on time, need to be redesigned, enroll patients on time or be completed on schedule, if at all. Our development programs may be delayed for a variety of reasons, including delays related to:

- § the FDA or other regulatory authorities requiring us to submit additional data or imposing other requirements before permitting us to initiate a clinical trial;
- § obtaining regulatory approval to commence a clinical trial;
- § reaching agreement on acceptable terms with prospective CROs and clinical trial sites, the terms of which can be subject to extensive negotiation and may vary significantly among different CROs and clinical trial sites;
- § obtaining institutional review board, or IRB, approval at each clinical trial site;
- § recruiting suitable patients to participate in a clinical trial;
- § having patients complete a clinical trial or return for post-treatment follow-up;
- § clinical trial sites deviating from trial protocol or dropping out of a trial;
- § adding new clinical trial sites; or
- § manufacturing sufficient quantities of our product candidates for use in clinical trials.

Furthermore, we expect to rely on our CROs and clinical trial sites to ensure the proper and timely conduct of our clinical trials and, while we expect to enter into agreements governing their committed activities, we have limited influence over their actual performance.

We could encounter delays if prescribing physicians encounter unresolved ethical issues associated with enrolling patients in clinical trials of our current or potential future product candidates in lieu of prescribing existing treatments that have established safety and efficacy profiles. Further, a clinical trial may be suspended or terminated by us, our partners, the IRBs of the institutions in which such trials are being conducted, the Data Safety Monitoring Board for such trial or by the FDA or other regulatory authorities due to a number of factors, including failure to conduct the clinical trial in accordance with regulatory requirements or our clinical protocols, inspection of the clinical trial operations or trial site by the FDA or other regulatory authorities resulting in the imposition of a clinical hold,

unforeseen safety issues or adverse side effects, failure to demonstrate a benefit from using a drug or therapeutic biologic, changes in governmental regulations or administrative actions or lack of adequate funding to continue the clinical trial. If we experience delays in the completion of, or termination of, any clinical trial of any of our current or potential future product candidates, the commercial prospects of such product candidate will be harmed, and our ability to generate product revenue from such product candidates will be delayed. In addition, any delays in completing our clinical trials will increase our costs, slow our product development and approval process and jeopardize our ability to commence product sales and generate revenue. Any of these occurrences may materially and adversely affect our business, financial condition, results of operations and prospects. In addition, many of the factors that cause, or lead to, a delay in the commencement or completion of clinical trials may also ultimately lead to the denial of regulatory approval of our current or potential future product candidates.

We may be unable to obtain U.S. or foreign regulatory approval and, as a result, be unable to commercialize ATRC-101 or potential future product candidates.

ATRC-101 and any potential future product candidates are subject to extensive governmental regulations relating to, among other things, research, testing, development, manufacturing, safety, efficacy, approval, recordkeeping, reporting, labeling, storage, packaging, advertising and promotion, pricing, marketing and distribution of drugs and therapeutic biologics. Rigorous preclinical testing and clinical trials and an extensive regulatory approval process are required to be successfully completed in the U.S. and in many foreign jurisdictions before a new drug or therapeutic biologic can be marketed. Satisfaction of these and other regulatory requirements is costly, time-consuming, uncertain and subject to unanticipated delays. It is possible that none of the product candidates we may develop will obtain the regulatory approvals necessary for us or our potential future partners to begin selling them.

We have very limited experience in conducting and managing the clinical trials necessary to obtain regulatory approvals, including approval by the FDA. The time required to obtain FDA and other approvals is unpredictable but typically takes many years following the commencement of clinical trials, depending upon the type, complexity and novelty of the product candidate. The standards that the FDA and its foreign counterparts use when regulating us require judgment and can change, which makes it difficult to predict with certainty how they will be applied. Any analysis we perform of data from preclinical and clinical activities is subject to confirmation and interpretation by regulatory authorities, which could delay, limit or prevent regulatory approval. We may also encounter unexpected delays or increased costs due to new government regulations, for example, from future legislation or administrative action, or from changes in FDA policy during the period of product development, clinical trials and FDA regulatory review. It is impossible to predict whether legislative changes will be enacted, or whether FDA or foreign regulations, guidance or interpretations will be changed, or what the impact of such changes, if any, may be.

Because ATRC-101 or potential future product candidates we are developing may work through mechanisms of action or work against targets with which the FDA has limited early experience, the FDA and its foreign counterparts have not yet established any definitive policies, practices or guidelines in relation to these product candidates. While we believe these product candidates are regulated as therapeutic biologics that are subject to requirements for review and approval of a Biologics License Application, or BLA, by the FDA, the lack of policies, practices or guidelines may hinder or slow review by the FDA of any regulatory filings that we may submit. Moreover, the FDA may respond to these submissions by defining requirements we may not have anticipated. Such responses could lead to significant delays in the clinical development of these product candidates, including ATRC-101. In addition, because there may be approved treatments for some of the diseases for which we may seek approval, in order to receive regulatory approval, we may need to demonstrate through clinical trials that the current or potential future product candidates we develop to treat these diseases, if any, are not only safe and effective, but safer or more effective than existing products.

Any delay or failure in obtaining required approvals could have a material and adverse effect on our ability to generate revenue from the particular product candidate for which we are seeking approval. Further, we and our potential future partners may never receive approval to market and commercialize any product candidate. Even if we or a potential future partner obtains regulatory approval, the approval may be for targets, disease indications or patient populations that are not as broad as we intended or desired or may require labeling that includes significant use or distribution restrictions or safety warnings. We or a potential future partner may be subject to post-marketing testing requirements to maintain regulatory approval. If ATRC-101 or any of our potential future product candidates prove to be ineffective, unsafe or

commercially unviable, we may have to re-engineer ATRC-101 or our potential future product candidates, and our entire pipeline could have little, if any, value, which could require us to change our focus and approach to antibody discovery and development, which would have a material and adverse effect on our business, financial condition, results of operations and prospects.

We are also subject to numerous foreign regulatory requirements governing, among other things, the conduct of clinical trials, manufacturing and marketing authorization, pricing and third-party reimbursement. The foreign regulatory approval process varies among countries and may include all of the risks associated with FDA approval described above as well as risks attributable to the satisfaction of local regulations in foreign jurisdictions. Moreover, the time required to obtain approval may differ from that required to obtain FDA approval. Approval by the FDA does not ensure approval by regulatory authorities outside the United States and vice versa.

Even if we receive regulatory approval for any of our current or potential future product candidates, we will be subject to ongoing regulatory obligations and continued regulatory review, which may result in significant additional expense. Additionally, our current or potential future product candidates, if approved, could be subject to labeling and other restrictions and market withdrawal and we may be subject to penalties if we fail to comply with regulatory requirements or experience unanticipated problems with our products.

Any regulatory approvals that we or potential future partners obtain for ATRC-101 or any potential future product candidate may also be subject to limitations on the approved indicated uses for which a product may be marketed or to the conditions of approval, or contain requirements for potentially costly post-marketing testing, including “Phase 4” clinical trials, and surveillance to monitor the safety and efficacy of such product candidate. In addition, if the FDA or other regulatory authority approves ATRC-101 or any potential future product candidate, the manufacturing processes, labeling, packaging, distribution, adverse event reporting, storage, import, export, advertising, promotion and recordkeeping for such product will be subject to extensive and ongoing regulatory requirements. These requirements include submissions of safety and other post-marketing information and reports, registration, as well as continued compliance with cGMP and good clinical practices for any clinical trials that we conduct post-approval. Later discovery of previously unknown problems with a product, including adverse events of unanticipated severity or frequency, or with our third-party manufacturers or manufacturing processes, or failure to comply with regulatory requirements, may result in, among other things:

- § restrictions on the marketing or manufacturing of the product, withdrawal of the product from the market or voluntary or mandatory product recalls;
- § fines, warning letters or holds on clinical trials;
- § refusal by the FDA to approve pending applications or supplements to approved applications filed by us or our strategic partners;
- § suspension or revocation of product license approvals;
- § product seizure or detention or refusal to permit the import or export of products; and
- § injunctions or the imposition of civil or criminal penalties.

The FDA’s policies may change and additional government regulations may be enacted that could prevent, limit or delay regulatory approval of our product candidates. We cannot predict the likelihood, nature or extent of government regulation that may arise from future legislation or administrative action, either in the United States or abroad. If we are slow or unable to adapt to changes in existing requirements or the adoption of new requirements or policies, or if we are not able to maintain regulatory compliance, we may lose any marketing approval that we may have obtained and we may not achieve or sustain profitability, which would adversely affect our business.

We may attempt to secure approval from the FDA through the use of accelerated registration pathways. If unable to obtain approval under an accelerated pathway, we may be required to conduct additional preclinical studies or clinical trials which could increase the expense of obtaining, reduce the likelihood of obtaining or delay the timing of obtaining, necessary marketing approvals. Even if we receive accelerated approval from the FDA, if our confirmatory trials do not verify clinical benefit, or if we do not comply with rigorous post-marketing requirements, the FDA may seek to withdraw accelerated approval.

We may seek an accelerated approval development pathway for our product candidates, including ATRC-101. Under the accelerated approval provisions of the Federal Food, Drug, and Cosmetic Act, or the FDCA, and the FDA's implementing regulations, the FDA may grant accelerated approval to a product designed to treat a serious or life-threatening condition that provides meaningful therapeutic advantage over available therapies and demonstrates an effect on a surrogate endpoint or intermediate clinical endpoint that is reasonably likely to predict clinical benefit. The FDA considers a clinical benefit to be a positive therapeutic effect that is clinically meaningful in the context of a given disease. For the purposes of accelerated approval, a surrogate endpoint is a marker, such as a laboratory measurement, radiographic image, physical sign or other measure that is thought to predict clinical benefit but is not itself a measure of clinical benefit. An intermediate clinical endpoint is a clinical endpoint that can be measured earlier than an effect on irreversible morbidity or mortality that is reasonably likely to predict an effect on irreversible morbidity or mortality or other clinical benefit. The accelerated approval development pathway may be used in cases in which the advantage of a new drug over available therapy may not be a direct therapeutic advantage, but is a clinically important improvement from a patient and public health perspective. If granted, accelerated approval is contingent on the sponsor's agreement to conduct, in a diligent manner, additional post-approval confirmatory studies to verify and describe the drug's clinical profile or risks and benefits for accelerated approval. The FDA may require that any such confirmatory study be initiated or substantially underway prior to the submission of an application for accelerated approval. If such post-approval studies fail to confirm the drug's clinical profile or risks and benefits, the FDA may withdraw its approval of the drug.

If we choose to pursue accelerated approval, we intend to seek feedback from the FDA or will otherwise evaluate our ability to seek and receive such accelerated approval. There can be no assurance that, after our evaluation of the feedback from the FDA or other factors, we will decide to pursue or submit a BLA for accelerated approval or any other form of expedited development, review or approval. Furthermore, if we submit an application for accelerated approval, there can be no assurance that such application will be accepted or that approval will be granted on a timely basis, or at all. The FDA also could require us to conduct further studies or trials prior to considering our application or granting approval of any type. We might not be able to fulfill the FDA's requirements in a timely manner, which would cause delays, or approval might not be granted because our submission is deemed incomplete by the FDA.

Even if we receive accelerated approval from the FDA, we will be subject to rigorous post-marketing requirements, including the completion of confirmatory post-market clinical trials to verify the clinical benefit of the product, and submission to the FDA of all promotional materials prior to their dissemination. The FDA could seek to withdraw accelerated approval for multiple reasons, including if we fail to conduct any required post-market study with due diligence; a post-market study does not confirm the predicted clinical benefit; other evidence shows that the product is not safe or effective under the conditions of use; or we disseminate promotional materials that are found by the FDA to be false and misleading.

A failure to obtain accelerated approval or any other form of expedited development, review or approval for a product candidate that we may choose to develop would result in a longer time period prior to commercializing such product candidate, could increase the cost of development of such product candidate and could harm our competitive position in the marketplace.

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

In the United States, there have been and continue to be a number of legislative initiatives to contain healthcare costs. For example, in March 2010, the Patient Protection and Affordable Care Act, or the ACA, was enacted, which substantially changed the way healthcare is financed by both governmental and private insurers, and significantly

impacted the U.S. pharmaceutical industry. Among the provisions of the ACA, of greatest importance to the pharmaceutical and biotechnology industry are the following:

- § an annual, nondeductible fee on any entity that manufactures or imports certain specified branded prescription drugs and biologic agents apportioned among these entities according to their market share in some government healthcare programs;
- § an increase in the statutory minimum rebates a manufacturer must pay under the Medicaid Drug Rebate Program to 23.1% and 13% of the average manufacturer price for most branded and generic drugs, respectively, and capped the total rebate amount for innovator drugs at 100% of the Average Manufacturer Price (AMP);
- § a new methodology by which rebates owed by manufacturers under the Medicaid Drug Rebate Program are calculated for certain drugs and biologics that are inhaled, infused, instilled, implanted or injected;
- § extension of manufacturers' Medicaid rebate liability to covered drugs dispensed to individuals who are enrolled in Medicaid managed care organizations;
- § expansion of eligibility criteria for Medicaid programs by, among other things, allowing states to offer Medicaid coverage to additional individuals and by adding new mandatory eligibility categories for individuals with income at or below 133% of the federal poverty level, thereby potentially increasing manufacturers' Medicaid rebate liability;
- § a new Medicare Part D coverage gap discount program, in which manufacturers must agree to offer 50% (and 70% as of January 1, 2019) point-of-sale discounts off negotiated prices of applicable brand drugs to eligible beneficiaries during their coverage gap period, as a condition for the manufacturer's outpatient drugs to be covered under Medicare Part D;
- § expansion of the entities eligible for discounts under the Public Health program;
- § a new Patient-Centered Outcomes Research Institute to oversee, identify priorities in, and conduct comparative clinical effectiveness research, along with funding for such research;
- § establishment of a Center for Medicare Innovation at CMS to test innovative payment and service delivery models to lower Medicare and Medicaid spending; and
- § implementation of the federal physician payment transparency requirements, sometimes referred to as the "Physician Payments Sunshine Act".

Some of the provisions of the ACA have yet to be fully implemented, and there have been legal and political challenges to certain aspects of the ACA. 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 the Tax Act, includes a provision that 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." Additionally, 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, including the so-called "Cadillac" tax on certain high cost employer-sponsored insurance plans, the annual fee imposed on certain health insurance providers based on market share, and the medical device excise tax on non-exempt medical devices. Further, the Bipartisan Budget Act of 2018 (BBA), among other things, amended the ACA, effective January 1, 2019, to close the coverage gap in most Medicare 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 U.S. District Court Judge in the Northern District of Texas ruled that the individual mandate is an inseparable feature of the ACA, and therefore, because it was repealed as part of the Tax Act, the remaining provisions of the ACA are invalid as well. 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, 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 in the United States since the ACA was enacted. On August 2, 2011, the Budget Control Act of 2011 among other things, created measures for spending

reductions by Congress. A Joint Select Committee on Deficit Reduction, tasked with recommending a targeted deficit reduction of at least \$1.2 trillion for the years 2013 through 2021, was unable to reach required goals, thereby triggering the legislation's automatic reduction to several government programs. This includes aggregate reductions of Medicare payments to providers of 2% per fiscal year. These reductions went into effect on April 1, 2013 and, due to subsequent legislative amendments to the statute, will remain in effect through 2027 unless additional Congressional action is taken. On January 2, 2013, the American Taxpayer Relief Act of 2012 was signed into law, which, among other things, further reduced Medicare payments to several types of providers. Additionally, there has been heightened governmental scrutiny recently over the manner in which manufacturers set prices for their marketed products. For example, there have been several recent Congressional inquiries and proposed and enacted federal and state legislation designed to, among other things, bring more transparency to drug pricing, review the relationship between pricing and manufacturer patient programs, and reform government program reimbursement methodologies for drug products. At the federal level, the Trump administration's budget proposal for fiscal year 2019 contains further drug price control measures that could be enacted during the 2019 budget process or in other future legislation, including, for example, measures to permit Medicare Part D plans to negotiate the price of certain drugs under Medicare Part B, to allow some states to negotiate drug prices under Medicaid, and to eliminate cost sharing for generic drugs for low-income patients. Further, the Trump administration released a "Blueprint" to lower drug prices and reduce out of pocket costs of drugs 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. In addition, on January 31, 2019, the HHS Office of Inspector General, proposed modifications to the federal Anti-Kickback Statute discount safe harbor for the purpose of reducing the cost of drug products to consumers which, among other things, if finalized, will affect discounts paid by manufacturers to Medicare Part D plans, Medicaid managed care organizations and pharmacy benefit managers working with these organizations. Although a number of these, and other potential, proposals will require additional authorization to become effective, Congress and the executive branch have each indicated that it will continue to seek new legislative 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, designed to encourage importation from other countries and bulk purchasing. These new laws and initiatives may result in additional reductions in Medicare and other healthcare funding, which could have a material adverse effect on our future customers and accordingly, our financial operations.

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

If we or potential future partners, manufacturers or service providers fail to comply with healthcare laws and regulations, we or they could be subject to enforcement actions, which could affect our ability to develop, market and sell our products and may harm our reputation.

Healthcare providers, physicians and third-party payors, among others, will play a primary role in the prescription and recommendation of any product candidates for which we obtain marketing approval. Our current and future arrangements with third-party payors, providers and customers, among others, may expose us to broadly applicable fraud and abuse and other healthcare laws and regulations that may constrain the business or financial arrangements and relationships through which we market, sell and distribute our product candidates for which we obtain marketing approval. Restrictions under applicable federal and state healthcare laws and regulations, include the following:

- § the federal Anti-Kickback Statute, which prohibits, among other things, a person or entity from knowingly and willfully soliciting, offering, paying, receiving or providing remuneration, directly or indirectly, in cash or in kind, to induce or reward either the referral of an individual for, or the purchase, lease order, arranging for or recommendation of, any good, facility, item or service, for which payment may be made, in whole or in part, by a federal healthcare program, such as Medicare or Medicaid. A person or entity does not need to have actual knowledge of the statute or specific intent to violate it in order to have committed a

- violation. In addition, a violation of the Anti-Kickback Statute can form the basis for a violation of the federal False Claims Act (discussed below);
- § federal civil and criminal false claims laws and civil monetary penalties laws, including the federal False Claims Act, which provides for civil whistleblower or qui tam actions, that impose penalties against individuals or entities for 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. In addition, the government may assert that a claim including items and services resulting from a referral made in violation of the federal Anti-Kickback Statute constitutes a false or fraudulent claim for purposes of the False Claims Act;
 - § HIPAA, which imposes criminal and civil liability for executing a scheme to defraud any healthcare benefit program, or knowingly and willfully falsifying, concealing or covering up a material fact or making any materially false statement in connection with the delivery of or payment for healthcare benefits, items or services. Similar to the federal Anti-Kickback Statute, a person or entity does not need to have actual knowledge of the statute or specific intent to violate it in order to have committed a violation;
 - § HIPAA, as amended by HITECH, and its implementing regulations, including the Final Omnibus Rule published in January 2013, which impose obligations on certain covered entity healthcare providers, health plans, and healthcare clearinghouses as well as their business associates that perform certain services involving the use or disclosure of individually identifiable health information, including mandatory contractual terms, with respect to safeguarding the privacy, security and transmission of individually identifiable health information, and require notification to affected individuals and regulatory authorities of certain breaches of security of individually identifiable health information;
 - § the federal false statements statute, which prohibits knowingly and willfully falsifying, concealing or covering up a material fact or making any materially false statement in connection with the delivery of or payment for healthcare benefits, items or services;
 - § the federal transparency requirements known as the federal Physician Payments Sunshine Act, created as part of ACA, 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 to report annually to CMS information related to payments and other transfers of value made by that entity to physicians and teaching hospitals, as well as ownership and investment interests held by physicians and their immediate family members; and
 - § analogous local, state and foreign laws and regulations, such as state anti-kickback and false claims laws that may apply to healthcare items or services reimbursed by third party payors, including private insurers; local, state and foreign transparency laws that require manufacturers to report information related to payments and transfers of value to other healthcare providers and healthcare entities, marketing expenditures, or drug pricing; state laws that require pharmaceutical companies to register certain employees engaged in marketing activities in the location and comply with the pharmaceutical industry’s voluntary compliance guidelines and the relevant compliance guidance promulgated by the federal government; and state and foreign laws governing the privacy and security of health information in certain circumstances, many of which differ from each other in significant ways and often are not preempted by HIPAA, thus complicating compliance efforts.

Ensuring that our future business arrangements with third parties comply with applicable healthcare laws and regulations could involve substantial costs. If our operations are found to be in violation of any such requirements, we may be subject to penalties, including criminal and significant civil monetary penalties, damages, fines, individual imprisonment, disgorgement, contractual damages, reputational harm, exclusion from participation in government healthcare programs, integrity obligations, injunctions, recall or seizure of products, total or partial suspension of production, denial or withdrawal of pre-marketing product approvals, private qui tam actions brought by individual whistleblowers in the name of the government, refusal to allow us to enter into supply contracts, including government contracts, additional reporting requirements and oversight if subject to a corporate integrity agreement or similar agreement to resolve allegations of non-compliance with these laws, and the curtailment or restructuring of our operations, any of which could adversely affect our ability to operate our business and our results of operations. Although effective compliance programs can mitigate the risk of investigation and prosecution for violations of these laws, these risks cannot be entirely eliminated. Any action against us for an alleged or suspected violation could cause us to incur significant legal expenses and could divert our management’s attention from the operation of our business, even

if our defense is successful. In addition, achieving and sustaining compliance with applicable laws and regulations may be costly to us in terms of money, time and resources.

If we fail to comply with U.S. and foreign regulatory requirements, regulatory authorities could limit or withdraw any marketing or commercialization approvals we may receive and subject us to other penalties that could materially harm our business.

Even if we receive marketing and commercialization approval of a product candidate, we will be subject to continuing regulatory requirements, including in relation to adverse patient experiences with the product and clinical results that are reported after a product is made commercially available, both in the United States and any foreign jurisdiction in which we seek regulatory approval. The FDA has significant post-market authority, including the authority to require labeling changes based on new safety information and to require post-market studies or clinical trials to evaluate safety risks related to the use of a product or to require withdrawal of the product from the market. The FDA also has the authority to require a Risk Evaluation and Mitigation Strategy, or a REMS, after approval, which may impose further requirements or restrictions on the distribution or use of an approved drug or therapeutic biologic. The manufacturer and manufacturing facilities we use to make a future product, if any, will also be subject to periodic review and inspection by the FDA and other regulatory agencies, including for continued compliance with cGMP requirements. The discovery of any new or previously unknown problems with our third-party manufacturers, manufacturing processes or facilities may result in restrictions on the product, manufacturer or facility, including withdrawal of the product from the market. We intend to rely on third-party manufacturers, and we will not have control over compliance with applicable rules and regulations by such manufacturers. Any product promotion and advertising will also be subject to regulatory requirements and continuing regulatory review. If we or our existing or future partners, manufacturers or service providers fail to comply with applicable continuing regulatory requirements in the U.S. or foreign jurisdictions in which we seek to market our products, we or they may be subject to, among other things, fines, warning letters, holds on clinical trials, delay of approval or refusal by the FDA to approve pending applications or supplements to approved applications, suspension or withdrawal of regulatory approval, product recalls and seizures, administrative detention of products, refusal to permit the import or export of products, operating restrictions, injunction, civil penalties and criminal prosecution.

Even if we are able to commercialize any product candidate, such product candidate may become subject to unfavorable pricing regulations or third-party coverage and reimbursement policies, which would harm our business.

Our ability to commercialize any products successfully will depend, in part, on the extent to which coverage and adequate reimbursement for these products and related treatments will be available from third-party payors, such as government authorities, private health insurers and health maintenance organizations. Patients who are prescribed medications for the treatment of their conditions generally rely on third-party payors to reimburse all or part of the costs associated with their prescription drugs. Coverage and adequate reimbursement from government healthcare programs, such as Medicare and Medicaid, and private health insurers are critical to new product acceptance. Patients are unlikely to use our future products, if any, unless coverage is provided and reimbursement is adequate to cover a significant portion of the cost.

Cost-containment is a priority in the U.S. healthcare industry and elsewhere. As a result, government authorities and other third party payors have attempted to control costs 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 and are challenging the prices charged for medical products. Third-party payors also may request additional clinical evidence beyond the data required to obtain marketing approval, requiring a company to conduct expensive pharmacoeconomic studies in order to demonstrate the medical necessity and cost-effectiveness of its product. Commercial third-party payors often rely upon Medicare coverage policy and payment limitations in setting their reimbursement rates, but also have their own methods and approval process apart from Medicare determinations. Therefore, coverage and reimbursement for pharmaceutical products in the U.S. can differ significantly from payor to payor. We cannot be sure that coverage and adequate reimbursement will be available for any product that we commercialize and, if reimbursement is available, that the level of reimbursement will be adequate. Coverage and reimbursement may impact the demand for, or the price of, any product candidate for which we obtain

marketing approval. If coverage and reimbursement are not available or are available only at limited levels, we may not be able to successfully commercialize any product candidate for which we obtain marketing approval.

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

We are subject to U.S. and foreign anti-corruption and anti-money laundering laws with respect to our operations and non-compliance with such laws can subject us to criminal or civil liability and harm our business.

We are subject to the U.S. Foreign Corrupt Practices Act of 1977, as amended, or the FCPA, the U.S. domestic bribery statute contained in 18 U.S.C. § 201, the U.S. Travel Act, the USA PATRIOT Act, and possibly other state and national anti-bribery and anti-money laundering laws in countries in which we conduct activities. Anti-corruption laws are interpreted broadly and prohibit companies and their employees, agents, third-party intermediaries, joint venture partners and collaborators from authorizing, promising, offering or providing, directly or indirectly, improper payments or benefits to recipients in the public or private sector. We interact with officials and employees of government agencies and government-affiliated hospitals, universities and other organizations. In addition, we may engage third-party intermediaries to promote our clinical research activities abroad or to obtain necessary permits, licenses and other regulatory approvals. We can be held liable for the corrupt or other illegal activities of these third party intermediaries, our employees, representatives, contractors, partners and agents, even if we do not explicitly authorize or have actual knowledge of such activities.

Our Code of Business Conduct and Ethics mandates compliance with the FCPA and other anti-corruption laws applicable to our business throughout the world. However, we cannot assure you that our employees and third-party intermediaries will comply with this code or such anti-corruption laws. Noncompliance with anti-corruption and anti-money laundering laws could subject us to whistleblower complaints, investigations, sanctions, settlements, prosecution, other enforcement actions, disgorgement of profits, significant fines, damages, other civil and criminal penalties or injunctions, suspension or debarment from contracting with certain persons, the loss of export privileges, reputational harm, adverse media coverage and other collateral consequences. If any subpoenas, investigations or other enforcement actions are launched, or governmental or other sanctions are imposed, or if we do not prevail in any possible civil or criminal litigation, our business, results of operations and financial condition could be materially harmed. In addition, responding to any action will likely result in a materially significant diversion of management's attention and resources and significant defense and compliance costs and other professional fees. In certain cases, enforcement authorities may even cause us to appoint an independent compliance monitor which can result in added costs and administrative burdens.

Comprehensive tax reform bills could adversely affect our business and financial condition.

On December 20, 2017, the U.S. Congress passed the Tax Act, enacting comprehensive tax legislation that includes significant changes to the taxation of business entities. These changes include, among others: a permanent reduction to the corporate income tax rate; a partial limitation on the deductibility of business interest expense; a shift of the U.S. taxation of multinational corporations from a tax on worldwide income to a territorial system (along with certain rules designed to prevent erosion of the U.S. income tax base); and a one-time tax on accumulated offshore earnings held in cash and illiquid assets, with the latter taxed at a lower rate.

Notwithstanding the reduction in the corporate income tax rate, the overall impact of this tax reform remains uncertain, and our business and financial condition could be adversely affected. This Annual Report on Form 10-K does not provide an in-depth discussion of any such tax legislation or the manner in which it might affect purchasers of our

Class A common stock. We urge our stockholders to consult with their legal and tax advisors with respect to any such legislation and the potential tax consequences of investing in our Class A common stock.

Risks Related to Our Class A Common Stock

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

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

- § variations in the level of expense related to the ongoing development of our product candidates or future development programs;
- § results of clinical trials, or the addition or termination of clinical trials or funding support by us or potential future partners;
- § our execution of any collaboration, licensing or similar arrangements, and the timing of payments we may make or receive under potential future arrangements or the termination or modification of any such potential future arrangements;
- § any intellectual property infringement, misappropriation or violation lawsuit or opposition, interference or cancellation proceeding in which we may become involved;
- § additions and departures of key personnel;
- § strategic decisions by us or our competitors, such as acquisitions, divestitures, spin-offs, joint ventures, strategic investments or changes in business strategy;
- § if any of our product candidates receives regulatory approval, the terms of such approval and market acceptance and demand for such product candidates;
- § regulatory developments affecting our product candidates or those of our competitors; and
- § changes in general market and economic conditions.

If our quarterly operating results fall below the expectations of investors or securities analysts, the price of our Class A common stock could decline substantially. Furthermore, any quarterly fluctuations in our operating results may, in turn, cause the price of our stock to fluctuate substantially. We believe that quarterly comparisons of our financial results are not necessarily meaningful and should not be relied upon as an indication of our future performance.

Our stock price may be volatile and purchasers of our Class A common stock could incur substantial losses.

Our stock price is likely to be volatile. As a result of this volatility, investors may not be able to sell their Class A common stock at or above the initial public offering price. The market price for our Class A common stock may be influenced by many factors, including the other risks described in this section of the Annual Report on Form 10-K titled “Risk Factors” and the following:

- § our ability to advance ATRC-101 or potential future product candidates through preclinical studies and clinical trials;
- § results of preclinical studies and clinical trials of ATRC-101 or potential future product candidates, or those of our competitors or potential future partners;
- § regulatory or legal developments in the United States and other countries, especially changes in laws or regulations applicable to our products;
- § the success of competitive products or technologies;
- § introductions and announcements of new products by us, our future commercialization partners, or our competitors, and the timing of these introductions or announcements;
- § actions taken by regulatory agencies with respect to our products, clinical trials, manufacturing process or sales and marketing terms;
- § actual or anticipated variations in our financial results or those of companies that are perceived to be similar to us;
- § the success of our efforts to acquire or in-license additional technologies, products or product candidates;

- § developments concerning any future collaborations, including, but not limited to, those with our sources of manufacturing supply and our commercialization partners;
- § market conditions in the pharmaceutical and biotechnology sectors;
- § announcements by us or our competitors of significant acquisitions, strategic partnerships, joint ventures or capital commitments;
- § developments or disputes concerning patents or other proprietary rights, including patents, litigation matters and our ability to obtain patent protection for our products;
- § our ability or inability to raise additional capital and the terms on which we raise it;
- § the recruitment or departure of key personnel;
- § changes in the structure of healthcare payment systems;
- § actual or anticipated changes in earnings estimates or changes in stock market analyst recommendations regarding our Class A common stock, other comparable companies or our industry generally;
- § our failure or the failure of our competitors to meet analysts' projections or guidance that we or our competitors may give to the market;
- § fluctuations in the valuation of companies perceived by investors to be comparable to us;
- § announcement and expectation of additional financing efforts;
- § speculation in the press or investment community;
- § trading volume of our Class A common stock;
- § sales of our Class A common stock by us or our stockholders;
- § the concentrated ownership of our Class A common stock;
- § changes in accounting principles;
- § terrorist acts, acts of war or periods of widespread civil unrest;
- § natural disasters and other calamities; and
- § general economic, industry and market conditions.

In addition, the stock markets in general, and the markets for pharmaceutical, biopharmaceutical and biotechnology stocks in particular, have experienced extreme volatility that has been often unrelated to the operating performance of the issuer. These broad market and industry factors may seriously harm the market price of our Class A common stock, regardless of our operating performance.

The future issuance of equity or of debt securities that are convertible into equity would dilute our share capital.

We may choose to raise additional capital in the future, depending on market conditions, strategic considerations and operational requirements. To the extent that additional capital is raised through the issuance of shares or other securities convertible into shares, our stockholders will be diluted. Future issuances of our Class A common stock or other equity securities, or the perception that such sales may occur, could adversely affect the trading price of our Class A common stock and impair our ability to raise capital through future offerings of shares or equity securities. No prediction can be made as to the effect, if any, that future sales of Class A common stock or the availability of Class A common stock for future sales will have on the trading price of our Class A common stock.

The dual class structure of our common stock and the option of the holder of shares of our Class B common stock to convert into shares of our Class A common stock may limit your ability to influence corporate matters.

Our Class A common stock has one vote per share, while our Class B common stock is non-voting. Nonetheless, each share of our Class B common stock may be converted at any time into one share of Class A common stock at the option of its holder, subject to the limitations provided for in our amended and restated certificate of incorporation. Consequently, if holders of Class B common stock exercise their option to make this conversion, this will have the effect of increasing the relative voting power of those prior holders of our Class B common stock, and correspondingly decrease the voting power of the current holders of our Class A common stock, which may limit your ability to influence corporate matters. Because our Class B common stock is generally non-voting, stockholders who own more than 10% of our common stock overall but 10% or less of our Class A common stock will not be required to report changes in their ownership from transactions in our Class B common stock pursuant to Section 16(a) of the Securities Exchange Act of 1934, as amended, or the Exchange Act, and would not be subject to the short-swing profit

provisions of Section 16(b) of the Exchange Act. In addition, acquisitions of Class B common stock would not be subject to notification pursuant to the Hart-Scott-Rodino Antitrust Improvements Act of 1976, as amended.

An active trading market for our Class A common stock may not develop.

In June 2019, we completed the initial public offering of our Class A common stock. Although our Class A common stock trades on The Nasdaq Global Select Market, an active trading market for our shares may never develop or be sustained. If an active market for our Class A common stock does not develop, it may be difficult for stockholders to sell our shares without depressing the market price for the shares or at all.

Our management has flexibility in allocating the net proceeds from our initial public offering, and you may not agree with how we use these proceeds, and these proceeds may not be invested successfully.

We intend to use the net proceeds from our initial public offering to fund preclinical and clinical development activities, further development of our discovery platform, discover new product candidates, hire additional personnel, make capital expenditures, pay costs of operating as a public company and fund other general purposes. We may also use a portion of the net proceeds from our initial public offering to in-license, acquire or invest in complementary businesses, technologies, products or assets. However, we have no current commitments or obligations to do so. Therefore, our management will have flexibility in allocating the net proceeds from our initial public offering. Accordingly, you will be relying on the judgment of our management with regard to the allocation of these net proceeds, and you will not have the opportunity, as part of your investment decision, to assess whether the proceeds are being allocated appropriately. It is possible that the proceeds will be invested in a way that does not yield a favorable, or any, return for our company.

If securities or industry analysts do not publish research or reports about our company, or if they issue an adverse or misleading opinion regarding our stock, our stock price and trading volume could decline.

The trading market for our Class A common stock will be influenced by the research and reports that industry or securities analysts publish about us or our business. We do not currently have and may never obtain research coverage by securities and industry analysts. If no or few securities or industry analysts commence coverage of our company, the trading price for our Class A common stock would be negatively impacted. In the event we obtain securities or industry analyst coverage, if any of the analysts who cover us issue an adverse or misleading opinion regarding us, our business model, our intellectual property rights or our Class A common stock performance, or if our target studies and operating results fail to meet the expectations of the analysts, our stock price would likely decline. If one or more of these analysts cease coverage of our company or fail to publish reports on us regularly, we could lose visibility in the financial markets, which in turn could cause our stock price or trading volume to decline.

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

Based on the beneficial ownership of our capital stock as of December 31, 2019, our executive officers and directors, together with holders of 5% or more of our capital stock and their respective affiliates, beneficially owned approximately 76.0% of our Class A common stock and Class B common stock. As a result, these stockholders, if acting together, will continue to have significant influence over the outcome of corporate actions requiring stockholder approval, including the election of directors, any merger, consolidation or sale of all or substantially all of our assets and any other significant corporate transaction. In addition, pursuant to a nominating agreement between us and Baker Brothers Life Sciences L.P. and 667, L.P., or together, Baker Brothers, following the closing of our initial public offering and so long as Baker Brothers together with its affiliates beneficially owns at least 3,333,333 shares of our common stock, we will have the obligation to support the nomination of, and to cause our board of directors to include in the slate of nominees recommended to our stockholders for election, two individuals designated by Baker Brothers, each a Baker Designee, subject to customary conditions and exceptions, as well as the obligation to invite two board of directors observer designees of Baker Brothers to attend all meetings of our board of directors and all meetings of the committees of our board of directors as a nonvoting observer, if there is no Baker Designee on our board of directors, subject to customary conditions and exceptions. Baker Brothers and its affiliates may therefore have influence over

management and control over matters requiring stockholder approval, including the annual election of directors and significant corporate transactions, such as a merger or other sale of our company or its assets, following the closing of our initial public offering and for the foreseeable future.

The interests of these stockholders may not be the same as, and may even conflict with, your interests. For example, these stockholders could delay or prevent a change of control of our company, even if such a change of control would benefit our other stockholders, which could deprive our stockholders of an opportunity to receive a premium for their Class A common stock as part of a sale of our company or our assets and might affect the prevailing market price of our Class A common stock. The significant concentration of stock ownership may adversely affect the trading price of our Class A common stock due to investors' perception that conflicts of interest may exist or arise.

Sales of a substantial number of shares of our Class A common stock or Class B common stock by our existing stockholders in the public market could cause our stock price to fall.

If our existing stockholders sell, or indicate an intention to sell, substantial amounts of our Class A common stock in the public market after the lock-up and other legal restrictions on resale in connection with our initial public offering lapse, the trading price of our Class A common stock could decline. These lock-up agreements expired in December 2019, which was 180 days from the date of the June 2019 Prospectus filed in connection with our initial public offering. In addition, shares of Class A common stock that are either subject to outstanding options or reserved for future issuance under our 2019 Equity Incentive Plan, or our 2019 Plan, will become eligible for sale in the public market to the extent permitted by the provisions of various vesting schedules, the lock-up agreements and Rule 144 and Rule 701 under the Securities Act of 1933, as amended, or the Securities Act. If these additional shares of Class A common stock are sold, or if it is perceived that they will be sold, in the public market, the trading price of our Class A common stock could decline.

The holders of 17,248,259 shares of our Class A common stock (including Class A common stock issuable upon conversion of Class B common stock) at December 31, 2019 are entitled to rights with respect to the registration of their shares under the Securities Act. Registration of these shares under the Securities Act would result in the shares becoming freely tradable without restriction under the Securities Act, except for shares held by affiliates, as defined in Rule 144 under the Securities Act. Any sales of securities by these stockholders could have a material adverse effect on the trading price of our Class A common stock.

Future sales and issuances of our Class A common stock or Class B common stock or rights to purchase Class A common stock or Class B common stock, including pursuant to our 2019 Plan, could result in additional dilution of the percentage ownership of our stockholders and could cause our stock price to fall.

We expect that significant additional capital may be needed in the future to continue our planned operations, including further development of our discovery platform, preparing IND filings, conducting clinical trials, commercialization efforts, expanded research and development activities and costs associated with operating a public company. To raise capital, we may sell Class A common stock or Class B common stock, convertible securities or other equity securities in one or more transactions at prices and in a manner we determine from time to time. If we sell Class A common stock or Class B common stock, convertible securities or other equity securities, investors may be materially diluted by subsequent sales. Such sales may also result in material dilution to our existing stockholders, and new investors could gain rights, preferences and privileges senior to the holders of our Class A common stock.

Pursuant to our 2019 Plan, our management is authorized to grant stock options to our employees, directors and consultants. Initially, the aggregate number of shares of our Class A common stock that may be issued pursuant to stock awards under our 2019 Plan is 6,141,842 shares. Additionally, the number of shares of our Class A common stock reserved for issuance under our 2019 Plan will automatically increase on January 1 of each year, beginning on January 1, 2020 and continuing through and including January 1, 2029, by 4% of the total number of shares of our capital stock outstanding on December 31 of the preceding calendar year, or a lesser number of shares determined by our board of directors. Unless our board of directors elects not to increase the number of shares available for future grant each year, our stockholders may experience additional dilution, which could cause our stock price to fall.

We are an “emerging growth company” and our election of reduced reporting requirements applicable to emerging growth companies may make our Class A common stock less attractive to investors.

We are an “emerging growth company” as defined in the Jumpstart Our Business Startups Act, or JOBS Act. For as long as we continue to be an emerging growth company, we may take advantage of exemptions from various reporting requirements that are applicable to other public companies that are not emerging growth companies, including not being required to comply with the auditor attestation requirements of Section 404 of the Sarbanes-Oxley Act, or Section 404, reduced disclosure obligations regarding executive compensation in our periodic reports and proxy statements and exemptions from the requirements of holding a nonbinding advisory vote on executive compensation and stockholder approval of any golden parachute payments not previously approved. We could be an emerging growth company for up to five years following the completion of our initial public offering, although circumstances could cause us to lose that status earlier, including if we are deemed to be a “large accelerated filer,” which occurs when the market value of our Class A common stock that is held by non-affiliates exceeds \$700 million as of the prior June 30, or if we have total annual gross revenue of \$1.07 billion or more during any fiscal year before that time, in which cases we would no longer be an emerging growth company as of the following December 31, or if we issue more than \$1.0 billion in non-convertible debt during any three-year period before that time, in which case we would no longer be an emerging growth company immediately. Even after we no longer qualify as an emerging growth company, we could still qualify as a “smaller reporting company,” which would allow us to take advantage of many of the same exemptions from disclosure requirements including not being required to comply with the auditor attestation requirements of Section 404 and reduced disclosure obligations regarding executive compensation in our periodic reports and proxy statements. We cannot predict if investors will find our Class A common stock less attractive because we may rely on these exemptions. If some investors find our Class A common stock less attractive as a result, there may be a less active trading market for our Class A common stock and our share price may be more volatile.

Under the JOBS Act, emerging growth companies can also delay adopting new or revised accounting standards until such time as those standards apply to private companies. We have elected to avail ourselves of an exemption that allows us to delay adopting new or revised accounting standards until such time as those standards apply to private companies. As a result, we will not be subject to the same new or revised accounting standards as other public companies that comply with the public company effective dates, including but not limited to the new lease accounting standard. We may also elect to take advantage of other reduced reporting requirements in future filings. As a result of these elections, the information that we provide to our stockholders may be different than you might receive from other public reporting companies. However, if we later decide to opt out of the extended period for adopting new accounting standards, we would need to disclose such decision and it would be irrevocable.

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

As a public company, and particularly after we are no longer an emerging growth company, we will incur significant legal, accounting and other expenses that we did not incur as a private company. The Sarbanes-Oxley Act, the Dodd-Frank Wall Street Reform and Consumer Protection Act, the listing requirements of the Nasdaq Stock Market and other applicable securities rules and regulations impose various requirements on public companies, including establishment and maintenance of effective disclosure and financial controls and corporate governance practices. Our management and other personnel will need to devote a substantial amount of time to these compliance initiatives. Moreover, these rules and regulations will increase our legal and financial compliance costs and will make some activities more time-consuming and costly. For example, we expect that these rules and regulations may make it more difficult and more expensive for us to obtain director and officer liability insurance, which in turn could make it more difficult for us to attract and retain qualified members of our board of directors. However, these rules and regulations are often subject to varying interpretations, in many cases due to their lack of specificity, and, as a result, their application in practice may evolve over time as new guidance is provided by regulatory and governing bodies. This could result in continuing uncertainty regarding compliance matters and higher costs necessitated by ongoing revisions to disclosure and governance practices.

Our ability to use net operating losses, or NOLs, to offset future taxable income may be subject to certain limitations.

In general, under Section 382 of the Internal Revenue Code of 1986, as amended, or the Code, a corporation that undergoes an “ownership change” is subject to limitations on its ability to utilize its pre-change NOL or tax credits to offset future taxable income. Our existing NOLs or credits may be subject to substantial limitations arising from previous ownership changes, and if we undergo an ownership change our ability to utilize NOLs or credits could be further limited by Section 382 of the Code. In addition, future changes in our stock ownership, many of which are outside of our control, could result in an ownership change under Section 382 of the Code. Our NOLs or credits may also be impaired under state law. Accordingly, we may not be able to utilize a material portion of our NOLs or credits. Furthermore, our ability to utilize our NOLs or credits is conditioned upon our attaining profitability and generating U.S. federal and state taxable income. As described above under “—Risks Related to Business,” we have incurred significant net losses since our inception and anticipate that we will continue to incur significant losses for the foreseeable future; thus, we do not know whether or when we will generate the U.S. federal or state taxable income necessary to utilize our NOLs or credits.

We previously identified a material weakness in our internal control over financial reporting, which we believe has now been remediated. Any future failure to establish and maintain effective internal control over financial reporting could result in material misstatements in our financial statements and cause investors to lose confidence in our reported financial information, which in turn could cause the trading price of our securities to decline.

We previously identified a material weakness in our internal control over financial reporting related to a lack of application-based controls inherent in our enterprise resource planning, or ERP, system used for maintaining our financial books and records. As a result of such weakness, our management concluded that our disclosure controls and procedures and internal control over financial reporting were not effective as of December 31, 2018 and December 31, 2017.

As of December 31, 2019, management sufficiently completed its remediation of this material weakness by taking the following actions:

- " We have implemented a new ERP system that is our system of record for our financial books and records from January 1, 2019 forward. This new ERP system has strong application-based controls inherent in its design that provide a stronger internal control infrastructure for financial reporting and for our internal control procedures.
- " We strengthened the segregation of duties by hiring additional personnel and implementing workflows to appropriately segregate the incompatible duties of custody of assets, approvals and authorizations, and recording of transactions;
- " We designed additional controls around identification, documentation and application of technical accounting guidance with particular emphasis on events outside the ordinary course of business. These controls include the implementation of additional supervision and review activities by qualified personnel, the preparation of formal accounting memoranda to support our conclusions on technical accounting matters, and the development and use of checklists and research tools to assist in compliance with generally accepted accounting principles with regard to complex accounting issues.
- " We developed and implemented policies and procedures related to security access, including security access reviews of our key financial systems’ users to ensure the appropriateness of their roles and security access levels.
- " We performed testing related to the functioning of these controls and continue to monitor these controls and make enhancements as needed.

We have completed the documentation and review of the corrective actions described above and our management has concluded that the design and operation of our closing and financial reporting processes is effective and the previously identified material weakness has been remediated as of December 31, 2019.

Although we have remediated this material weakness in our internal control over financial reporting, any failure to improve our disclosure controls and procedures or internal control over financial reporting to address any identified

weaknesses in the future, if they were to occur, could prevent us from maintaining accurate accounting records and discovering material accounting errors. Any of these results could adversely affect our business and the value of our common stock.

Because we do not anticipate paying any cash dividends on our capital stock in the foreseeable future, capital appreciation, if any, will be your sole source of gain.

We have never declared or paid cash dividends on our capital stock. We currently intend to retain all of our future earnings, if any, to finance the growth and development of our business. As a result, capital appreciation, if any, of our Class A common stock will be your sole source of gain for the foreseeable future.

We may incur significant costs from class action litigation due to our expected stock volatility.

Our stock price may fluctuate for many reasons, including as a result of public announcements regarding the progress of our development efforts for our discovery platform and our product candidates, the development efforts of future partners or competitors, the addition or departure of our key personnel, variations in our quarterly operating results and changes in market valuations of biopharmaceutical and biotechnology companies. This risk is especially relevant to us because biopharmaceutical and biotechnology companies have experienced significant stock price volatility in recent years. When the market price of a stock has been volatile as our stock price may be, holders of that stock have occasionally brought securities class action litigation against the company that issued the stock. If any of our stockholders were to bring a lawsuit of this type against us, even if the lawsuit is without merit, we could incur substantial costs defending the lawsuit. The lawsuit could also divert the time and attention of our management.

Anti-takeover provisions in our charter documents and under Delaware law could make an acquisition of our company, which may be beneficial to our stockholders, more difficult and may prevent attempts by our stockholders to replace or remove our current management.

Provisions in our amended and restated certificate of incorporation and our amended and restated bylaws may delay or prevent an acquisition of our company or a change in our management. In addition, these provisions may frustrate or prevent any attempts by our stockholders to replace or remove our current management by making it more difficult for stockholders to replace members of our board of directors. Because our board of directors is responsible for appointing the members of our management team, these provisions could in turn affect any attempt by our stockholders to replace current members of our management team. These provisions include:

- § a prohibition on actions by our stockholders by written consent;
- § a requirement that special meetings of stockholders, which our company is not obligated to call more than once per calendar year, be called only by the chairman of our board of directors, our chief executive officer, or our board of directors pursuant to a resolution adopted by a majority of the total number of authorized directors;
- § advance notice requirements for election to our board of directors and for proposing matters that can be acted upon at stockholder meetings;
- § division of our board of directors into three classes, serving staggered terms of three years each; and
- § the authority of the board of directors to issue preferred stock with such terms as the board of directors may determine.

Moreover, because we are incorporated in Delaware, we are governed by the provisions of Section 203 of the Delaware General Corporation Law, as amended, which prohibits a person who owns in excess of 15% of our outstanding voting stock from merging or combining with us for a period of three years after the date of the transaction in which the person acquired in excess of 15% of our outstanding voting stock, unless the merger or combination is approved in a prescribed manner. These provisions would apply even if the proposed merger or acquisition could be considered beneficial by some stockholders.

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

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

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

This provision would not apply to suits brought to enforce a duty or liability created by the Exchange Act or any other claim for which the U.S. federal courts have exclusive jurisdiction.

Our amended and restated certificate of incorporation provides that the federal district courts of the United States of America will be the exclusive forum for resolving any complaint asserting a cause of action arising under the Securities Act, subject to and contingent upon a final adjudication in the State of Delaware of the enforceability of such exclusive forum provision.

These exclusive-forum provisions may limit a stockholder's ability to bring a claim in a judicial forum that it finds favorable for disputes with us or our directors, officers, or other employees, which may discourage lawsuits against us and our directors, officers, and other employees. If any other court of competent jurisdiction were to find either exclusive-forum provision in our amended and restated certificate of incorporation to be inapplicable or unenforceable, we may incur additional costs associated with resolving the dispute in other jurisdictions, which could seriously harm our business. For example, the Court of Chancery of the State of Delaware recently determined that a provision stating that U.S. federal district courts are the exclusive forum for resolving any complaint asserting a cause of action arising under the Securities Act is not enforceable. However, this decision may be reviewed and ultimately overturned by the Delaware Supreme Court.

Item 1B. Unresolved Staff Comments

None.

Item 2. Properties

Our principal executive offices are currently located at 450 East Jamie Court, South San Francisco, California, 94080, where the Company leases approximately 74,788 square feet of office and lab space. In addition, we rent approximately 33,000 square feet of office space in a separate facility.

We lease all of our facilities and do not own any real property. We believe our facilities are adequate and suitable for our current needs and that, should it be needed, suitable additional or alternative space will be available to accommodate our operations.

Item 3. Legal Proceedings

From time to time, we may become involved in litigation relating to claims arising from the ordinary course of business. Our management believes that there are currently no claims or actions pending against us, the ultimate disposition of which would have a material adverse effect on our results of operations, financial condition or cash flows.

Item 4. Mine Safety Disclosures

Not Applicable

PART II

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

Market Information for Common Stock

Our Class A common stock is traded on The Nasdaq Select Global Market, or Nasdaq, under the symbol “BCEL.” Our Class B Common Stock is not listed or traded on any exchange, but each share of Class B common stock is convertible at any time at the option of the holder into one share of Class A common stock.

Holders of Record

As of March 9, 2020, there were 106 stockholders of record of our Class A common stock, and the closing price of our Class A common stock was \$21.25 per share as reported on the Nasdaq. Because many of our shares of Class A common stock are held by brokers and other institutions on behalf of stockholders, we are unable to estimate the total number of stockholders represented by these record holders. As of March 9, 2020, there were 2 stockholders of record of our Class B common stock.

Dividend Policy

We have never declared or paid any dividends on our common stock. We currently intend to retain all available funds and any future earnings for the operation and expansion of our business. Accordingly, we do not anticipate declaring or paying dividends in the foreseeable future. The payment of any future dividends will be at the discretion of our board of directors and will depend on our results of operations, capital requirements, financial condition, prospects, contractual arrangements, any limitations on payment of dividends present in any debt agreements, and other factors that our board of directors may deem relevant.

Recent Sales of Unregistered Securities

None.

Issuer Purchases of Equity Securities

None.

Stock Performance Graph

The disclosures of the Company’s stock performance graph is not required because we qualify as a smaller reporting company under federal securities laws.

Item 6. Selected Financial Data

The disclosures in this section are not required because we qualify as a smaller reporting company under federal securities laws.

Item 7. Management’s Discussion and Analysis of Financial Condition and Results of Operations

The following discussion and analysis of our financial condition and results of operations should be read in conjunction with the consolidated financial statements and related notes thereto included in Part II, Item 8, “Financial Statements and Supplementary Data,” of this Form 10-K. Some of the information contained in this discussion and analysis or set forth elsewhere in this Form 10-K, including information with respect to our plans and strategy for our business, includes forward-looking statements that involves risks and uncertainties. See “Special Note Regarding Forward-Looking Statements” and “Risk Factors” for a discussion of forward-looking statements and important factors that could cause actual results to differ materially from the results described in or implied by the forward-looking statements. All information presented herein is based on our fiscal calendar. Unless otherwise stated, references to particular years, quarters, months or periods refer to our fiscal years ended December 31 and the associated quarters, months and periods of those fiscal years.

Overview

We are a clinical-stage biopharmaceutical company utilizing our differentiated platform to discover and develop novel antibody-based immunotherapeutics to treat a range of solid tumor types. While more traditional oncology drug discovery approaches attempt to generate antibodies against known targets, our approach relies on the human immune system to direct us to unique antibody-target pairs from patients experiencing a clinically meaningful, active immune response against their tumors. These unique antibody-target pairs represent a potentially novel and previously unexplored landscape of immuno-oncology targets. We believe the fact that our approach has the potential to deliver novel, previously unexplored immuno-oncology targets provides us with a significant competitive advantage over traditional approaches which focus on known targets that many companies are aware of and can pursue. We have utilized our drug discovery approach to identify over 1,600 distinct human antibodies that bind preferentially to tumor tissue from patients who are not the source of the antibody. Our lead product candidate, ATRC-101, is a monoclonal antibody with a novel mechanism of action and target derived from an antibody identified using our discovery platform. ATRC-101 reacts in vitro with a majority of human ovarian, non-small cell lung, colorectal and breast cancer samples from multiple patients. It has demonstrated robust anti-tumor activity as a single agent in multiple preclinical models, including one model in which PD-1 checkpoint inhibitors typically display limited activity. We filed the Investigational New Drug, or IND, application for ATRC-101, which was cleared by the U.S. Food and Drug Administration, or FDA, in the fourth quarter of 2019 and have initiated a Phase 1b clinical trial in patients with select solid tumors in which the first patient was dosed in February 2020.

Since commencing operations in 2010, we have devoted substantially all our resources to research and development, raising capital, building our management team and building our intellectual property portfolio. We do not have any products approved for marketing or sale and have not generated any revenue from product sales. We have funded our operations to date primarily from the sale of convertible preferred stock. We have also received more than \$15 million in payments to date under our service agreement with the Bill & Melinda Gates Foundation.

We have incurred significant operating losses since our inception. Our ability to generate product revenue sufficient to achieve or sustain profitability will depend on the successful development, regulatory approval and eventual commercialization of one or more of our current or future product candidates. Our net losses were \$67.5 million and \$37.9 million for the years ended December 31, 2019 and 2018, respectively. As of December 31, 2019, we had an accumulated deficit of \$164.1 million. We anticipate that a substantial portion of our capital resources and efforts in the foreseeable future will be focused on discovering, completing the necessary development, obtaining regulatory approval for and preparing for potential commercialization of product candidates. As of December 31, 2019, our cash, cash equivalents and investments were \$183.4 million.

We expect to continue to incur significant expenses and increasing operating losses for the foreseeable future. Our net losses may fluctuate significantly from period to period, depending on the timing of our planned preclinical

studies and clinical trials and expenditures on other research and development activities. We expect our expenses will increase substantially over time as we:

- § complete clinical trials for ATRC-101 and initiate preclinical studies on any additional product candidates that we may pursue in the future;
- § continue research and development to expand our growing library of more than 1,600 antibodies and develop potential future product candidates from that collection;
- § continue to invest in advancing our differentiated discovery platform, and the underlying technologies;
- § seek marketing approvals for product candidates that successfully complete clinical trials;
- § maintain, protect and expand our portfolio of intellectual property rights, including patents, trade secrets and know-how;
- § implement additional operational, financial and management systems; and
- § attract, hire and retain additional administrative, clinical, regulatory and research personnel.

Furthermore, as a result of the closing of our initial public offering in June 2019, costs associated with operating as a public company have increased. Such costs include significant legal, accounting, insurance, investor relations and other expenses that we did not incur historically as a private company.

Financial Operations Overview

Revenue

We have no products approved for marketing or commercial sale and have never generated any revenue from product sales.

Operating Expenses

Research and Development

Research and development expenses represent costs incurred in performing research, development and manufacturing activities in support of our own product development efforts, including intellectual property legal expenses, salaries, employee benefits and stock-based compensation for personnel contributing to research and development activities, laboratory supplies, outsourced research and development expenses, professional services and allocated facilities-related costs. We expect our research and development expenses to increase in the foreseeable future as we continue to invest in our differentiated discovery platform to expand our pipeline of product candidates, advance our product candidates into and through preclinical studies and clinical trials and pursue regulatory approval of our product candidates.

General and Administrative

Our general and administrative expenses consist primarily of personnel costs, allocated facilities costs and other expenses for outside professional services, including legal, human resource, audit and accounting services. We expect to incur additional general and administrative expenses as we continue to support the growth of our business and incur the costs of compliance associated with being a public company.

Interest and Other Income (Expense)

Other income (expense) includes other income which represents amounts received from partners for research and discovery services, interest income earned on our cash, cash equivalents and investments, interest expense, revaluation expense resulting from the liability recorded for certain preferred stock warrants and gains or losses on the periodic disposals of property and equipment.

Results of Operations

Comparison of the Years Ended December 31, 2019 and 2018

The following table summarizes our results of operations during the respective periods:

	Year Ended December 31,		Change	
	2019	2018	\$	%
	(in thousands)			
Operating expenses:				
Research and development	\$ 54,726	\$ 32,513	\$ 22,213	68 %
General and administrative	17,845	7,060	10,785	153 %
Total operating expenses	<u>72,571</u>	<u>39,573</u>	<u>32,998</u>	83 %
Operating Loss	(72,571)	(39,573)	(32,998)	83 %
Other income (expense), net:				
Other income	2,134	961	1,173	122 %
Interest income	3,213	714	2,499	350 %
Interest expense	(6)	(9)	3	(33) %
Preferred stock warrant liability revaluation	(123)	(33)	(90)	*
Foreign exchange loss	(8)	—	(8)	*
Loss on disposal of property and equipment	(122)	(1)	(121)	*
Total other income, net	<u>5,088</u>	<u>1,632</u>	<u>3,456</u>	212 %
Income tax benefit (expense)	(1)	1	(2)	*
Net Loss	<u>\$ (67,484)</u>	<u>\$ (37,940)</u>	<u>\$ (29,544)</u>	78 %

* Not meaningful

Research and Development

The following table summarizes our research and development expenses incurred during the respective periods:

	Year Ended December 31,	
	2019	2018
	(in thousands)	
Personnel related (including stock-based compensation)	\$ 20,440	\$ 12,250
Product and preclinical contract services	15,453	8,453
Laboratory supplies and equipment	6,666	4,549
Consulting, legal and other services	4,131	3,614
Facility related	5,706	1,757
Other	2,330	1,890
Total research and development expenses	<u>\$ 54,726</u>	<u>\$ 32,513</u>

Research and development expenses increased by \$22.2 million, or 68%, during the year ended December 31, 2019 compared to the same period in 2018. The increase was primarily attributable to higher personnel-related expenses of \$8.2 million as a result of additional employee headcount, a \$7.0 million increase in product and preclinical development costs primarily associated with efforts to advance ATRC-101 towards an IND application in late 2019, \$3.9 million and \$2.1 million of increases in facility and lab-related expenses due to expansion of lab facilities and activities.

General and Administrative

General and administrative expenses increased by \$10.8 million, or 153%, during the year ended December 31, 2019 compared to the same period in 2018. The increase consists of a \$5.4 million increase in personnel-related expenses, including stock-based compensation, as a result of additional employee headcount, a \$1.9 million increase in

consulting, legal and other services costs primarily due to increasing legal costs related compliance work, and IND filing for ATRC-101 and a \$2.3 million increase in other expenses in relation to software subscriptions and employee relations.

Other Income

Other income is comprised of amounts earned from research and discovery services provided to partners under service agreements. Other income increased by \$1.2 million during the year ended December 31, 2019 compared to the same period in 2018 due largely to an increase in the level of services being provided to external partners.

Interest Income

Interest income increased to \$3.2 million during the year ended December 31, 2019 compared to \$0.7 million during the year ended December 31, 2018 due to increased interest earned on our cash, cash equivalents and investment balances which were significantly higher in 2019 compared to 2018.

Interest Expense

Interest expense during the year ended December 31, 2019 and 2018 pertained to the interest portion of payments made on capital leases under which we acquired certain property and equipment.

Preferred Stock Warrant Liability Revaluation

Preferred stock warrant liability revaluation recognizes changes in the fair value of the preferred stock warrants. We recognized an expense of \$123,000 during the year ended December 31, 2019 primarily as a result of an increase in the estimated fair market value of our company during that period.

Liquidity and Capital Resources; Plan of Operations

Liquidity and Capital Resources

As of December 31, 2019, we had cash, cash equivalents and investments totaling \$183.4 million. Our cash and cash equivalents primarily consist of bank deposits and money market funds. Our investments consist of U.S. government treasury securities.

Due to our significant research and development expenditures, we have generated significant operating losses since inception. We have funded our operations primarily through the sale of convertible preferred stock and common stock. We have also received more than \$15 million under our agreement with the Bill & Melinda Gates Foundation to date. In September 2018, we issued and sold 8,941,325 shares of Series C1 convertible preferred stock and Series C2 convertible preferred stock for gross proceeds of approximately \$125.0 million.

In June 2019, we completed our initial public offering, or IPO, of 6,452,500 shares of our Class A common stock and 2,000,000 shares of our Class B common stock at an offering price of \$17.00 per share, including 1,102,500 shares pursuant to the underwriters' option to purchase additional shares of the Company's Class A common stock. We received net proceeds of \$130.8 million in our IPO, after deducting underwriting discounts and commissions of \$10.1 million and offering expenses of \$2.8 million. As of December 31, 2019, we had an accumulated deficit of \$164.1 million.

Our management evaluates whether there are relevant conditions and events that in the aggregate raise substantial doubt about our ability to continue as a going concern and to meet its obligations as they become due within one year from the date that the financial statements are issued. We believe our existing cash, cash equivalents and investments will be sufficient to fund our operating and capital needs for at least the next 12 months.

We are subject to risks and uncertainties common to early-stage companies in the biotechnology industry, including, but not limited to, development by competitors of new technological innovations, dependence on key

personnel, protection of proprietary technology, compliance with government regulations and the ability to secure additional capital to fund operations. Identification and development of product candidates will require significant additional research and development efforts, including extensive preclinical and clinical testing and regulatory approval prior to commercialization. These efforts require significant amounts of additional capital, adequate personnel and infrastructure and extensive compliance-reporting capabilities. Even if our drug development efforts are successful, it is uncertain when, if ever, we will realize significant revenue from product sales.

Cash Flows

The following table summarizes our cash flows for the periods indicated:

	Year Ended December 31,	
	2019	2018
	(in thousands)	
Cash used in operating activities	\$ (58,538)	\$ (34,700)
Cash (used in) provided by investing activities	(27,904)	20,658
Cash provided by financing activities	131,174	120,304
Net increase in cash and cash equivalents and restricted cash	\$ 44,732	\$ 106,262

Cash Flows from Operating Activities

For the year ended December 31, 2019, cash used in operating activities was \$58.5 million, which consisted of a net loss of \$67.5 million, partially offset by \$7.2 million in non-cash charges and a net change of \$1.7 million in our net operating assets and liabilities. The non-cash charges consisted of depreciation and amortization of \$1.7 million and stock-based compensation of \$6.1 million, partially offset by accretion of discount on investments of \$0.8 million. The change in operating assets and liabilities was primarily due to increases in accounts payable of \$0.8 million and accrued expense of \$2.5 million resulting from an increase in personnel-related expenses as a result of additional employee headcount and costs related to contractual manufacturing services, partially offset by an increase in prepaid expenses of \$2.4 million as a result of increases in prepaid rent and prepaid insurance, partially offset by decreases in vendor prepayments and deposit.

For the year ended December 31, 2018, cash used in operating activities was \$34.7 million, which consisted of a net loss of \$37.9 million, partially offset by \$2.9 million in non-cash charges and a net change of \$0.4 million in our net operating assets and liabilities. The non-cash charges primarily consisted of stock-based compensation of \$1.4 million and depreciation and amortization of \$1.4 million. The change in operating assets and liabilities was primarily due to the net effect of an increase in payables and accruals of \$1.8 million and an increase in prepaid expenses and other current assets of \$1.4 million resulting from the timing of payments made for research and development activities.

Cash Flows from Investing Activities

For the year ended December 31, 2019, cash used in investing activities of \$27.9 million was primarily related to \$99.6 million in net purchases of investments and \$3.4 million in purchases of property and equipment, partially offset by \$75.0 million provided by proceeds from maturities of investments.

For the year ended December 31, 2018, cash provided by investing activities of \$20.7 million was primarily attributable to maturities of investments totaling \$22.4 million, partially offset by investments in property and equipment of \$1.8 million.

Cash Flows from Financing Activities

For the year ended December 31, 2019, cash provided by financing activities was \$131.2 million, which primarily related to \$133.6 million proceeds from the IPO, net of underwriting discounts and commissions, partially offset by \$2.8 million in payments related to IPO costs.

For the year ended December 31, 2018, cash provided by financing activities was \$120.3 million, primarily related to \$120.3 million proceeds from issuance convertible preferred stock, net of fees and commissions.

Off-Balance Sheet Arrangements

Our liquidity is not dependent on the use of off-balance sheet financing arrangements (as that term is defined in Item 303(a) (4) (ii) of Regulation S-K) and as of December 31, 2019, we had no such arrangements. There has been no material change in our contractual obligations other than in the ordinary course of business since our fiscal year ended December 31, 2019. Since inception, we have not engaged in any off-balance sheet arrangements, as defined in the rules and regulations of the SEC.

Contractual Obligations and Other Commitments

The following table summarizes our contractual obligations as of December 31, 2019:

	Payments Due by Period				Total
	Less than 1 Year	1 to 3 Years	3 to 5 Years	More than 5 Years	
Contractual obligations:					
Operating lease obligations	\$ 5,622	\$ 14,033	\$ 14,286	\$ 69,091	\$ 103,032
Capital lease obligations	51	55	—	—	106
Total contractual obligations	<u>\$ 5,673</u>	<u>\$ 14,088</u>	<u>\$ 14,286</u>	<u>\$ 69,091</u>	<u>\$ 103,138</u>

The operating lease obligations noted above represent operating lease obligations related to our currently occupied premises in South San Francisco, California and premises in San Carlos, California, which we are obligated to occupy in the future. These leases expire at various dates through the first half of 2033.

In July 2019, we entered into a lease agreement, or the San Carlos Lease, for the lease of approximately 99,557 rentable square feet of office space located in San Carlos, California, which is intended to serve as our permanent headquarters, office and laboratory space following the completion of construction and certain tenant improvements. The term of the San Carlos Lease will commence on the date that the landlord delivers the premises to us for construction of certain tenant improvements, which is estimated to be August 2020, and will end on the date that is 144 months from the first day of the first full month after rent commences. Base rent for the San Carlos Lease is \$557,519 per month, with annual increases of 3%. We are obligated to provide a security deposit of \$1.1 million in the form of a letter of credit.

In July 2019, concurrently with the execution and delivery of the San Carlos Lease, we also entered into a lease agreement, or the Temporary Lease, for the lease of approximately 74,788 rentable square feet of office space located in South San Francisco, California, which is intended to serve as our temporary headquarters, office and laboratory space while our permanent headquarters is under construction. The Temporary Lease commenced in August 2019, and is expected to end 90 days following the substantial completion of certain tenant improvements and construction on the space covered by the San Carlos Lease. Base rent for the Temporary Lease is \$280,455 per month, with annual increases of 3%.

The capital lease obligations noted above represent certain property and equipment we acquired under capital leases. In 2017, we financed purchases of \$226,000 in equipment under a capital lease agreement. Outstanding amounts under the capital lease agreements are generally secured by liens on the related property and equipment.

In addition, we enter into contracts in the normal course of business with contract research organizations for preclinical and clinical studies as well as with contract development manufacturing organizations for the manufacture of materials for those studies. These agreements generally provide for termination at the request of either party with less than one-year notice and are, therefore, cancelable contracts and not reflected in the table above.

Critical Accounting Policies and Estimates

Our management's discussion and analysis of our financial condition and results of operations is based on our financial statements, which have been prepared in accordance with generally accepted accounting principles. The preparation of these financial statements requires us to make estimates and assumptions that affect the reported amounts of assets and liabilities and the disclosure of contingent assets and liabilities at the date of the financial statements, as well as the reported revenue generated, and reported expenses incurred during the reporting periods. Our estimates are based on our historical experience and on various other factors that we believe are reasonable under the circumstances, the results of which form the basis for making judgments about the carrying value of assets and liabilities that are not readily apparent from other sources. Actual results may differ from these estimates under different assumptions or conditions.

Impairment of Long-Lived Assets

In accordance with ASC 360-10, Property, Plant & Equipment—Overall, we review long-lived assets for impairment whenever events or changes in circumstances indicate that the carrying amount of property and equipment may not be recoverable. Determination of recoverability is based on an estimate of undiscounted future cash flows resulting from the use of the asset and its eventual disposition. In the event that such cash flows are not expected to be sufficient to recover the carrying amount of the assets, we write down the assets to their estimated fair values and recognize the loss in the Consolidated Statements of Operations and Comprehensive Loss.

Research and Development Expenses and Accrued Research and Development Costs

We expense research and development costs as incurred. Research and development expenses consist of personnel costs for our research and product development employees. Also included are non-personnel costs such as professional fees payable to third parties for preclinical studies, clinical trials and research services, laboratory supplies and equipment maintenance and depreciation, intellectual property licenses and other consulting costs.

We estimate preclinical studies, clinical trials and research expenses based on the services performed, pursuant to contracts with research institutions that conduct and manage preclinical studies, clinical trials and research services on our behalf. We estimate these expenses based on discussions with management and external service providers as to the progress or stage of completion of services and the contracted fees to be paid for such services. We record the estimated costs of research and development activities based upon the estimated amount services provided but not yet invoiced, and include these costs in development expenses. We accrue for these costs based on factors such as estimates of the work completed and in accordance with agreements established with our third party service providers under the service agreements. We make significant judgments and estimates in determining the accrued liabilities balance in each reporting period. As actual costs become known, we adjust our accrued liabilities. We have not experienced any material differences between accrued costs and actual costs incurred. However, the status and timing of actual services performed may vary from our estimates, resulting in adjustments to expense in future periods. Changes in these estimates that result in material changes to our accruals could materially affect our results of operations. Payments associated with licensing agreements to acquire exclusive license to develop, use, manufacture and commercialize products that have not reached technological feasibility and do not have alternate future use are expensed as incurred.

Payments made to third parties under these arrangements in advance of the performance of the related services by the third parties are recorded as prepaid expenses until the services are rendered. We evaluate these payments for current or long-term classification based on when we expect to receive these services.

Stock-Based Compensation

We maintain a stock-based compensation plan as a long-term incentive for employees, consultants and members of our board of directors. The plan allows for the issuance of non-statutory options, or NSOs, incentive stock options, restricted stock and restricted stock units to employees and NSOs to nonemployees.

Stock-based payments are measured using fair-value-based measurements and recognized as compensation expense over the service period in which the awards are expected to vest. Our fair-value-based measurements of awards to employees and directors as of the grant date utilize the single-option award-valuation approach, and we use the straight-line method for expense attribution. The valuation model used for calculating the estimated fair value of stock awards is the Black-Scholes option-pricing model. The Black-Scholes model requires us to make assumptions and judgments about the variables used in the calculations, including the expected term (weighted-average period of time that the options granted are expected to be outstanding), the expected volatility of our common stock, the related risk-free interest rate and the expected dividend. We have elected to recognize forfeitures of stock-based payment awards as they occur.

For stock-based awards issued to non-employees, we record expense related to stock options based on the fair value of the options calculated using the Black-Scholes option-pricing model over the service performance period.

The Black-Scholes option-pricing model requires the use of highly subjective assumptions which determine the fair value of stock-based awards. These assumptions include:

- § Expected Term. The expected term represents the period that stock-based awards are expected to be outstanding. The expected term for option grants is determined using the simplified method. The simplified method deems the term to be the average of the time-to-vesting and the contractual life of the stock-based awards.
- § Expected Volatility. Since we have been privately held and do not have any trading history for our common stock, the expected volatility was estimated based on the average volatility for comparable publicly traded biotechnology companies over a period equal to the expected term of the stock option grants. The comparable companies were chosen based on their similar size, stage in the life cycle or area of specialty.
- § Risk-Free Interest Rate. The risk-free interest rate is based on the U.S. Treasury zero coupon issues in effect at the time of grant for periods corresponding with the expected term of option.
- § Expected Dividend. We have never paid dividends on our common stock and have no plans to pay dividends on our common stock. Therefore, we used an expected dividend yield of zero.

Emerging Growth Company Status

We are an emerging growth company, as defined in the Jumpstart Our Business Startups Act of 2012, or the JOBS Act. Under the JOBS Act, emerging growth companies can delay adopting new or revised accounting standards issued subsequent to the enactment of the JOBS Act until such time as those standards apply to private companies.

We elected to use this extended transition period for complying with new or revised accounting standards, including but not limited to Topic 842, the new lease accounting standard, that have different effective dates for public and private companies until the earlier of the date that we (i) are no longer an emerging growth company or (ii) affirmatively and irrevocably opt out of the extended transition period provided in the JOBS Act. As a result, our financial statements may not be comparable to companies that comply with the new or revised accounting pronouncements as of public company effective dates. We early adopted Accounting Standards Update 2014-09, Revenue from Contracts with Customers (Accounting Standards Codification Topic 606), and Accounting Standards Update 2018-07, Improvements to Nonemployee Share-Based Payment Accounting (Accounting Standards Codification Topic 718), as the JOBS Act does not preclude an emerging growth company from early adopting a new or revised accounting standard earlier than the time that such standard applies to private companies. We expect to use the extended transition period for any other new or revised accounting standards during the period in which we remain an emerging growth company.

We will remain an emerging growth company until the earliest of (i) December 31, 2024, (ii) the last day of our first fiscal year in which we have total annual gross revenues of at least \$1.07 billion, (iii) the date on which we are deemed to be a "large accelerated filer" under the rules of the Securities and Exchange Commission, which means the market value of our voting and non-voting common equity that is held by non-affiliates is equal to or exceeds \$700.0

million as of the prior June 30th and (iv) the date on which we have issued more than \$1.0 billion in non-convertible debt securities during the prior three-year period.

Recent Accounting Pronouncements

See Note 2, *Summary of Significant Accounting Policies*, in our Notes to Consolidated Financial Statements included in Part I, Item 1 of this Annual Report on Form 10-K for a discussion of recent accounting pronouncements.

Item 7A. Quantitative and Qualitative Disclosures About Market Risk

The disclosures in this section are not required because we qualify as a smaller reporting company under federal securities laws.

Atreca, Inc.
Form 10-K
For the Fiscal Year Ended December 31, 2019

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Report of Independent Registered Public Accounting Firm

Stockholders and Board of Directors
Atreca, Inc.
South San Francisco, California

Opinion on the Financial Statements

We have audited the accompanying consolidated balance sheets of Atreca, Inc. (the “Company”) as of December 31, 2019 and 2018, the related consolidated statements of operations and comprehensive loss, stockholders’ equity and cash flows for each of the two years in the period ended December 31, 2019, and the related notes (collectively referred to as the “consolidated financial statements”). In our opinion, the consolidated financial statements present fairly, in all material respects, the financial position of the Company at December 31, 2019 and 2018, and the results of its operations and its cash flows for each of the two years in the period ended December 31, 2019, in conformity with accounting principles generally accepted in the United States of America.

Basis for Opinion

These consolidated financial statements are the responsibility of the Company’s management. Our responsibility is to express an opinion on the Company’s consolidated financial statements based on our audits. We are a public accounting firm registered with the Public Company Accounting Oversight Board (United States) (“PCAOB”) and are required to be independent with respect to the Company in accordance with the U.S. federal securities laws and the applicable rules and regulations of the Securities and Exchange Commission and the PCAOB.

We conducted our audits in accordance with the standards of the PCAOB. Those standards require that we plan and perform the audit to obtain reasonable assurance about whether the consolidated financial statements are free of material misstatement, whether due to error or fraud. The Company is not required to have, nor were we engaged to perform, an audit of its internal control over financial reporting. As part of our audits we are required to obtain an understanding of internal control over financial reporting but not for the purpose of expressing an opinion on the effectiveness of the Company’s internal control over financial reporting. Accordingly, we express no such opinion.

Our audits included performing procedures to assess the risks of material misstatement of the consolidated financial statements, whether due to error or fraud, and performing procedures that respond to those risks. Such procedures included examining, on a test basis, evidence regarding the amounts and disclosures in the consolidated financial statements. Our audits also included evaluating the accounting principles used and significant estimates made by management, as well as evaluating the overall presentation of the consolidated financial statements. We believe that our audits provide a reasonable basis for our opinion.

/s/ OUM & CO. LLP

San Francisco, California
March 11, 2020

We have served as the Company's auditor since 2017.

Atreca, Inc.
Consolidated Balance Sheets
(in thousands, except share and per share data)

	<u>December 31,</u>	
	<u>2019</u>	<u>2018</u>
ASSETS		
Current Assets		
Cash and cash equivalents	\$ 157,954	\$ 114,504
Investments	14,663	—
Prepaid expenses and other current assets	3,502	2,721
Total current assets	176,119	117,225
Property and equipment, net	5,771	4,143
Long-term Investments	10,799	—
Deposits and other	3,026	316
Total assets	<u>\$ 195,715</u>	<u>\$ 121,684</u>
LIABILITIES AND STOCKHOLDERS' EQUITY (DEFICIT)		
Current Liabilities		
Accounts payable	\$ 2,133	\$ 1,307
Accrued expenses	5,395	3,008
Other current liabilities	419	247
Total current liabilities	7,947	4,562
Capital lease obligations, net of current portion	53	100
Deferred rent	763	6
Preferred stock warrant liability	—	380
Total liabilities	<u>8,763</u>	<u>5,048</u>
Commitments and contingencies (Note 8)		
Series A convertible preferred stock, \$0.0001 par value; 100,000,000 and 32,133,287 shares authorized as of December 31, 2019 and December 31, 2018, respectively; zero and 5,305,513 shares issued and outstanding as of December 31, 2019 and December 31, 2018, respectively (aggregate liquidation preference of \$58,892)	—	55,030
Series B convertible preferred stock, \$0.0001 par value; 100,000,000 and 18,008,749 shares authorized as of December 31, 2019 and December 31, 2018, respectively; zero and 3,001,421 shares issued and outstanding as of December 31, 2019 and December 31, 2018, respectively (aggregate liquidation preference of \$35,000)	—	34,333
Series C1 convertible preferred stock, \$0.0001 par value; 50,000,000 and 54,184,549 shares authorized as of December 31, 2019 and December 31, 2018, respectively; zero and 5,007,134 shares issued and outstanding as of December 31, 2019 and December 31, 2018, respectively (aggregate liquidation preference of \$70,000)	—	65,691
Series C2 convertible preferred stock, \$0.0001 par value; 50,000,000 and 23,605,150 shares authorized as of December 31, 2019 and December 31, 2018, respectively; zero and 3,934,191 shares issued and outstanding as of December 31, 2019 and December 31, 2018, respectively (aggregate liquidation preference of \$55,000)	—	54,615
Stockholders' equity (deficit)		
Class A common stock, \$0.0001 par value, 650,000,000 and 191,398,492 shares authorized as of December 31, 2019 and December 31, 2018, respectively; 22,035,976 and 2,119,872 shares issued and outstanding at December 31, 2019 and December 31, 2018, respectively	2	—
Class B common stock, \$0.0001 par value, 50,000,000 and 23,605,150 shares authorized as of December 31, 2019 and December 31, 2018, respectively; 5,934,191 and zero shares issued and outstanding as of December 31, 2019 and December 31, 2018, respectively	1	—
Additional paid-in capital	351,039	3,593
Accumulated other comprehensive income (loss)	16	(4)
Accumulated deficit	(164,106)	(96,622)
Total stockholders' equity (deficit)	<u>186,952</u>	<u>(93,033)</u>
Total liabilities and stockholders' equity (deficit)	<u>\$ 195,715</u>	<u>\$ 121,684</u>

Atreca, Inc.
Consolidated Statements of Operations
(in thousands, except share and per share data)

	<u>Year Ended December 31,</u>	
	<u>2019</u>	<u>2018</u>
Expenses		
Research and development	\$ 54,726	\$ 32,513
General and administrative	17,845	7,060
Total expenses	<u>72,571</u>	<u>39,573</u>
Interest and other income (expense)		
Other income	2,134	961
Interest income	3,213	714
Interest expense	(6)	(9)
Preferred stock warrant liability revaluation	(123)	(33)
Foreign exchange loss	(8)	—
Loss on disposal of property and equipment	<u>(122)</u>	<u>(1)</u>
Loss before income tax expense	(67,483)	(37,941)
Income tax benefit (expense)	(1)	1
Net loss	<u>\$ (67,484)</u>	<u>\$ (37,940)</u>
Net loss per share, basic and diluted	<u>\$ (4.26)</u>	<u>\$ (18.02)</u>
Weighted-average shares used in computing net loss per share, basic and diluted	<u>15,834,175</u>	<u>2,104,861</u>

Atreca, Inc.
Consolidated Statements of Loss and Comprehensive Loss
(in thousands)

	<u>Year Ended December 31,</u>	
	<u>2019</u>	<u>2018</u>
Net loss	\$ (67,484)	\$ (37,940)
Other comprehensive income (loss);		
Unrealized gain on fair value of investments	16	26
Unrealized gain (loss) on currency translation	4	(16)
Comprehensive loss	<u>\$ (67,464)</u>	<u>\$ (37,930)</u>

Atreca, Inc.
Consolidated Statements of Convertible Preferred Stock and Stockholders' Equity (Deficit)
(in thousands, except share data)

	Convertible Preferred Stock		Common Stock		Additional Paid-In	Accumulated Other Comprehensive	Accumulated	Total
	Shares	Amount	Shares	Amount	Capital	Income (Loss)	Deficit	Stockholders' Equity (Deficit)
Balances at								
December 31, 2017	8,306,934	\$ 89,362	2,092,040	\$ —	\$ 2,130	\$ (14)	\$ (58,682)	\$ (56,566)
Issuance of convertible preferred stock	8,941,325	120,306						
Issuance of common stock upon exercise of options	—	—	27,832	—	44	—	—	44
Stock-based compensation	—	—	—	—	1,419	—	—	1,419
Unrealized gain on fair value of investments	—	—	—	—	—	26	—	26
Unrealized currency exchange loss	—	—	—	—	—	(16)	—	(16)
Net loss	—	—	—	—	—	—	(37,940)	(37,940)
Balances at								
December 31, 2018	17,248,259	\$ 209,668	2,119,872	\$ —	\$ 3,593	\$ (4)	\$ (96,622)	\$ (93,033)
Conversion of convertible preferred stock	(17,248,259)	(209,668)	17,248,259	2	209,666	—	—	209,668
Issuance of common stock upon initial public offering, net	—	—	8,452,500	1	130,785	—	—	130,786
Exercise of warrants	—	—	62,936	—	—	—	—	—
Issuance of common stock upon exercise of options	—	—	77,368	—	288	—	—	288
Vesting of early exercised stock options	—	—	—	—	15	—	—	15
Reclassification of redeemable convertible preferred stock warrant liability to additional paid-in capital	—	—	—	—	503	—	—	503
Issuance of common stock under the Employee Stock Purchase Plan	—	—	9,232	—	133	—	—	133
Stock-based compensation	—	—	—	—	6,056	—	—	6,056
Unrealized gain on fair value of investments	—	—	—	—	—	16	—	16
Unrealized currency exchange gain	—	—	—	—	—	4	—	4
Net loss	—	—	—	—	—	—	(67,484)	(67,484)
Balances at								
December 31, 2019	—	\$ —	27,970,167	\$ 3	\$ 351,039	\$ 16	\$ (164,106)	\$ 186,952

Atreca, Inc.
Consolidated Statements of Cash Flows
(in thousands)

	Year Ended December 31,	
	2019	2018
Cash Flows from Operating Activities		
Net loss	\$ (67,484)	\$ (37,940)
Adjustments to reconcile net loss to net cash used in operating activities:		
Depreciation and amortization	1,697	1,409
Loss on disposal of property and equipment	122	1
Stock-based compensation	6,056	1,419
Preferred stock warrant liability revaluation	123	33
Accretion of discount on investments	(800)	—
Changes in operating assets and liabilities:		
Prepaid expenses and other current assets	(2,394)	(1,370)
Accounts payable	826	698
Accrued expenses	2,465	1,085
Other current liabilities	160	—
Deferred rent	691	(35)
Net cash used in operating activities	<u>(58,538)</u>	<u>(34,700)</u>
Cash Flows from Investing Activities		
Purchase of property and equipment	(3,447)	(1,764)
Purchase of investments	(99,646)	—
Proceeds from maturities of investments	75,000	22,398
Change in deposits	189	24
Net cash provided by (used in) investing activities	<u>(27,904)</u>	<u>20,658</u>
Cash Flows from Financing Activities		
Proceeds from issuance of convertible preferred stock, net	—	120,306
Proceeds from the issuance of common stock under the Employee Stock Purchase Plan	133	—
Proceeds from exercise of stock options	303	46
Proceeds from initial public offering, net	133,633	—
Principal payments on capital lease obligations	(47)	(48)
Payments of initial offering costs	(2,848)	—
Net cash provided by financing activities	<u>131,174</u>	<u>120,304</u>
Net change in cash, cash equivalents and restricted cash	44,732	106,262
Cash, cash equivalents and restricted cash, beginning of period	114,504	8,242
Cash, cash equivalents and restricted cash, end of period	<u>\$ 159,236</u>	<u>\$ 114,504</u>

Atreca, Inc.
Consolidated Statements of Cash Flows (continued)
(in thousands)

	<u>Year Ended December 31,</u>	
	<u>2019</u>	<u>2018</u>
Supplemental Disclosure of Cash Flow Information		
Cash paid for interest	\$ 6	\$ 9
Cash paid for income taxes	\$ 1	\$ (1)
Supplemental Schedule of Non-Cash Investing and Financing Activities		
Conversion of redeemable convertible preferred stock to common stock	\$ 209,668	\$ —
Reclassification of redeemable convertible preferred stock warrant liability to additional paid-in capital	\$ 503	\$ —
Vesting of early exercised common stock options	\$ 15	\$ —

1. Business

Nature of Business

Atreca, Inc. (the “Company”) was incorporated in the State of Delaware on June 11, 2010 (“inception date”), and is located in South San Francisco, California. In April 2016, the Company formed a wholly owned subsidiary, Atreca Pte. Ltd., in Singapore. The Company is a biopharmaceutical company utilizing its differentiated platform to discover and develop novel antibody-based immunotherapeutics to treat a range of solid tumor types. The Company’s lead product candidate, ATRC-101, is a monoclonal antibody in clinical development with a novel mechanism of action and a target derived from an antibody identified using its discovery platform. The Company operates in a single segment. Since inception, the Company has been primarily engaged in research and development, raising capital, building its management team and building its intellectual property portfolio.

Reverse Stock Split

On June 7, 2019, the Company effected a 1-for-6 reverse stock split of all classes of its capital stock. Upon the effectiveness of the reverse stock split, (i) every one share of the Company’s outstanding capital stock was combined into one-sixth of one share of the same class and series of capital stock, (ii) the number of shares of its Class A common stock and its Series A preferred stock for which each outstanding option or warrant, to purchase its Class A common stock and its Series A preferred stock is exercisable was proportionally decreased on a 1-for-6 basis and (iii) the exercise price of each outstanding option or warrant to purchase its Class A common stock and its Series A preferred stock was proportionately increased on a 1-for-6 basis. The par value per share of its common stock and preferred stock were not adjusted as a result of the reverse stock split.

Initial Public Offering

In June 2019, the Company closed its initial public offering (“IPO”) of 6,452,500 shares of its Class A common stock and 2,000,000 shares of its Class B common stock at an offering price of \$17.00 per share, including 1,102,500 shares pursuant to the underwriters’ option to purchase additional shares of the Company’s Class A common stock. The Company received net proceeds of \$130.8 million, after deducting underwriting discounts and commissions of \$10.1 million and offering expenses of \$2.8 million. Immediately prior to the closing of the IPO, all outstanding shares of the Company’s convertible Series A preferred stock, convertible Series B preferred stock and convertible Series C1 preferred stock automatically converted into 13,314,068 shares of the Company’s Class A common stock and all outstanding shares of the Company’s convertible Series C2 preferred stock automatically converted into 3,934,191 shares of the Company’s Class B common stock. Immediately prior to the closing of the IPO, the Company issued 62,936 shares of Class A common stock upon the exercise of an outstanding warrant. The Company reclassified \$209.7 million from temporary equity to Class A common stock, Class B common stock, and additional paid-in-capital on its consolidated balance sheet.

Deferred Offering Cost

Deferred offering costs of \$2.8 million, consisting of legal, accounting and other fees and costs related to the IPO, were reclassified to additional paid-in capital as a reduction of the proceeds upon the closing of the IPO in June 2019. During the year ended December 31, 2019, \$2.8 million of the deferred offering costs were paid.

2. Summary of Significant Accounting Policies

Basis of Presentation

The consolidated financial statements have been prepared in accordance with accounting principles generally accepted in the United States of America (“U.S. GAAP”) and include the accounts of the Company and its wholly owned subsidiaries. All intercompany transactions and accounts have been eliminated.

Prior period reclassification

An immaterial reclassification of prior period amounts has been made to conform to the current period presentation.

Principles of Consolidation

The consolidated financial statements include accounts of the Company and its wholly owned subsidiary. All significant intercompany accounts and transactions are eliminated upon consolidation.

Use of Estimates

The preparation of financial statements in conformity with accounting principles generally accepted in the United States of America requires management to make estimates and assumptions that affect the reported amounts of assets and liabilities, disclosure of contingent assets and liabilities, and reported amounts of income and expenses in the consolidated financial statements and accompanying notes. Actual results could differ from those estimates. Key estimates in the consolidated financial statements include estimated useful lives of property and equipment, impairment of long-lived assets, accrued expenses, valuation of deferred income tax assets, the fair value of warrants issued to purchasers of shares of preferred stock and common stock and fair value of options granted under the Company's stock option plan.

Other Income

Other income is comprised of amounts earned from services performed under service agreements. Beginning January 1, 2018, the Company follows the provisions of Accounting Standards Update 2014-09 Accounting Standards Codification (“ASC”) Topic 606, *Revenue from Contracts with Customers* (“Topic 606”). The guidance provides a unified model to determine how income is recognized.

In determining the appropriate amount of other income to be recognized as it fulfills its obligations under the agreements, the Company performs the following steps: (i) identifies the promised goods or services in the contract; (ii) determines whether the promised goods or services are performance obligations including whether they are distinct in the context of the contract; (iii) measures the transaction price, including the constraint on variable consideration; (iv) allocates the transaction price to the performance obligations based on estimated selling prices; and (v) recognizes other income when (or as) the Company satisfies each performance obligation.

Upon adoption of Topic 606, there was no change to the units of accounting previously identified with respect to existing service agreements under legacy Generally Accepted Accounting Principles (“GAAP”), which are now considered performance obligations under Topic 606, and there was no change to the revenue recognition pattern for the performance obligations. Accordingly, the adoption of the new standard resulted in no cumulative effect change to the Company's opening accumulated deficit balance.

The Company generally allocates the transaction price to distinct performance obligations at their stand-alone selling prices, determined by their estimated costs plus some margin. Performance obligations are generally delivered over time and recognized based upon observable inputs as the related research services are performed, which are recorded as research and development expenses. Amounts due under service agreements are generally billed monthly as services are delivered and do not generally result in contract liabilities or assets. Receivables under service agreements

of \$237,000 and \$282,000 are included in prepaid expenses and other current assets as of December 31, 2019 and 2018, respectively. Contract liabilities of zero and \$200,000 are included in other current liabilities as of December 31, 2019 and 2018, respectively.

Collaboration and Service Arrangements

In March 2016, the Company entered into a research collaboration agreement with Genome Institute of Singapore (GIS) for the development of a high-throughput microfluidic droplet system for single cell phenotyping and genotyping. Under the agreement, the Company contributes reimbursement of research expenses and certain reagents and other consumables to GIS. The Company accounts for the collaboration agreement with GIS in accordance with ASC 808—Collaborative Arrangements. The Company recognized \$36,000 and \$522,000 of research and development expenses in 2019 and 2018, respectively, under the collaboration agreement, including wind-down costs. The Company exercised its right to early terminate the collaboration agreement in December 2018.

Fair Value of Financial Instruments:

The Company uses a three-level hierarchy, which prioritizes, within the measurement of fair value, the use of market-based information over entity-specific information for fair value measurements based on the nature of inputs used in the valuation of an asset or liability as of the measurement date. Fair value focuses on an exit price and is defined as the price that would be received to sell an asset or paid to transfer a liability in an orderly transaction between market participants at the measurement date. The inputs or methodology used for valuing financial instruments are not necessarily an indication of the risk associated with those financial instruments.

The three-level hierarchy for fair value measurements is defined as follows:

Level 1: Inputs to the valuation methodology are quoted prices (unadjusted) for identical assets or liabilities in active markets.

Level 2: Inputs to the valuation methodology include quoted prices for similar assets and liabilities in active markets, and inputs that are observable for the asset or liability, either directly or indirectly, for substantially the full term of the financial instrument.

Level 3: Inputs to the valuation methodology are unobservable and significant to the fair value measurement.

An asset or liability's categorization within the valuation hierarchy is based upon the lowest level of input that is significant to the fair value measurement.

Cash, Cash Equivalents and Restricted Cash

Cash and cash equivalents include all cash balances and highly liquid investments purchased with an original maturity of three months or less.

The Company maintained restricted cash of \$1.3 million and zero as of December 31, 2019 and 2018, respectively. This amount as of December 31, 2019 is included in deposits and other in the accompanying consolidated balance sheets and is comprised solely of letters of credit required pursuant to leases for Company facilities.

The following table provides a reconciliation of cash and cash equivalents and restricted cash reported within the consolidated balance sheets that sum to the total of the same amounts shown in the consolidated statements of cash flows (in thousands):

	December 31,	
	2019	2018
Cash and cash equivalents	\$ 157,954	\$ 114,504
Restricted cash	1,282	—
Cash, cash equivalents and restricted cash shown in the consolidated statements of cash flows	\$ 159,236	\$ 114,504

Investments

The Company considers securities purchased with original maturities greater than three months to be investments. The Company's policy is to protect the value of its investment portfolio and minimize principal risk by earning returns based on current interest rates. The Company's intent is to convert all investments into cash to be used for operations and has classified them as available for sale. For purposes of determining realized gains and losses, the cost of securities sold is based on specific identification. Interest and dividends on securities classified as available-for-sale are included in interest income.

Convertible Preferred Stock Warrants

The Company issued convertible preferred stock warrants, which were exercisable into Series A preferred stock with liquidation preference. The conversion feature was evaluated under ASC Topic 480, *Distinguishing liabilities from equity* and the warrants were determined to be debt instruments and classified prior to the IPO as liabilities on the consolidated balance sheets. The Company recorded these warrant liabilities at fair value and adjusted the carrying value to their estimated fair value at each reporting date with the increases or decreases in the fair value recorded as a gain (loss) on revaluation of the warrant liability in the consolidated statements of operations. Upon the IPO, the 49,997 preferred stock warrants were converted to common stock warrants of Class A shares and the warrant liability of \$0.5 million was reclassified to additional paid-in capital as a result of the conversion. The warrants were not subject to further remeasurement for fair value.

Risks and Uncertainties

The Company is subject to a number of risks associated with companies at a similar stage, including dependence on key individuals, competition from similar services and larger companies, volatility of the industry, ability to obtain regulatory clearance, ability to obtain adequate financing to support growth, the ability to attract and retain additional qualified personnel to manage the anticipated growth of the Company and general economic conditions.

Concentration of Credit Risk

Financial instruments that potentially subject the Company to concentration of credit risk consist of cash and cash equivalents, investments and other receivables. Cash and cash equivalents are held at three financial institution and were in excess of the Federal Deposit Insurance Corporation insurable limit at December 31, 2019, and 2018. Additionally, cash and cash equivalents and investments are maintained at a brokerage firm for which amounts are insured by the Securities Investor Protection Corporation subject to legal limits. The Company has not experienced any losses on its deposits to date.

The Company does not require collateral or other security for other receivables; however, credit risk is mitigated by the Company's ongoing evaluations of its debtors' credit worthiness.

Property and Equipment

Property and equipment are stated at cost less depreciation. Depreciation is computed using the straight-line method with the estimated useful lives of the assets ranging from two to five years. Leasehold improvements are

amortized over the estimated useful life of the asset, or the remaining lease term, whichever is shorter. Expenditures for repairs and maintenance, which do not extend the useful life of the property and equipment, are expensed as incurred.

Accounting for Impairment of Long-Lived Assets

Long-lived assets consist of property and equipment. The Company reviews its long-lived assets for impairment whenever events or changes in circumstances indicate the carrying amount of an asset may not be recoverable. Recoverability of assets held and used is measured by comparison of the carrying amount of an asset to future net cash flows expected to be generated by the asset. If such assets are considered to be impaired, the impairment to be recognized is measured by the amount by which the carrying amount of the assets exceeds the fair value of the assets. The Company has not recorded any impairment of long-lived assets in 2019 or 2018.

Intellectual Property

The legal and professional costs incurred by the Company to maintain its patent rights have been expensed as part of research and development costs since inception. As of December 31, 2019, and 2018, the Company has determined that these expenses have not met the criteria to be capitalized. Intellectual property-related expenses for the years ended December 31, 2019 and 2018 were \$1.3 million and \$1.1 million, respectively.

Deferred Rent

The Company has entered into lease agreements for its laboratory and office facilities. These leases qualify as and are accounted for as operating leases. Rent expense is recognized on a straight-line basis over the term of the lease and, accordingly, the Company records the difference between cash rent payments and the recognition of rent expense as a deferred rent liability.

Research and Development Costs

Research and development costs are expensed as incurred. Research and development costs consist primarily of salaries and benefits, consultant fees, stock-based compensation, certain facility costs, legal costs and other costs associated with preclinical development.

A substantial portion of the Company's ongoing research and development activities are conducted by third-party service providers in connection with preclinical development activities and contract manufacturing organizations in connection with the production of materials for clinical trials. At the end of the reporting period, the Company compares payments made to third-party service providers to the estimated progress toward completion of the research or development objectives. Such estimates are subject to change as additional information becomes available. Depending on the timing of payments to the service providers and the progress that the Company estimates has been made as a result of the service provided, the Company may record net prepaid or accrued expense relating to these costs.

Stock-Based Compensation

The Company generally grants stock options to its employees for a fixed number of shares with an exercise price equal to the fair value of the underlying shares at the date of grant. The Company accounts for stock option grants using the fair value method. The fair value of options is calculated using the Black-Scholes option pricing model. Stock-based compensation is recognized as the underlying options vest using the straight-line attribution approach, and forfeitures are recorded as they occur.

Emerging Growth Company Status

The Company is an "emerging growth company," ("EGC") as defined in the Jumpstart Our Business Startups Act, ("JOBS Act"), and may take advantage of certain exemptions from various reporting requirements that are applicable to other public companies that are not EGCs. The Company may take advantage of these exemptions until it is no longer an EGC under Section 107 of the JOBS Act, which provides that an EGC can take advantage of the

extended transition period afforded by the JOBS Act for the implementation of new or revised accounting standards. The Company has elected to use the extended transition period for complying with new or revised accounting standards, and as a result of this election, the Company's consolidated financial statements may not be comparable to companies that comply with public company Financial Accounting Standards Board ("FASB") standards' effective dates. The Company may take advantage of these exemptions up until the last day of the fiscal year following the fifth anniversary of the IPO or such earlier time that the Company is no longer an EGC.

Income Taxes

The Company applies the provisions set forth in FASB ASC Topic 740, Income Taxes, to account for the uncertainty in income taxes. In the preparation of income tax returns in federal, foreign and state jurisdictions, the Company asserts certain income tax positions based on its understanding and interpretation of income tax laws. The taxing authorities may challenge such positions, and the resolution of such matters could result in recognition of income tax expense in the Company's consolidated financial statements. Management believes it has used reasonable judgments and conclusions in the preparation of its income tax returns.

The Company accounts for income taxes using the asset and liability method. Under this method, deferred income tax assets and liabilities are recorded based on the estimated future tax effects of differences between the financial statement and income tax basis of existing assets and liabilities. A valuation allowance is provided against the Company's deferred income tax assets when realization is not reasonably assured.

Net Loss Per Share

The Company computes basic loss per share by dividing the net loss available to common stockholders by the weighted average number of common shares outstanding for the period, without consideration for common stock equivalents. Diluted net loss assumes the conversion, exercise or issuance of all potential common stock equivalents, unless the effect of inclusion would be anti-dilutive. For purposes of this calculation, common stock equivalents include the Company's stock options, common stock warrants, convertible preferred stock warrants and convertible preferred stock, which are convertible into shares of the Company's common stock. No shares related to the convertible preferred stock were included in the diluted net loss calculation for the years ended December 31, 2019 or 2018 because the inclusion of such shares would have had an anti-dilutive effect. The shares to be issued upon exercise of certain outstanding stock options were also excluded from the diluted net loss calculation for the years ended December 31, 2019 and 2018 because such shares are anti-dilutive.

Recent Accounting Pronouncements

In February 2016, the FASB issued ASU 2016-02 and subsequent amendments to the initial guidance under ASU 2017-13, ASU 2018-10, ASU 2018-11, and ASU 2019-01 (collectively, "*Topic 842*"), which modifies the accounting by lessees for all leases with a term greater than 12 months. This standard will require lessees to recognize on the balance sheet the assets and liabilities for the rights and obligations created by those leases. *Topic 842* is effective for the Company as of January 1, 2021. Early adoption is permitted. The Company's most significant lease is its operating lease for its corporate headquarters, and, while the Company has not yet estimated the amounts by which its financial statements will be affected by the adoption of this guidance, it expects that the overall recognition of expense will be similar to current guidance, but that there will be a significant change in the balance sheet due to the recognition of right of use assets and the corresponding lease liabilities.

In June 2016, the FASB issued ASU 2016-13, *Financial Instruments - Credit Losses* ("*Topic 326*"); Measurement of Credit Losses on Financial Instruments and subsequent amendments to the initial guidance under ASU 2018-19, ASU 2019-04 and ASU 2019-05, which amends the current approach to estimate credit losses on certain financial assets, including trade and other receivables. The amendment replaces the existing incurred loss impairment model with an expected loss methodology, which will result in more timely recognition of credit losses. For available-for-sale debt securities, credit losses should be recorded through an allowance for credit losses. *Topic 326* is effective for the Company as of January 1, 2023. Early adoption is permitted. The Company is currently evaluating the impact the adoption of this standard will have on its consolidated financial statements and related disclosures.

In August 2016, the FASB issued ASU 2016-15, *Statement of Cash Flows: Classification of Certain Cash Receipts and Cash Payments* (“Topic 230”). The standard clarifies how certain cash receipts and cash payments will be presented and classified in the statement of cash flows. Topic 230 is effective for the Company as of January 1, 2019. The adoption of this update had no material effect on the Company’s consolidated financial statements.

3. Fair Value of Financial Instruments

The Company’s financial assets and liabilities subject to fair value measurements on a recurring basis and the level of inputs used for such measurements were as follows (in thousands):

	December 31, 2019			
	Level 1	Level 2	Level 3	Total
Assets				
Money market funds	\$ 152,770	\$ —	\$ —	\$ 152,770
Certificates of deposit	1,950	—	—	1,950
Corporate debt securities	—	3,459	—	3,459
U.S. Treasury securities	20,052	—	—	20,052
	<u>\$ 174,772</u>	<u>\$ 3,459</u>	<u>\$ —</u>	<u>\$ 178,231</u>
	December 31, 2018			
	Level 1	Level 2	Level 3	Total
Assets				
Money market funds	\$ 109,630	\$ —	\$ —	\$ 109,630
Total	<u>\$ 109,630</u>	<u>\$ —</u>	<u>\$ —</u>	<u>\$ 109,630</u>
Liabilities				
Warrant liability	\$ —	\$ —	\$ 380	\$ 380
Total	<u>\$ —</u>	<u>\$ —</u>	<u>\$ 380</u>	<u>\$ 380</u>

The Company utilized the market approach and Level 1 valuation inputs to value its money market funds and U.S. government treasury securities because published net asset values were readily available. The Company measured the fair value of the corporate debt securities using Level 2 valuation inputs, which are based on quoted prices and market observable data of similar instruments. As of December 31, 2019 and 2018, gross unrealized gains and unrealized losses for cash equivalents and short-term investments were not material, and the contractual maturity of all marketable securities was less than two years.

The fair value of the warrants was calculated using the Black-Scholes option pricing model and was revalued to fair value at the end of each reporting period until the warrants were converted to common stock warrants effective with the closing of the IPO on June 24, 2019. The liability was valued using the following assumptions:

	December 31, 2018
Exercise price ⁽¹⁾	\$ 14.46
Stock price ⁽²⁾	\$ 13.20
Time to maturity (in years)	3.64
Volatility ⁽³⁾	83.7 %
Risk-free interest rate ⁽⁴⁾	2.50 %
Expected dividend	\$ —

(1) Based upon terms provided in the warrant agreement.

(2) Based upon an independently prepared valuation as of December 31, 2018, adjusted for the one-for-six reverse stock split.

- (3) Based upon the historical daily volatility of a group of peer public company closing prices.
 (4) Based upon interest rate for U.S. Treasury Bonds, as published by the U.S. Federal Reserve.

The preferred stock warrants were previously valued at Level 3 as there were no observable inputs supported by market activity. The Company estimated the fair value of the preferred stock warrants using the Black-Scholes model which considers various potential liquidity outcomes and assigned probabilities to each to arrive at the weighted equity value. Upon the IPO, the 49,997 preferred stock warrants were revalued and converted to common stock warrants of Class A shares and the warrant liability of \$0.5 million was reclassified to additional paid-in capital as a result of the conversion. Revaluation upon IPO was performed using the following assumptions: expected life of 3.17 years; fair value of Series A of \$17.00 per share; risk-free interest rate of 1.69%; volatility of 83.61% and no expected dividends. For further information regarding convertible preferred stock warrants, refer to Note 9, *Capital Stock*.

4. Cash, Cash Equivalents and Investments

The fair value and the amortized cost of cash, cash equivalents and available-for-sale investments by major security type consist of the following (in thousands):

	As of December 31, 2019			
	Amortized Cost	Gross Unrealized Gains	Gross Unrealized Losses	Estimated Fair Value
Cash and cash equivalents and investments				
Cash, cash equivalents and money market funds	\$ 157,954	\$ —	\$ —	\$ 157,954
U.S. Treasury securities	20,037	16	—	20,053
Corporate debt securities	3,459	—	—	3,459
Certificates of deposit	1,950	—	—	1,950
Total	183,400	16	—	183,416
Less amounts classified as cash and cash equivalents	(157,954)	—	—	(157,954)
Total available-for-sale investments	\$ 25,446	\$ 16	\$ —	\$ 25,462

	As of December 31, 2018			
	Amortized Cost	Gross Unrealized Gains	Gross Unrealized Losses	Estimated Fair Value
Cash and cash equivalents and investments				
Cash, cash equivalents and money market funds	\$ 114,504	\$ —	\$ —	\$ 114,504
Total	114,504	—	—	114,504
Less amounts classified as cash and cash equivalents	(114,504)	—	—	(114,504)
Total available-for-sale investments	\$ —	\$ —	\$ —	\$ —

5. Prepaid Expenses and Other Current Assets

Prepaid expenses and other current assets consist of the following (in thousands):

	December 31,	
	2019	2018
Prepaid insurance	\$ 1,265	\$ 36
Vendor prepayments and deposits	963	2,009
Prepaid rent	879	394
Non-trade receivables	242	282
Interest receivables and other current assets	153	—
Total prepaid expenses and other current assets	\$ 3,502	\$ 2,721

6. Property and Equipment, net

Property and equipment consists of the following (in thousands):

	December 31,	
	2019	2018
Laboratory equipment	\$ 9,355	\$ 7,561
Furniture and fixtures	225	386
Computer hardware and software	785	580
Leasehold improvements	765	236
	11,130	8,763
Less accumulated depreciation and amortization	(5,359)	(4,620)
Total property and equipment, net	\$ 5,771	\$ 4,143

Depreciation and amortization expense was \$1.7 million and \$1.4 million for the years ended December 31, 2019 and 2018, respectively. The net book value of property and equipment under capital leases was \$94,000 and \$142,000 at December 31, 2019 and 2018, respectively.

7. Accrued Expenses

Accrued expenses consist of the following (in thousands):

	December 31,	
	2019	2018
Compensation and related benefits	\$ 4,435	\$ 2,568
Professional fees	214	183
Contract research fees	563	43
Other	183	214
Total accrued expenses	\$ 5,395	\$ 3,008

8. Commitments and Contingencies

Leases

The Company leases its office facilities under non-cancellable operating lease agreements that expire at various dates through May 2033. Under the terms of the leases, the Company is responsible for certain insurance, property taxes and maintenance expenses. The office facilities lease agreements contain scheduled increases over the lease term. The related rent expense is calculated on a straight-line basis with the difference recorded as deferred rent. Rent expense was \$4,534,000 and \$1,250,000 for the years ended December 31, 2019 and 2018, respectively.

The Company leases certain property and equipment under capital leases. In 2017, the Company financed purchases of \$226,000 under a capital lease agreement. Outstanding amounts under the capital lease agreements are generally secured by liens on the related property and equipment.

Future minimum lease payments under non-cancelable operating and capital lease agreements consisted of the following at December 31, 2019 (in thousands):

	Capital Leases	Operating Leases
Years ending December 31:		
2020	51	5,622
2021	51	6,697
2022	4	7,336
2023	—	7,037
2024	—	7,249
Thereafter	—	69,091
Total minimum lease payments	106	\$ 103,032
Less: amount representing interest	(6)	
Present value of capital lease obligation	100	
Less: current portion	(47)	
Non-current portion	\$ 53	

Litigation

The Company is not aware of any asserted or unasserted claims against it where it believes that an unfavorable resolution would have an adverse material impact on the operations or financial position of the Company.

9. Capital Stock

Class A and Class B Common Stock

On June 2, 2019 the board of directors of the Company authorized the issuance of 650,000,000 shares of Class A common stock, \$0.0001 par value per share, 50,000,000 shares of Class B common stock, \$0.0001 par value per share and 300,000,000 shares of preferred stock, \$0.0001 par value per share, upon the filing of the Company's Amended and Restated Certificate of Incorporation in connection with the reverse stock split. Each holder of Class A common stock will be entitled to one vote and each holder of Class B common stock is not entitled to vote except as may be required by law and shall not be entitled to vote on the election of directors at any time.

Convertible Preferred Stock Warrant

Upon the IPO, the 49,997 preferred stock warrants were revalued and converted to common stock warrants of Class A common stock shares and the warrant liability of \$0.5 million was reclassified to additional paid-in capital as a result of the conversion. The warrants were not subject to further remeasurement for fair value. The balances of the preferred stock warrant liabilities were zero and \$0.4 million, respectively, as of December 31, 2019 and 2018.

Common Stock Warrant

In connection with the issuance of Series A in August 2015, the Company issued a warrant to purchase an aggregate of 62,936 shares of common stock at \$0.0001 per share. The warrant was immediately exercisable and expires, if not exercised, in August 2025. At issuance, the fair value of the warrant was determined to be \$41,509, which was recorded as a Series A preferred stock issuance cost and additional paid-in capital. The warrant was exercised in full during the year ended December 31, 2019 and the Company issued 62,936 shares of Class A common stock upon such exercise.

10. Equity Incentive Plans

2019 Equity Incentive Plan

The Company's board of directors adopted and our stockholders approved our 2019 Equity Incentive Plan, (the "2019 Plan"), on June 2, 2019, and June 7, 2019, respectively. The 2019 Plan became effective on June 19, 2019, and no further grants will be made under the Company's 2010 Equity Incentive Plan. The purpose of the 2019 Plan, through the

grant of stock awards including stock options and other stock-based awards, including restricted stock units (“RSUs”), is to help us secure and retain the services of eligible award recipients, provide incentives for such persons to exert maximum efforts for our success and that of our affiliates, and provide a means by which the eligible recipients may benefit from increases in the value of our Class A common stock. Under the 2019 Plan, 6,141,842 shares of the Company’s Class A common stock have been reserved for issuance to employees, directors and consultants. Additionally, the number of shares of our Class A common stock reserved for issuance under our 2019 Plan will automatically increase on January 1 of each year, beginning on January 1, 2020 and continuing through and including January 1, 2029, by 4% of the total number of shares of our capital stock outstanding on December 31 of the preceding calendar year, or a lesser number of shares determined by our board of directors.

Stock option activity under the Plan is as follow (in thousands, except share and per share data and years):

	Options Outstanding			
	Number of Shares	Weighted-Average Exercise Price	Weighted-Average Remaining Contractual Life (years)	Aggregate Intrinsic Value (in thousands)
Balances, December 31, 2017	567,319	\$ 3.96	8.1	\$ 694
Granted	1,609,086	6.66		
Exercised	(27,832)	1.68		
Cancelled	(12,282)	4.92		
Balances, December 31, 2018	2,136,291	\$ 6.06	8.9	\$ 12,881
Granted	1,764,713	13.63		
Exercised	(77,368)	3.94		
Cancelled	(81,492)	9.80		
Balances, December 31, 2019	3,742,144	\$ 9.58	8.6	\$ 22,910
Vested and expected to vest at December 31, 2019	3,742,144	\$ 9.58	8.6	\$ 22,910
Exercisable at December 31, 2019	1,793,254	\$ 5.87	7.7	\$ 17,211
Vested at December 31, 2019	1,168,118	\$ 6.27	7.5	\$ 10,747

Additional information regarding the Company’s stock options outstanding and vested and exercisable as of December 31, 2019 is summarized below:

Exercise Prices	Options Outstanding			Options Exercisable	
	Number of Stock Options Outstanding	Weighted-Average Remaining Contractual Life (Years)	Weighted-Average Exercise Price per Share	Shares Subject to Stock Options	Weighted-Average Exercise Price per Share
Up to \$0.66	48,984	2.9	\$ 0.17	48,984	\$ 0.17
\$4.56-\$5.16	1,474,367	7.7	\$ 5.00	1,450,561	\$ 5.00
\$9.94-\$12.95	1,720,981	9.1	\$ 11.56	293,709	\$ 11.13
\$16.10-\$22.06	497,812	9.5	\$ 17.18	—	—
	3,742,144	8.6	\$ 9.58	1,793,254	\$ 5.87

The weighted-average grant date fair value of options granted to employees and non-employees in the year ended December 31, 2019 and 2018 was \$10.35 and \$5.16, respectively. The fair value of each option is estimated on the date of grant using the Black-Scholes option pricing model, assuming no expected dividends and the following weighted average assumptions:

	<u>Year Ended December 31,</u>	
	<u>2019</u>	<u>2018</u>
Expected life (in years)	6.02	6.01
Volatility	81.0 %	78.3 %
Risk-free interest rate	2.16 %	2.88 %

Expected volatility is based on volatilities of public companies operating in the Company’s industry. The expected life of the options is estimated using the simplified method detailed in SEC Staff Accounting Bulletin No. 107. The simplified method calculates the expected term as the mid-point between the weighted-average time to vesting and the contractual maturity. The risk-free rate is based on the U.S. Treasury yield curve in effect at the time of grant. The Company has elected to account for forfeitures as they occur, rather than estimate expected forfeitures.

2019 Employee Stock Purchase Plan

The Company’s board of directors adopted the 2019 Employee Stock Purchase Plan, (“ESPP”), on June 2, 2019, and the Company’s stockholders approved the ESPP on June 7, 2019. The ESPP became effective on June 19, 2019. The Company’s board of directors authorized 283,333 shares of Class A common stock to be reserved for future issuance under the ESPP. The number of shares of our Class A common stock reserved for issuance will automatically increase on January 1 of each calendar year, from January 1, 2020 through January 1, 2029, by the lesser of (1) 1% of the total number of shares of our Class A common stock outstanding on December 31 of the preceding calendar year, and (2) 416,666 shares; provided, that prior to the date of any such increase, the Company’s board of directors may determine that such increase will be less than the amount set forth in clauses (1) and (2). During the year ended December 31, 2019, the expense related to the ESPP was \$348,000. The fair value of each ESPP is estimated on the date of grant using the Black-Scholes option pricing model, assuming no expected dividends and the following range of assumptions:

	<u>Year Ended December 31,</u>	
	<u>2019</u>	<u>2018</u>
Expected life (in years)	0.2 - 2.0	—
Volatility	74.5 - 101.6 %	— %
Risk-free interest rate	1.50 - 2.15 %	— %

The Company recognized \$6.1 million and \$1.4 million of stock-based compensation expense related to options and the ESPP granted to employees and non-employees for the years ended December 31, 2019 and 2018, respectively. The compensation expense is allocated on a departmental basis, based on the classification of the option holder as follows (in thousands):

	<u>Year Ended December 31,</u>	
	<u>2019</u>	<u>2018</u>
Research and development	\$ 2,977	\$ 631
General and administrative	3,079	788
	<u>\$ 6,056</u>	<u>\$ 1,419</u>

No income tax benefits have been recognized in the statements of operations for stock-based compensation arrangements and no stock-based compensation costs have been capitalized as property and equipment as of December 31, 2019.

Unrecognized estimated compensation expense as of December 31, 2019, totaled \$20.0 million related to non-vested stock options with a remaining requisite service period of 3.1 years.

11. 401(k) Plan

The Company has a 401(k) plan that qualifies as a deferred compensation arrangement under Section 401 of the Internal Revenue Code of 1986, as amended, or the Code. Eligible employees may elect to defer a portion of their pretax earnings subject to certain statutory limits. The Company has not made any matching contributions to date.

12. Net Loss Per Share

The Company calculates basic and diluted net loss per share attributable to common stockholders in conformity with the two-class method required for companies with participating securities. The Company considered all series of redeemable convertible preferred stock to have been participating securities as the holders were entitled to receive non-cumulative dividends on a pari passu basis in the event a dividend was paid on common stock. Under the two-class method, the net loss attributable to common stockholders is not allocated to the redeemable convertible preferred stock as the holders of redeemable convertible preferred stock do not have a contractual obligation to share in losses.

Under the two-class method, basic net loss per share attributable to common stockholders is calculated by dividing the net loss by the weighted-average number of shares of common stock outstanding during the period, less shares subject to repurchase. Diluted net loss per share attributable to common stockholders is computed by giving effect to all potentially dilutive common stock equivalents outstanding for the period. For purposes of this calculation, redeemable convertible preferred stock, stock options to purchase common stock, early exercised stock options, and warrants to purchase redeemable convertible preferred stock and common stock are considered common shares equivalents but have been excluded from the calculation of diluted net loss per share attributable to common stockholders as their effect is antidilutive. Basic and diluted net loss per share was the same for each period presented, as the inclusion of all potential common shares outstanding would have been antidilutive.

The rights, including the liquidation and dividend rights, of the holders of Class A and Class B common stock are identical, except with respect to voting. As the liquidation and dividend rights are identical, the undistributed earnings are allocated on a proportionate basis and the resulting net loss per share attributed to common stockholders will, therefore, be the same for both Class A and Class B common stock on an individual or combined basis.

The following table sets forth the computation of basic and diluted net loss per share attributable to common stockholders (in thousands, except share and per share data):

	Year Ended December 31,	
	2019	2018
Numerator:		
Net loss attributable to common stockholders for earnings per share, basic and diluted	\$ 67,484	\$ 37,940
Denominator:		
Shares used to compute net loss per share, basic and diluted	15,834,175	2,104,861
Basic and diluted net loss attributable to common stockholders per share	<u>\$ 4.26</u>	<u>\$ 18.02</u>

The following outstanding potentially dilutive common shares were excluded from the computation of diluted net loss per share attributable to common stockholders for the periods presented because the impact of including them would have been antidilutive:

	Year Ended December 31,	
	2019	2018
Convertible preferred stock (as converted)	—	17,248,259
Common stock options	3,742,144	2,136,291
Common stock warrants	49,997	62,936
Convertible preferred stock warrants	—	49,997
Early exercised stock options	913	—
	3,793,054	19,497,483

13. Income Taxes

For the years ended December 31, 2019, and 2018, the Company recorded income tax provision related to state minimum taxes due. A reconciliation of the federal statutory income tax rate and the Company's effective income tax rate is as follows:

	December 31,	
	2019	2018
Tax computed at federal statutory rate	21.0 %	21.0 %
State income taxes, net of federal benefit	8.3 %	2.0 %
Other	(1.0)%	(1.5)%
Tax reform rate change	0.0 %	0.4 %
Change in valuation allowance	(30.4)%	(24.2)%
Credits	2.1	2.3 %
Effective income tax rate	0.0 %	0.0 %

Deferred income taxes result from the tax effect of transactions that are recognized in different periods for financial statement and income tax reporting purposes, as well as operating loss and tax credit carryforwards. Significant components of the Company's deferred income tax assets and liabilities are as follows (in thousands):

	As of December 31,	
	2019	2018
Deferred tax assets:		
Net operating loss carryforward	\$ 34,529	\$ 18,636
Tax credits	7,459	4,121
Intangibles	1,914	1,554
Other	1,379	366
Total deferred tax assets	45,281	24,677
Deferred tax liabilities:		
Fixed assets	233	133
Total deferred tax liabilities	233	133
Valuation allowance	(45,048)	(24,544)
Total	\$ —	\$ —

The Company uses the "more likely than not" criterion for recognizing the income tax benefit of uncertain income tax positions and establishing measurement criteria for income tax benefits. The Company has evaluated the impact of these positions and has reserved an unrecognized tax benefit of \$2.6 million and \$1.4 million as of December 31, 2019 and 2018, respectively.

The following table summarizes the changes in the Company's unrecognized tax benefits during the periods presented (in thousands):

	As of December 31,	
	2019	2018
Beginning of period	\$ 1,396	\$ 915
Current period tax position increases	1,097	457
Prior period tax position increases	90	24
End of period	<u>2,583</u>	<u>1,396</u>

The increase in the unrecognized tax benefit in 2019 is primarily additions based on tax positions related to 2019. In the event the Company should need to recognize interest and penalties related to unrecognized income tax liabilities, this amount will be recorded as an accrued liability and an increase to income tax expense. No amounts of interest or penalties were recognized in the Company's consolidated financial statements for 2019 or 2018. The Company is not currently under examination by income tax authorities in federal, state or other foreign jurisdictions. The Company does not anticipate any significant changes within 12 months of this reporting date of its uncertain tax positions.

The net increase in the valuation allowance was \$20.5 million and \$9.2 million in 2019 and 2018, respectively.

At December 31, 2019, the Company has federal and state net operating loss carryforwards of \$46.5 million and \$46.2 million, respectively, which begin to expire in 2030 and \$98.5 million of federal net operating loss carryforwards which do not expire but are subject to the 80% taxable income limitation. Additionally, the Company had federal tax credits totaling \$5.7 million and \$3.2 million at December 31, 2019 and 2018, respectively, and state tax credits totaling \$5.3 million and \$2.9 million, at December 31, 2019 and 2018, respectively. The federal tax credits begin to expire in 2032. The state tax credits may be carried forward indefinitely.

Section 382 of the Internal Revenue Code of 1986, as amended, limits the use of net operating losses and income tax credit carryforwards in certain situations where changes occur in stock ownership of a company. If the Company should have an ownership change of more than 50% of the value of the Company's capital stock, utilization of the carryforwards could be restricted.

The Company files income tax returns in the U.S. federal jurisdiction, various state jurisdictions and Singapore. The U.S. federal and state tax years from 2010 to 2019 remain open to examination due to the carryover of unused net operating loss carryforwards and tax credits.

In January 2018, the FASB released guidance on the accounting for tax on the global intangible low-taxed income (GILTI) provisions of the 2017 Tax Act. The GILTI provisions subject certain U.S. entities to current tax on GILTI earned by certain foreign subsidiaries. The Company has considered these new provisions as they are effective for tax years starting after December 31, 2017 and determined that none will likely apply for the year ended December 31, 2019 and 2018.

14. Related Party Transactions

The Company recorded other income of \$611,000 and \$892,000 for the years ended December 31, 2019, and 2018, respectively, under service contracts with a stockholder. The Company had a receivable from the stockholder as of December 31, 2019, and 2018 of \$121,000 and \$89,000, respectively.

The Company recorded expense of \$1.4 million and \$1.1 million for the years ended December 31, 2019, and 2018, respectively, related to intellectual property and other legal services performed by a related party. The Company owed \$69,000 and \$134,000 to the related party at December 31, 2019, and 2018, respectively.

The Company recorded expense of \$2.7 million and \$0.5 million for the years ended December 31, 2019, and 2018, respectively, related to legal services performed by a related party. The Company owed \$186,000 and \$40,000 to the related party at December 31, 2019, and 2018, respectively.

The Company recorded research and development expenses of \$400,000 for each of the years ended December 31, 2019, and 2018, respectively, under consulting agreements with two members of the Company's board of directors. On August 22, 2019, one of the two members provided the Company with notice of his resignation from the Company's Board of Directors. The Company owed \$73,000 and zero to the member of the Company's board of directors as of December 31, 2019, and 2018, respectively.

15. Subsequent Events

The Company has evaluated subsequent events that may require adjustments to or disclosure in the consolidated financial statements through March 11, 2020, the date on which the consolidated financial statements were available to be issued.

In February, the Company entered into a research collaboration agreement with Merck Sharp & Dohme Corp., a subsidiary of Merck & Co., Inc. ("Merck"), to identify the antigenic targets of select antibodies discovered by Atreca with potential utility in oncology. Under the terms of the agreement, Atreca received a nominal upfront cash payment and following target identification, both companies will have freedom to advance therapeutic candidates against the targets identified under the collaboration, with development and commercial milestones payable by either party.

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

None.

Item 9A. Controls and Procedures

Evaluation of Disclosure Controls and Procedures

Management is responsible for establishing and maintaining adequate "internal control over financial reporting," as such term is defined under Rule 13a-15(f) of the Exchange Act. We maintain internal control over financial reporting 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. Internal control over financial reporting includes maintaining records that in reasonable detail accurately and fairly reflect our transactions; providing reasonable assurance that transactions are recorded as necessary for preparation of our financial statements; providing reasonable assurance that receipts and expenditures of our assets are made in accordance with management's authorization; and providing reasonable assurance that unauthorized acquisition, use or disposition of our assets that could have a material effect on the financial statements would be prevented or detected on a timely basis.

We maintain "disclosure controls and procedures," as defined in Rule 13a-15(e) and Rule 15d-15(e) under the Exchange Act that are designed to ensure that information required to be disclosed by a company in the reports that it files or submits under the Exchange Act is recorded, processed, summarized and reported, within the time periods specified in the SEC's rules and forms. Disclosure controls and procedures include, without limitation, controls and procedures designed to ensure that information required to be disclosed by a company in the reports that it files or submits under the Exchange Act is accumulated and communicated to our management, including our principal executive and principal financial officers, as appropriate to allow timely decisions regarding required disclosure.

Our management, with the participation of our Chief Executive Officer and our Chief Financial Officer, evaluated the effectiveness of our disclosure controls and procedures as of December 31, 2019. Based on the evaluation of our disclosure controls and procedures as of December 31, 2019, our Chief Executive Officer and Chief Financial

Officer concluded that, as of such date, our disclosure controls and procedures were effective at the reasonable assurance level.

We are not required to comply with the auditor attestation requirement of Section 404 of the Sarbanes-Oxley Act while we qualify as an “emerging growth company” as defined in the JOBS Act. Subject to certain limitations, we expect to remain an emerging growth company under the JOBS Act for up to five years from June 24, 2019, the date of our initial public offering. . In connection with our preparation and the audits of our financial statements as of and for the years ended December 31, 2019 and 2018, we and our auditor identified a material weakness as defined under the Exchange Act and by the Public Company Accounting Oversight Board (United States) in our internal control over financial reporting.. The material weakness related to a lack of application-based controls inherent in our enterprise resource planning (“ERP”) system used for maintaining our financial books and records. A material weakness is a deficiency, or a combination of deficiencies, in internal control over financial reporting such that there is a reasonable possibility that a material misstatement of our financial statements will not be prevented or detected on a timely basis. If we fail to establish and maintain effective internal control over financial reporting in the future, our operating results and our ability to operate our business could be harmed.

Remediation of Previously Identified Material Weaknesses

Management previously identified and disclosed a material weakness in our internal control over financial reporting at June 24, 2019 which related to a lack of application-based controls inherent in our enterprise resource planning (“ERP”) system used for maintaining our financial books and records.

As of December 31, 2019, management sufficiently completed its remediation of this material weakness by taking the following actions:

- " We have implemented a new ERP system that is our system of record for our financial books and records from January 1, 2019 forward. This new ERP system has strong application-based controls inherent in its design that provide a much stronger internal control infrastructure for financial reporting and for our internal control procedures.
- " We strengthened the segregation of duties by hiring additional personnel and implementing workflows to appropriately segregate the incompatible duties of custody of assets, approvals and authorizations, and recording of transactions;
- " We designed additional controls around identification, documentation and application of technical accounting guidance with particular emphasis on events outside the ordinary course of business. These controls include the implementation of additional supervision and review activities by qualified personnel, the preparation of formal accounting memoranda to support our conclusions on technical accounting matters, and the development and use of checklists and research tools to assist in compliance with GAAP with regard to complex accounting issues.
- " We developed and implemented policies and procedures related to security access, including security access reviews of our key financial systems’ users to ensure the appropriateness of their roles and security access levels.
- " We performed testing related to the functioning of these controls and continue to monitor these controls and make enhancements as needed.

We have completed the documentation and review of the corrective actions described above and our management has concluded that the design and operation of our closing and financial reporting processes is effective and therefore that this previously identified material weakness has been fully remediated as of December 31, 2019.

Changes in Internal Control Over Financial Reporting

Except for those remedial actions described above, there was no change in our internal control over financial reporting identified in connection with the evaluation required by Rule 13a-15(d) and 15d-15(d) of the Exchange Act that occurred during the period covered by this Annual Report on Form 10-K that has materially affected, or is reasonably likely to materially affect, our internal control over financial reporting.

Inherent Limitations on Effectiveness of Controls

Our management, including our Chief Executive Officer and Chief Financial Officer, believes that our disclosure controls and procedures and internal control over financial reporting are designed to provide reasonable assurance of achieving their objectives and are effective at the reasonable assurance level. However, our management does not expect that our disclosure controls and procedures or our internal control over financial reporting will prevent all errors and all fraud. A control system, no matter how well conceived and operated, can provide only reasonable, not absolute, assurance that the objectives of the control system are met. Further, the design of a control system must reflect the fact that there are resource constraints, and the benefits of controls must be considered relative to their costs. Because of the inherent limitations in all control systems, no evaluation of controls can provide absolute assurance that all control issues and instances of fraud, if any, have been detected. These inherent limitations include the realities that judgments in decision making can be faulty, and that breakdowns can occur because of a simple error or mistake. Additionally, controls can be circumvented by the individual acts of some persons, by collusion of two or more people or by management override of the controls. The design of any system of controls also is based in part upon certain assumptions about the likelihood of future events, and there can be no assurance that any design will succeed in achieving its stated goals under all potential future conditions; over time, controls may become inadequate because of changes in conditions, or the degree of compliance with policies or procedures may deteriorate. Because of the inherent limitations in a cost-effective control system, misstatements due to error or fraud may occur and not be detected.

Item 9B. Other Information

None.

PART III

Item 10. Directors, Executive Officers and Corporate Governance

The information required by this Item (other than the information set forth in the next paragraph in this Item) will be included in the 2020 Proxy Statement to be filed with the SEC no later than 120 days after the end of our fiscal year ended December 31, 2019 and is incorporated herein by reference.

We have adopted a Code of Business Conduct and Ethics, or the Code of Conduct, applicable to all of our employees, executive officers and directors. The Code of Conduct is available on our website at ir.atreca.com. The nominating and corporate governance committee of our board of directors is responsible for overseeing the Code of Conduct and must approve any waivers of the Code of Conduct for employees, executive officers and directors. We expect that any amendments to the Code of Conduct, or any waivers of its requirements, will be disclosed on our website, as required by applicable law or the listing standards of The Nasdaq Global Select Market. The inclusion of our website address in this Form 10-K does not include or incorporate by reference into this Form 10-K the information on or accessible through our website.

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 our Code of Ethics by posting such information on our website at ir.atreca.com within four business days following the date of such amendment or waiver.

Item 11. Executive Compensation

The information required by this Item will be included in the 2020 Proxy Statement to be filed with the SEC no later than 120 days after the end of the fiscal year ended December 31, 2019 and is incorporated herein by reference.

Item 12. Security Ownership of Certain Beneficial Owners and Management and Related Stockholder Matters

The information required by this Item will be included in the 2020 Proxy Statement to be filed with the SEC no later than 120 days after the end of the fiscal year ended December 31, 2019 and is incorporated herein by reference.

Item 13. Certain Relationships and Related Transactions, and Director Independence

The information required by this Item will be included in the 2020 Proxy Statement to be filed with the SEC no later than 120 days after the end of the fiscal year ended December 31, 2019 and is incorporated herein by reference.

Item 14. Principal Accounting Fees and Services

The information required by this Item will be included in the 2020 Proxy Statement to be filed with the SEC no later than 120 days after the end of the fiscal year ended December 31, 2019 and is incorporated herein by reference.

PART IV

Item 15. Exhibits, Financial Statement Schedules

(a) Documents filed as part of this report

(1) All financial statements

The exhibits listed on the accompanying Exhibit Index are filed or incorporated by reference (as stated therein) as part of this Annual Report on Form 10-K.

Number	Exhibit Title	Incorporated by Reference				
		Form	File No.	Exhibit	Filing Date	Filed Herewith
3.1	Amended and Restated Certificate of Incorporation of the Registrant.	8-K	001-38935	3.1	06/26/19	
3.2	Amended and Restated Bylaws of the Registrant.	8-K	001-38935	3.2	06/26/19	
4.1	Amended and Restated Investors' Rights Agreement, dated as of September 5, 2018, by and among the Registrant and certain of its stockholders.	S-1	333-231770	4.2	05/24/19	
4.2	Form of Warrant to Purchase Shares of Series A Preferred Stock, dated as of August 21, 2015, by and between the Registrant and Warrant holders of the Registrant.	S-1	333-231770	4.3	05/24/19	
4.3	Form of Class A Common Stock Certificate of the Registrant.	8-K	001-38935	4.1	06/26/19	
4.4	Form of Class B Common Stock Certificate of the Registrant.	8-K	001-38935	4.2	06/26/19	
4.5	Description of Registrant's Securities					X
10.1#	Atreca, Inc. 2010 Equity Incentive Plan, as amended, and forms of agreement thereunder.	S-1	333-231770	10.1	05/24/19	
10.2#	Atreca, Inc. 2019 Equity Incentive Plan and forms of agreement thereunder.	S-1/A	333-231770	10.2	06/10/19	
10.3#	Atreca, Inc. 2019 Employee Stock Purchase Plan.	S-1/A	333-231770	10.3	06/10/19	
10.4#	Letter Agreement, dated as of November 7, 2019, by and between the Registrant and Susan Berland.	10-Q	001-38935	10.3	11/12/19	
10.5#	Form of Indemnity Agreement entered into by and between the Registrant and each director and officer.	S-1	333-231770	10.4	05/24/19	
10.6	Lease Agreement dated July 17, 2019, between the Registrant and ARE-EAST JAMIE COURT, LLC.	8-K	001-38935	10.18	07/23/19	
10.7	Lease Agreement dated July 17, 2019, between the Registrant and ARE-SAN FRANCISCO NO. 63, LLC.	8-K	001-38935	10.19	07/23/19	
10.8#	Letter Agreement, dated May 28, 2019, between the Registrant and Lisa Decker.	10-Q	001-38935	10.6	08/13/19	
10.9#	Executive Employment Agreement, dated June 10, 2019, between the Registrant and Courtney Phillips.	10-Q	001-38935	10.7	08/13/19	

10.10	Registration Rights Agreement, dated as of March 11, 2020, by and among the Registrant, Baker Brothers Life Sciences L.P. and 667, L.P.								X
10.11#	Atreca, Inc. Non-Employee Director Compensation Policy.								X
10.12#	Atreca, Inc. Performance Bonus Plan								X
10.13†	Nominating Agreement, dated as of September 5, 2018, by and among the Registrant, Baker Brothers Life Sciences, L.P. and 667, L.P.	S-1/A	333-231770	10.15	06/10/19				
10.14	Sublease, dated as of March 22, 2016, by and between the Registrant and CardioDxz, Inc.	S-1/A	333-231770	10.12	06/10/19				
10.15	First Amendment to Sublease, dated as of August 25, 2017, by and between the Registrant and CardioDxz, Inc.	S-1/A	333-231770	10.13	06/10/19				
10.16†	Letter Agreement, dated as of August 21, 2015, by and between the Registrant and the Bill & Melinda Gates Foundation.	S-1/A	333-231770	10.14	06/10/19				
10.17†	Exclusive (Equity) Agreement, dated as of May 24, 2018, by and between the Registrant and The Board of Trustees of the Leland Stanford Junior University.	S-1/A	333-231770	10.16	06/10/19				
10.18	Amendment to the Exclusive (Equity Agreement, dated as of May 24, 2018, by and between the Registrant and The Board of Trustees of the Leland Stanford Junior University.	S-1/A	333-231770	10.17	06/10/19				
21.1	Subsidiaries of the Registrant.	S-1	333-231770	21.1	05/24/19				
23.1	Consent of OUM & Co. LLP, independent registered public accounting firm.								X
24.1	Power of Attorney (included in signature pages).								
31.1	Certification of Chief Executive Officer, as required by Rule 13a-14(a) or Rule 15d-14(a).								X
31.2	Certification of Chief Financial Officer, as required by Rule 13a-14(a) or Rule 15d-14(a).								X
32.1*	Certification of Principal Executive Officer and Principal Financial Officer, as required by Rule 13a-14(b) or Rule 15d-14(b) and Section 1350 of Chapter 63 of Title 18 of the United States Code (18 U.S.C. Section 1350).								X

101.INS	XBRL Instance Document.	X
101.SCH	XBRL Taxonomy Extension Schema Document.	X
101.CAL	XBRL Taxonomy Extension Calculation Linkbase Document.	X
101.DEF	XBRL Taxonomy Extension Definition Linkbase Document.	X
101.LAB	XBRL Taxonomy Extension Label Linkbase Document.	X
101.PRE	XBRL Taxonomy Extension Presentation Linkbase Document.	X

Indicates management contract or compensatory plan.

† Portions of this exhibit (indicated by asterisks) have been omitted as the Registrant has determined that (i) the omitted information is not material and (ii) the omitted information would likely cause competitive harm if publicly disclosed.

* The certifications attached as Exhibit 32.1 accompany this Annual Report on Form 10-K pursuant to 18 U.S.C. Section 1350, as adopted pursuant to Section 906 of the Sarbanes-Oxley Act of 2002, and shall not be deemed “filed” by the Registrant for purposes of Section 18 of the Securities Exchange Act of 1934, as amended.

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 Annual Report on Form 10-K to be signed on its behalf by the undersigned thereunto duly authorized, in the City of South San Francisco, State of California.

ATRECA, INC.

Date: March 11, 2020

By: /s/ JOHN A. ORWIN
John A. Orwin
President and Chief Executive Officer
(Principal Executive Officer)

POWER OF ATTORNEY

KNOW ALL PERSONS BY THESE PRESENTS, that each person whose signature appears below constitutes and appoints John A. Orwin, Herbert Cross and Courtney Phillips, jointly and severally, his or her attorneys-in-fact, each with the power of substitution, for him or her in any and all capacities, to sign any 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 substitute or substitutes, may do or cause to be done by virtue hereof.

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.

<u>Signature</u>	<u>Title</u>	<u>Date</u>
<u>/s/ JOHN A. ORWIN</u> John A. Orwin	Director, President and Chief Executive Officer (Principal Executive Officer)	March 11, 2020
<u>/s/ HERBERT CROSS</u> Herbert Cross	Chief Financial Officer (Principal Financial and Accounting Officer)	March 11, 2020
<u>/s/ BRIAN ATWOOD</u> Brian Atwood	Chairman of the Board of Directors	March 11, 2020
<u>/s/ FRANKLIN BERGER</u> Franklin Berger	Director	March 11, 2020
<u>/s/ DAVID LACEY</u> David Lacey	Director	March 11, 2020
<u>/s/ WILLIAM H. ROBINSON</u> William H. Robinson, M.D., Ph. D.	Director	March 11, 2020
<u>/s/ LINDSEY ROLFE</u> Lindsey Rolfe, BSc, MB ChB, MRCP, FFPM	Director	March 11, 2020
<u>/s/ TITO A. SERAFINI</u> Tito A. Serafini, Ph.D.	Director and Chief Strategy Officer	March 11, 2020

**DESCRIPTION OF REGISTRANT'S SECURITIES
REGISTERED PURSUANT TO SECTION 12 OF THE SECURITIES EXCHANGE ACT OF 1934**

General

The following description summarizes the most important terms of our capital stock. Because it is only a summary, it does not contain all the information that may be important to you. For a complete description of the matters set forth in this "Description of Registrant's Securities," you should refer to our amended and restated certificate of incorporation and amended and restated bylaws, which are included as exhibits to our Annual Report on Form 10-K, and to the applicable provisions of Delaware law.

Our authorized capital stock consists of 650,000,000 shares of Class A common stock, \$0.0001 par value per share, 50,000,000 shares of Class B common stock, \$0.0001 par value per share and 300,000,000 shares of preferred stock, \$0.0001 par value per share.

Class A Common Stock***Voting Rights***

Except as otherwise expressly provided in our amended and restated certificate of incorporation or as required by applicable law, on any matter that is submitted to a vote by our stockholders, holders of our Class A common stock are entitled to one vote per share of Class A common stock, including for the election of directors. We have not provided for cumulative voting rights for our Class A common stock in our amended and restated certificate of incorporation.

Conversion Rights

Holders of our Class A common stock have no conversion rights.

Economic Rights

Dividends and Distributions. Subject to preferences that may be applicable to any then outstanding preferred stock, holders of our Class A common stock and Class B common stock are entitled to receive ratably those dividends, if any, as may be declared by the board of directors out of legally available funds.

Liquidation Rights. In the event of our liquidation, dissolution or winding up, the holders of our Class A common stock and Class B common stock will be entitled to share ratably in the assets legally available for distribution to stockholders after the payment of or provision for all of our debts and other liabilities, subject to the prior rights of any preferred stock then outstanding.

Holders of our Class A common stock have no preemptive rights or other subscription rights and there are no redemption or sinking funds provisions applicable to our Class A common stock.

Class B Common Stock***Voting Rights***

Except as otherwise expressly provided in our amended and restated certificate of incorporation or as required by applicable law, on any matter that is submitted to a vote by our stockholders, holders of our Class B common stock are not entitled to any votes per share of Class B common stock, including for the election of directors. We have not provided for cumulative voting rights for our Class B common stock in our amended and restated certificate of incorporation.

Conversion Rights

Holders of our Class B common stock shall have the right to convert each share of our Class B common stock into one share of Class A common stock at such holder's election, provided that as a result of such conversion, such holder would not beneficially own in excess of 4.99% of any class of our securities registered under the Exchange Act, unless otherwise as expressly provided for in our amended and restated certificate of incorporation. However, this ownership limitation may be increased or decreased to any other percentage designated by such holder of Class B common stock upon 61 days' notice to us.

Economic Rights

Dividends and Distributions. Subject to preferences that may be applicable to any then outstanding preferred stock, holders of our Class B common stock and Class A common stock are entitled to receive ratably those dividends, if any, as may be declared by the board of directors out of legally available funds.

Liquidation Rights. In the event of our liquidation, dissolution or winding up, the holders of our Class B common stock and Class A common stock will be entitled to share ratably in the assets legally available for distribution to stockholders after the payment of or provision for all of our debts and other liabilities, subject to the prior rights of any preferred stock then outstanding.

Holders of our Class B common stock have no preemptive rights or other subscription rights and there are no redemption or sinking funds provisions applicable to our Class B common stock.

Preferred Stock

Under the terms of our amended and restated certificate of incorporation, our board of directors has the authority, without further action by our stockholders, to issue up to 300,000,000 shares of preferred stock in one or more series, to establish from time to time the number of shares to be included in each such series, to fix the dividend, voting and other rights, preferences and privileges of the shares of each wholly unissued series and any qualifications, limitations or restrictions thereon, and to increase or decrease the number of shares of any such series, but not below the number of shares of such series then outstanding.

Our board of directors may authorize the issuance of preferred stock with voting or conversion rights that could adversely affect the voting power or other rights of the holders of the Class A common stock. The issuance of preferred stock, while providing flexibility in connection with possible acquisitions and other corporate purposes, could, among other things, have the effect of delaying, deferring or preventing a change in our control and may adversely affect the market price of the Class A common stock and the voting and other rights of the holders of Class A common stock. We have no current plans to issue any shares of preferred stock.

Anti-Takeover Effects of Provisions of Delaware Law and Our Amended and Restated Certificate of Incorporation and Amended and Restated Bylaws

Some provisions of Delaware law, our amended and restated certificate of incorporation and our amended and restated bylaws contain provisions that could make the following transactions more difficult: an acquisition of us by means of a tender offer; an acquisition of us by means of a proxy contest or otherwise; or the removal of our incumbent officers and directors. It is possible that these provisions could make it more difficult to accomplish or could deter transactions that stockholders may otherwise consider to be in their best interest or in our best interests, including transactions which provide for payment of a premium over the market price for our shares.

These provisions, summarized below, are intended to discourage coercive takeover practices and inadequate takeover bids. These provisions are also designed to encourage persons seeking to acquire control of us to first negotiate with our board of directors. We believe that the benefits of the increased protection of our potential ability to negotiate with the proponent of an unfriendly or unsolicited proposal to acquire or restructure us outweigh the disadvantages of discouraging these proposals because negotiation of these proposals could result in an improvement of their terms.

Section 203 of the Delaware General Corporation Law

We are subject to Section 203 of the Delaware General Corporation Law, which prohibits a Delaware corporation from engaging in any business combination with any interested stockholder for a period of three years after the date that such stockholder became an interested stockholder, with the following exceptions:

- before such date, the board of directors of the corporation approved either the business combination or the transaction that resulted in the stockholder becoming an interested stockholder;
- upon completion of the transaction that resulted in the stockholder becoming an interested stockholder, the interested stockholder owned at least 85% of the voting stock of the corporation outstanding at the time the transaction began, excluding for purposes of determining the voting stock outstanding (but not the outstanding voting stock owned by the interested stockholder) those shares owned (1) by persons who are directors and also officers and (2) employee stock plans in which employee participants do not have the right to determine confidentially whether shares held subject to the plan will be tendered in a tender or exchange offer; and
- on or after such date, the business combination is approved by the board of directors and authorized at an annual or special meeting of the stockholders, and not by written consent, by the affirmative vote of at least 66 2/3% of the outstanding voting stock that is not owned by the interested stockholder.

In general, Section 203 of the Delaware General Corporation Law defines “business combination” to include the following:

- any merger or consolidation involving the corporation and the interested stockholder;
- any sale, transfer, pledge or other disposition of 10% or more of the assets of the corporation involving the interested stockholder;
- subject to certain exceptions, any transaction that results in the issuance or transfer by the corporation of any stock of the corporation to the interested stockholder;
- any transaction involving the corporation that has the effect of increasing the proportionate share of the stock or any class or series of the corporation beneficially owned by the interested stockholder; and
- the receipt by the interested stockholder of the benefit of any loans, advances, guarantees, pledges or other financial benefits by or through the corporation.

In general, Section 203 defines an “interested stockholder” as an entity or person who, together with the person’s affiliates and associates, beneficially owns, or within three years prior to the time of determination of interested stockholder status owned, 15% or more of the outstanding voting stock of the corporation.

The statute could prohibit or delay mergers or other takeover or change in control attempts and, accordingly, may discourage attempts to acquire us even though such a transaction may offer our stockholders the opportunity to sell their stock at a price above the prevailing market price.

Amended and Restated Certificate of Incorporation and Amended and Restated Bylaws

Our amended and restated certificate of incorporation provides for our board of directors to be divided into three classes with staggered three-year terms. Only one class of directors is elected at each annual meeting of our stockholders, with the other classes continuing for the remainder of their respective three-year terms. Because our stockholders do not have cumulative voting rights, the holders of a majority of the outstanding shares of Class A common stock entitled to vote in any election of directors can elect all of the directors standing for election, if they so choose, other than any directors that holders of any preferred stock we may issue may be entitled to elect. Our amended and restated certificate of incorporation also provide that directors may be removed by the stockholders only for cause upon the affirmative vote of sixty-six and two-thirds percent (66 2/3%) of the voting power of all then-outstanding shares of our capital stock entitled to vote generally at an election of the directors.

Our amended and restated certificate of incorporation and amended and restated bylaws provide that no action shall be taken by our stockholders except at an annual or special meeting of stockholders called in accordance with our amended and restated bylaws, and no action of our stockholders shall be taken by written consent or electronic transmission. Our amended and restated bylaws also provides that a special meeting of stockholders may

be called only by our chairperson of the board, chief executive officer or president, or by a resolution adopted by a majority of our board of directors.

Our amended and restated bylaws also establishes advance notice procedures with respect to stockholder proposals to be brought before a stockholder meeting and the nomination of candidates for election as directors, other than nominations made by or at the direction of the board of directors or a committee of the board of directors.

The amendment of any of the above provisions, except for the provision making it possible for our board of directors to issue preferred stock, would require approval by holders of at least two thirds of the total voting power of all of our outstanding voting stock.

The provisions of Delaware law, our amended and restated certificate of incorporation and our amended and restated bylaws could have the effect of discouraging others from attempting hostile takeovers and, as a consequence, they may also inhibit temporary fluctuations in the market price of our Class A common stock that often result from actual or rumored hostile takeover attempts. These provisions may also have the effect of preventing changes in the composition of our board and management. It is possible that these provisions could make it more difficult to accomplish transactions that stockholders may otherwise deem to be in their best interests.

Choice of Forum

Our amended and restated certificate of incorporation provides that the Court of Chancery of the State of Delaware will be the exclusive forum for the following types of actions or proceedings under Delaware statutory or common law: (i) any derivative action or proceeding brought on our behalf; (ii) any action asserting a breach of fiduciary duty; (iii) any action asserting a claim against us or our directors, officers, or employees arising under the Delaware General Corporation Law, our amended and restated certificate of incorporation or our amended and restated bylaws; and (iv) any action asserting a claim against us that is governed by the internal affairs doctrine. The provisions would not apply to suits brought to enforce a duty or liability created by the Exchange Act. Our amended and restated certificate of incorporation further provides that the federal district courts of the United States of America will be the exclusive forum for resolving any complaint asserting a cause of action arising under the Securities Act, subject to and contingent upon a final adjudication in the State of Delaware of the enforceability of such exclusive forum provision.

Transfer Agent and Registrar

The transfer agent and registrar for our Class A common stock and Class B common stock is Computershare Trust Company, N.A.. The transfer agent's address is 250 Royall Street, Canton, Massachusetts 02021-1011.

REGISTRATION RIGHTS AGREEMENT

This Registration Rights Agreement (this “Agreement”) is made as of March 11, 2020, by and between Atreca, Inc., a Delaware corporation (the “Company”), and the persons listed on the attached Schedule A who are signatories to this Agreement (collectively, the “Investors”). Unless otherwise defined herein, capitalized terms used in this Agreement have the respective meanings ascribed to them in Section 1.

RECITALS

WHEREAS, the Company and the Investors wish to provide for certain arrangements with respect to the registration of the Registrable Securities (as defined below) by the Company under the Securities Act (as defined below).

NOW, THEREFORE, in consideration of the mutual promises and covenants set forth herein, and other consideration, the receipt and adequacy of which are hereby acknowledged, the parties hereto agree as follows:

**Section 1.
DEFINITIONS**

1.1. Certain Definitions. In addition to the terms defined elsewhere in this Agreement, as used in this Agreement, the following terms have the respective meanings set forth below:

- (a) “Board” shall mean the Board of Directors of the Company.
 - (b) “Commission” shall mean the Securities and Exchange Commission or any other federal agency at the time administering the Securities Act.
 - (c) “Common Stock” shall mean the Company’s Class A Common Stock, par value \$0.0001 per share.
 - (d) “Exchange Act” shall mean the Securities Exchange Act of 1934, as amended, or any similar successor federal statute and the rules and regulations thereunder, all as the same shall be in effect from time to time.
 - (e) “Investor Rights Agreement” shall mean that certain Amended and Restated Investor Rights Agreement, dated as of September 5, 2018, by and among the Company and the investors listed on Exhibit A thereto, including the Investors, as the same may be amended and/or restated from time to time.
 - (f) “Other Securities” shall mean securities of the Company, other than Registrable Securities (as defined below).
 - (g) “Person” shall mean any individual, partnership, corporation, company, association, trust, joint venture, limited liability company, unincorporated organization, entity or division, or any government, governmental department or agency or political subdivision thereof.
-

- (h) “Registrable Securities” shall mean the shares of Common Stock and any Common Stock issued or issuable upon the exercise or conversion of any other securities (whether equity, debt or otherwise) of the Company now owned or hereafter acquired by any of the Investors.
- (i) The terms “register,” “registered” and “registration” shall refer to a registration effected by preparing and filing a Registration Statement in compliance with the Securities Act, and such Registration Statement becoming effective under the Securities Act.
- (j) “Registration Expenses” shall mean all expenses incurred by the Company in effecting any registration pursuant to this Agreement, including, without limitation, all registration, qualification, and filing fees, printing expenses, escrow fees, fees and disbursements of counsel for the Company, up to \$50,000 of reasonable legal expenses of one special counsel for Investors (if different from the Company’s counsel and if such counsel is reasonably approved by the Company) in connection with the preparation and filing of the Resale Registration Shelf (as defined below), and up to \$50,000 of reasonable legal expenses of one special counsel for Investors (if different from the Company’s counsel and if such counsel is reasonably approved by the Company) per underwritten public offering, blue sky fees and expenses, and expenses of any regular or special audits incident to or required by any such registration, but shall not include Selling Expenses.
- (k) “Registration Statement” means any registration statement of the Company filed with, or to be filed with, the SEC under the Securities Act, including the related prospectus, amendments and supplements to such registration statement, including pre- and post-effective amendments, and all exhibits and all material incorporated by reference in such registration statement as may be necessary to comply with applicable securities laws other than a registration statement (and related prospectus) filed on Form S-4 or Form S-8 or any successor forms thereto.
- (l) “Rule 144” shall mean Rule 144 as promulgated by the Commission under the Securities Act, as such rule may be amended from time to time, or any similar successor rule that may be promulgated by the Commission.
- (m) “Securities Act” shall mean the Securities Act of 1933, as amended, or any similar successor federal statute and the rules and regulations thereunder, all as the same shall be in effect from time to time.
- (n) “Selling Expenses” shall mean all underwriting discounts and selling commissions applicable to the sale of Registrable Securities, the fees and expenses of any legal counsel (except as provided in the definition of “Registration Expenses”) and any other advisors any of the Investors engage and all similar fees and commissions relating to the Investors’ disposition of the Registrable Securities.

Section 2.
RESALE REGISTRATION RIGHTS

2.1. Resale Registration Rights.

- (a) Following demand by any Investor the Company shall file with the Commission a Registration Statement on Form S-3 (except if the Company is not then eligible to register for

resale the Registrable Securities on Form S-3, in which case such registration shall be on another appropriate form in accordance with the Securities Act) covering the resale of the Registrable Securities by the Investors (the “Resale Registration Shelf”), and the Company shall file such Resale Registration Shelf as promptly as reasonably practicable following such demand, and in any event within sixty (60) days of such demand; provided, however, that the Company shall not be obligated to make any such filing until after December 17, 2019 (the “Demand Effective Date”). Such Resale Registration Shelf shall include a “base” prospectus that meets the requirements set forth or promulgated pursuant to Section 10(b) of the Securities Act, including the information required by Item 507 of Regulation S-K of the Securities Act, as provided by the Investors in accordance with Section 2.7. Notwithstanding the foregoing, before filing the Resale Registration Shelf, the Company shall furnish to the Investors a copy of the Resale Registration Shelf and afford the Investors an opportunity to review and comment on the Resale Registration Shelf. The Company’s obligation pursuant to this Section 2.1(a) is conditioned upon the Investors providing the information contemplated in Section 2.7. Notwithstanding anything contained herein to the contrary, any demand made by an Investor pursuant to this Agreement that the Company file with the Commission a Registration Statement shall be deemed to be a demand for registration of the same nature (i.e., Form S-3 or Form S-1, underwritten or not) pursuant to the Investor Rights Agreement to the extent such rights are, at the relative time, available pursuant to the Investor Rights Agreement.

(b) The Company shall use its reasonable best efforts to cause the Resale Registration Shelf and related prospectuses to become effective as promptly as practicable after filing. The Company shall use its reasonable best efforts to cause such Registration Statement to remain effective under the Securities Act until the earlier of the date (i) all Registrable Securities covered by the Resale Registration Shelf have been sold or may be sold freely without limitations or restrictions as to volume or manner of sale pursuant to Rule 144 or (ii) all Registrable Securities covered by the Resale Registration Shelf otherwise cease to be Registrable Securities pursuant to Section 2.9 hereof. The Company shall promptly, and within two (2) business days after the Company confirms effectiveness of the Resale Registration Shelf with the Commission, notify the Investors of the effectiveness of the Resale Registration Shelf.

(c) Notwithstanding anything contained herein to the contrary, the Company shall not be obligated to effect, or to take any action to effect, a registration pursuant to Section 2.1(a):

(i) if the Company has and maintains an effective Registration Statement on Form S-3ASR that provides for the resale of an unlimited number of securities by selling stockholders (a “Company Registration Shelf”);

(ii) during the period forty-five (45) days prior to the Company’s good faith estimate of the date of filing of a Company Registration Shelf; or

(iii) if the Company has caused a Registration Statement to become effective pursuant to this Section 2.1 or pursuant to Section 2.4 of the Investor Rights Agreement during the prior twelve (12) month period (provided that the Investors have the opportunity to register all of their Registrable Securities).

(d) If the Company has a Company Registration Shelf in place at any time in which the Investors make a demand pursuant to Section 2.1(a), the Company shall file with the

Commission, as promptly as practicable, and in any event within fifteen (15) business days after such demand, a “final” prospectus supplement to its Company Registration Shelf covering the resale of the Registrable Securities by the Investors (the “Prospectus”); provided, however, that (i) the Company shall not be obligated to make any such filing until after the Demand Effective Date and (ii) the Company shall not be obligated to file more than one Prospectus pursuant to this Section 2.1(d) in any six month period to add additional Registrable Securities to the Company Registration Shelf that were acquired by the Investors other than directly from the Company or in an underwritten public offering by the Company. The Prospectus shall include the information required under Item 507 of Regulation S-K of the Securities Act, which information shall be provided by the Investors in accordance with Section 2.7. Notwithstanding the foregoing, before filing the Prospectus, the Company shall furnish to the Investors a copy of the Prospectus and afford the Investors an opportunity to review and comment on the Prospectus.

(e) Deferral and Suspension. At any time after being obligated pursuant to this Agreement to file a Registration Statement or Prospectus, or after any such Registration Statement has become effective or such Prospectus has been filed with the Commission, the Company may defer the filing of or suspend the use of any such Registration Statement or Prospectus, upon giving written notice of such action to the Investors with a certificate signed by the Chairman of the Board of the Company stating that in the good faith judgment of the Board, the filing or use of any such Registration Statement or Prospectus covering the Registrable Securities would be seriously detrimental to the Company or its stockholders (including, without limitation, because the Company reasonably and in good faith believes that there is or may be in existence material nonpublic information or events involving the Company, the failure of which to be disclosed in the prospectus contained in such Restriction Statement, or such Prospectus, could result in a Violation, as defined below) at such time and that the Board concludes, as a result, that it is in the best interests of the Company and its stockholders to defer the filing or suspend the use of such Registration Statement or Prospectus at such time. The Company shall have the right to defer the filing of or suspend the use of such Registration Statement or Prospectus for a period of not more than one hundred twenty (120) days from the date the Company notifies the Investors of such deferral or suspension; provided that the Company shall not exercise the right contained in this Section 2.1(e) more than once in any twelve month period. In the case of the suspension of use of any effective Registration Statement or Prospectus, the Investors, immediately upon receipt of notice thereof from the Company, shall discontinue any offers or sales of Registrable Securities pursuant to such Registration Statement or Prospectus until advised in writing by the Company that the use of such Registration Statement or Prospectus may be resumed. In the case of a deferred Prospectus or Registration Statement filing, the Company shall provide prompt written notice to the Investors of (i) the Company’s decision to file or seek effectiveness of the Prospectus or Registration Statement, as the case may be, following such deferral and (ii) in the case of a Registration Statement, the effectiveness of such Registration Statement. In the case of either a suspension of use of, or deferred filing of, any Registration Statement or Prospectus, the Company shall not, during the pendency of such suspension or deferral, be required to take any action hereunder (including any action pursuant to Section 2.2 hereof) with respect to the registration or sale of any Registrable Securities pursuant to any such Registration Statement, Company Registration Shelf or Prospectus.

(f) Other Securities. Except with respect to an underwritten offering, any Resale Registration Shelf or Prospectus may include Other Securities, and may include securities of the

Company being sold for the account of the Company. No Other Securities may be included in an underwritten offering pursuant to Section 2.2 without the consent of the Investors, except as may be required pursuant to the Investor Rights Agreement.

2.2. Sales and Underwritten Offerings of the Registrable Securities.

(a) Notwithstanding any provision contained herein to the contrary, the Investors, collectively, shall, following the Demand Effective Date, and subject to the limitations set forth in this Section 2.2, be permitted one underwritten public offering per calendar year, but no more than three underwritten public offerings in total, to effect the sale or distribution of Registrable Securities.

(b) If the Investors intend to effect an underwritten public offering pursuant to a Resale Registration Shelf or Company Registration Shelf to sell or otherwise distribute Registrable Securities, they shall so advise the Company and provide as much notice to the Company as reasonably practicable (and in any event not less than fifteen (15) business days prior to the Investors' request that the Company file a prospectus supplement (or a preliminary if required) to a Resale Registration Shelf or Company Registration Shelf).

(c) In connection with any offering initiated by the Investors pursuant to this Section 2.2 involving an underwriting of shares of Registrable Securities, the Investors shall be entitled to select the underwriter or underwriters for such offering, subject to the consent of the Company, such consent not to be unreasonably withheld, conditioned or delayed.

(d) In connection with any offering initiated by the Investors pursuant to this Section 2.2 involving an underwriting of shares of Registrable Securities, the Company shall not be required to include any of the Registrable Securities in such underwriting unless the Investors (i) enter into an underwriting agreement in customary form with the underwriter or underwriters, (ii) accept customary terms in such underwriting agreement with regard to representations and warranties relating to ownership of the Registrable Securities and authority and power to enter into such underwriting agreement and (iii) complete and execute all questionnaires, powers of attorney, custody agreements, indemnities and other documents as may be requested by such underwriter or underwriters. Further, the Company shall not be required to include any of the Registrable Securities in such underwriting if (Y) the underwriting agreement proposed by the underwriter or underwriters contains representations, warranties or conditions that are not reasonable in light of the Company's then-current business or (Z) the underwriter, underwriters or the Investors require the Company to participate in any marketing, road show or comparable activity that may be required to complete the orderly sale of shares by the underwriter or underwriters.

(e) If the total amount of securities to be sold in any offering initiated by the Investors pursuant to this Section 2.2 involving an underwriting of shares of Registrable Securities exceeds the amount that the underwriters determine in their sole discretion is compatible with the success of the offering, then the Company shall be required to include in the offering only that number of such securities, including Registrable Securities (subject in each case to the cutback provisions set forth in this Section 2.2(e)), that the underwriters and the Company determine in their sole discretion shall not jeopardize the success of the offering. If the underwritten public offering has

been requested pursuant to Section 2.2(a) hereof, the number of shares that are entitled to be included in the registration and underwriting shall be allocated in the following manner: (a) first, shares of Company equity securities that the Company desires to include in such registration (including any Other Securities) shall be excluded and (b) second, Registrable Securities requested to be included in such registration by the Investors shall be excluded. To facilitate the allocation of shares in accordance with the above provisions, the Company or the underwriters may round down the number of shares allocated to any of the Investors to the nearest 100 shares.

2.3. Fees and Expenses. All Registration Expenses incurred in connection with registrations pursuant to this Agreement shall be borne by the Company. All Selling Expenses relating to securities registered on behalf of the Investors shall be borne by the Investors.

2.4. Registration Procedures. In the case of each registration of Registrable Securities effected by the Company pursuant to Section 2.1 hereof, the Company shall keep the Investors advised as to the initiation of each such registration and as to the status thereof. The Company shall use its reasonable best efforts, within the limits set forth in this Section 2.4, to:

- (a) prepare and file with the Commission such amendments and supplements to such Registration Statement and the prospectuses used in connection with such Registration Statement as may be necessary to keep such Registration Statement effective and current and comply with the provisions of the Securities Act with respect to the disposition of all securities covered by such Registration Statement.
- (b) furnish to the Investors such numbers of copies of a prospectus, including preliminary prospectuses, in conformity with the requirements of the Securities Act, and such other documents as the Investors may reasonably request in order to facilitate the disposition of Registrable Securities;
- (c) use its reasonable best efforts to register and qualify the Registrable Securities covered by such Registration Statement under such other securities or blue sky laws of such jurisdictions in the United States as shall be reasonably requested by the Investors, provided that the Company shall not be required in connection therewith or as a condition thereto to qualify to do business or to file a general consent to service of process in any such states or jurisdictions;
- (d) in the event of any underwritten public offering, and subject to Section 2.2(d), enter into and perform its obligations under an underwriting agreement, in usual and customary form, with the managing underwriter of such offering and take such other usual and customary action as the Investors may reasonably request in order to facilitate the disposition of such Registrable Securities;
- (e) notify the Investors at any time when a prospectus relating to a Registration Statement covering any Registrable Securities is required to be delivered under the Securities Act of the happening of any event as a result of which the prospectus included in such Registration Statement, as then in effect, includes an untrue statement of a material fact or omits to state a material fact required to be stated therein or necessary to make the statements therein not misleading in the light of the circumstances then existing. The Company shall use its reasonable best efforts to amend or supplement such prospectus in order to cause such prospectus not to

include any untrue statement of a material fact or omit to state a material fact required to be stated therein or necessary to make the statements therein not misleading in the light of the circumstances then existing;

(f) provide a transfer agent and registrar for all Registrable Securities registered pursuant to such Registration Statement and, if required, a CUSIP number for all such Registrable Securities, in each case not later than the effective date of such registration;

(g) if requested by an Investor, cause the Company's transfer agent to remove any restrictive legend from any Registrable Securities being transferred by an Investor pursuant to a Resale Registration Shelf or Company Registration Shelf, within two business days following such request;

(h) cause to be furnished, at the request of the Investors, on the date that Registrable Securities are delivered to underwriters for sale in connection with an underwritten offering pursuant to this Agreement, (i) an opinion, dated such date, of the counsel representing the Company for the purposes of such registration, in form and substance as is customarily given to underwriters in an underwritten public offering, addressed to the underwriters, and (ii) a letter or letters from the independent certified public accountants of the Company, in form and substance as is customarily given by independent certified public accountants to underwriters in an underwritten public offering, addressed to the underwriters; and

(i) cause all such Registrable Securities included in a Registration Statement pursuant to this Agreement to be listed on each securities exchange or other securities trading markets on which Common Stock is then listed.

2.5. The Investors Obligations.

(a) Discontinuance of Distribution. The Investors agree that, upon receipt of any notice from the Company of the occurrence of any event of the kind described in Section 2.4(e) hereof, the Investors shall immediately discontinue disposition of Registrable Securities pursuant to any Registration Statement covering such Registrable Securities until the Investors' receipt of the copies of the supplemented or amended prospectus contemplated by Section 2.4(e) hereof or receipt of notice that no supplement or amendment is required and that the Investors' disposition of the Registrable Securities may be resumed. The Company may provide appropriate stop orders to enforce the provisions of this Section 2.5(a).

(b) Compliance with Prospectus Delivery Requirements. The Investors covenant and agree that they shall comply with the prospectus delivery requirements of the Securities Act as applicable to them or an exemption therefrom in connection with sales of Registrable Securities pursuant to any Registration Statement filed by the Company pursuant to this Agreement.

(c) Notification of Sale of Registrable Securities. The Investors covenant and agree that they shall notify the Company following the sale of Registrable Securities to a third party as promptly as reasonably practicable, and in any event within twenty (20) days, following the sale of such Registrable Securities.

2.6. Indemnification.

(a) To the extent permitted by law, the Company shall indemnify the Investors, and, as applicable, their officers, directors, and constituent partners, legal counsel for each Investor and each Person controlling the Investors, with respect to which registration, related qualification, or related compliance of Registrable Securities has been effected pursuant to this Agreement, and each underwriter, if any, and each Person who controls any underwriter within the meaning of the Securities Act against all claims, losses, damages, or liabilities (or actions in respect thereof) to the extent such claims, losses, damages, or liabilities arise out of or are based upon (i) any untrue statement (or alleged untrue statement) of a material fact contained in any prospectus or other document (including any related Registration Statement) incident to any such registration, qualification, or compliance, or (ii) any omission (or alleged omission) to state therein a material fact required to be stated therein or necessary to make the statements therein not misleading, or (iii) any violation or alleged violation by the Company of the Securities Act, the Exchange Act, any state securities law, or any rule or regulation promulgated under the Securities Act, the Exchange Act or any state securities law applicable to the Company and relating to action or inaction required of the Company in connection with any such registration, qualification, or compliance (individually or collectively, a "Violation"); and the Company shall pay as incurred to the Investors, each such underwriter, and each Person who controls the Investors or underwriter, any legal and any other expenses reasonably incurred in connection with investigating or defending any such claim, loss, damage, liability, or action; provided, however, that the indemnity contained in this Section 2.6(a) shall not apply to amounts paid in settlement of any such claim, loss, damage, liability, or action if settlement is effected without the consent of the Company (which consent shall not unreasonably be withheld); and provided, further, that the Company shall not be liable in any such case to the extent that any such claim, loss, damage, liability, or expense arises out of or is based upon any violation by such Investor of the obligations set forth in Section 2.5 hereof or any untrue statement or omission contained in such prospectus or other document based upon written information furnished to the Company by the Investors, such underwriter, or such controlling Person and stated to be for use therein.

(b) To the extent permitted by law, each Investor (severally and not jointly) shall, if Registrable Securities held by such Investor are included for sale in the registration and related qualification and compliance effected pursuant to this Agreement, indemnify the Company, each of its directors, each officer of the Company who signs the applicable Registration Statement, each legal counsel and each underwriter of the Company's securities covered by such a Registration Statement, each Person who controls the Company or such underwriter within the meaning of the Securities Act against all claims, losses, damages, and liabilities (or actions in respect thereof) arising out of or based upon (i) any untrue statement (or alleged untrue statement) of a material fact contained in any such Registration Statement, or related document, or (ii) any omission (or alleged omission) to state therein a material fact required to be stated therein or necessary to make the statements therein not misleading, or (iii) any violation or alleged violation by such Investor of Section 2.5 hereof, the Securities Act, the Exchange Act, any state securities law, or any rule or regulation promulgated under the Securities Act, the Exchange Act or any state securities law applicable to such Investor and relating to action or inaction required of such Investor in connection with any such registration and related qualification and compliance, and shall pay as incurred to such persons, any legal and any other expenses reasonably incurred in connection with investigating or defending any such claim, loss, damage, liability, or action, in each case only to the extent that such untrue statement (or alleged untrue statement) or omission (or alleged omission) is made in (and such violation pertains to)

such Registration Statement or related document in reliance upon and in conformity with written information furnished to the Company by such Investor and stated to be specifically for use therein; provided, however, that the indemnity contained in this Section 2.6(b) shall not apply to amounts paid in settlement of any such claim, loss, damage, liability, or action if settlement is effected without the consent of such Investor (which consent shall not unreasonably be withheld); provided, further, that such Investor's liability under this Section 2.6(b) (when combined with any amounts such Investor is liable for under Section 2.6(d)) shall not exceed such Investor's net proceeds from the offering of securities made in connection with such registration.

(c) Promptly after receipt by an indemnified party under this Section 2.6 of notice of the commencement of any action, such indemnified party shall, if a claim in respect thereof is to be made against an indemnifying party under this Section 2.6, notify the indemnifying party in writing of the commencement thereof and generally summarize such action. The indemnifying party shall have the right to participate in and to assume the defense of such claim; provided, however, that the indemnifying party shall be entitled to select counsel for the defense of such claim with the approval of any parties entitled to indemnification, which approval shall not be unreasonably withheld; provided further, however, that if either party reasonably determines that there may be a conflict between the position of the Company and the Investors in conducting the defense of such action, suit, or proceeding by reason of recognized claims for indemnity under this Section 2.6, then counsel for such party shall be entitled to conduct the defense to the extent reasonably determined by such counsel to be necessary to protect the interest of such party. The failure to notify an indemnifying party promptly of the commencement of any such action, if prejudicial to the ability of the indemnifying party to defend such action, shall relieve such indemnifying party, to the extent so prejudiced, of any liability to the indemnified party under this Section 2.6, but the omission so to notify the indemnifying party shall not relieve such party of any liability that such party may have to any indemnified party otherwise than under this Section 2.6.

(d) If the indemnification provided for in this Section 2.6 is held by a court of competent jurisdiction to be unavailable to an indemnified party with respect to any loss, liability, claim, damage, or expense referred to therein, then the indemnifying party, in lieu of indemnifying such indemnified party hereunder, shall contribute to the amount paid or payable by such indemnified party as a result of such loss, liability, claim, damage, or expense in such proportion as is appropriate to reflect the relative fault of the indemnifying party on the one hand and of the indemnified party on the other in connection with the statements or omissions that resulted in such loss, liability, claim, damage, or expense as well as any other relevant equitable considerations. The relative fault of the indemnifying party and of the indemnified party shall be determined by reference to, among other things, whether the untrue or alleged untrue statement of a material fact or the omission to state a material fact relates to information supplied by the indemnifying party or by the indemnified party and the parties' relative intent, knowledge, access to information, and opportunity to correct or prevent such statement or omission. In no event, however, shall (i) any amount due for contribution hereunder be in excess of the amount that would otherwise be due under Section 2.6(a) or Section 2.6(b), as applicable, based on the limitations of such provisions and (ii) a Person guilty of fraudulent misrepresentation (within the meaning of the Securities Act) be entitled to contribution from a Person who was not guilty of such fraudulent misrepresentation.

(e) Notwithstanding the foregoing, to the extent that the provisions on indemnification and contribution contained in the underwriting agreement entered into in connection with an underwritten public offering are in conflict with the foregoing provisions, the provisions in the underwriting agreement shall control; provided, however, that the failure of the underwriting agreement to provide for or address a matter provided for or addressed by the foregoing provisions shall not be a conflict between the underwriting agreement and the foregoing provisions.

(f) The obligations of the Company and the Investors under this Section 2.6 shall survive the completion of any offering of Registrable Securities in a Registration Statement under this Agreement.

2.7. Information. The Investors shall furnish to the Company such information regarding the Investors and the distribution proposed by the Investors as the Company may reasonably request and as shall be reasonably required in connection with any registration referred to in this Agreement. The Investors agree to, as promptly as practicable (and in any event prior to any sales made pursuant to a prospectus), furnish to the Company all information required to be disclosed in order to make the information previously furnished to the Company by the Investors not misleading. The Investors agree to keep confidential the receipt of any notice received pursuant to Section 2.4(e) and the contents thereof, except as required pursuant to applicable law. Notwithstanding anything to the contrary herein, the Company shall be under no obligation to name the Investors in any Registration Statement if the Investors have not provided the information required by this Section 2.7 with respect to the Investors as a selling securityholder in such Registration Statement or any related prospectus.

2.8. Rule 144 Requirements. With a view to making available to the Investors the benefits of Rule 144 promulgated under the Securities Act and any other rule or regulation of the Commission that may at any time permit the Investors to sell Registrable Securities to the public without registration, the Company agrees to use its reasonable best efforts to:

(a) make and keep public information available, as those terms are understood and defined in Rule 144 under the Securities Act at all times after the date hereof;

(b) file with the Commission in a timely manner all reports and other documents required of the Company under the Securities Act and the Exchange Act;

(c) prior to the filing of the Registration Statement or any amendment thereto (whether pre-effective or post-effective), and prior to the filing of any prospectus or prospectus supplement related thereto, to provide the Investors with copies of all of the pages thereof (if any) that reference the Investors; and

(d) furnish to any Investor, so long as the Investor owns any Registrable Securities, forthwith upon request (i) a written statement by the Company that it has complied with the reporting requirements of Rule 144, and (ii) such other information as may be reasonably requested by an Investor in availing itself of any rule or regulation of the Commission which permits an Investor to sell any such securities without registration.

2.9. Termination of Status as Registrable Securities. The Registrable Securities shall cease to be Registrable Securities upon the earliest to occur of the following events: (i) such Registrable Securities have been sold pursuant to an effective Registration Statement; (ii) such Registrable Securities have been sold by the Investors pursuant to Rule 144 (or other similar rule), (iii) such Registrable Securities may be resold by the Investor holding such Registrable Securities without limitations as to volume or manner of sale pursuant to Rule 144; or (iv) ten (10) years after the date of this Agreement.

**Section 3.
MISCELLANEOUS**

3.1. Amendment. No amendment, alteration or modification of any of the provisions of this Agreement shall be binding unless made in writing and signed by each of the Company and the Investors.

3.2. Injunctive Relief. It is hereby agreed and acknowledged that it shall be impossible to measure in money the damages that would be suffered if the parties fail to comply with any of the obligations herein imposed on them and that in the event of any such failure, an aggrieved Person shall be irreparably damaged and shall not have an adequate remedy at law. Any such Person shall, therefore, be entitled (in addition to any other remedy to which it may be entitled in law or in equity) to injunctive relief, including, without limitation, specific performance, to enforce such obligations, and if any action should be brought in equity to enforce any of the provisions of this Agreement, none of the parties hereto shall raise the defense that there is an adequate remedy at law.

3.3. Notices. All notices required or permitted under this Agreement must be in writing and sent to the address or facsimile number identified below. Notices must be given: (a) by personal delivery, with receipt acknowledged; (b) by facsimile followed by hard copy delivered by the methods under clause (c) or (d); (c) by prepaid certified or registered mail, return receipt requested; or (d) by prepaid reputable overnight delivery service. Notices shall be effective upon receipt. Either party may change its notice address by providing the other party written notice of such change. Notices shall be delivered as follows:

If to the Investors: At such Investor's address as set forth on Schedule A hereto

If to the Company: 450 E. Jamie Ct.
South San Francisco, CA 94080
Attention: John Orwin, Chief Executive Officer

with a copy (which copy shall not constitute notice) to: Cooley LLP
3175 Hanover Street
Palo Alto, CA 94304
Attention: Michael Tenta, Esq.
Fax: (650) 849-7400

3.4. Governing Law; Jurisdiction; Venue; Jury Trial.

(a) This Agreement shall be governed by, and construed in accordance with, the law of the State of New York without giving effect to any choice or conflict of law provision or rule (whether of the State of New York or any other jurisdiction) that would cause the application of the laws of any jurisdiction other than the State of New York.

(b) Each of the Company and the Investors irrevocably and unconditionally submits, for itself and its property, to the nonexclusive jurisdiction of the courts of the State of New York sitting in the Borough of Manhattan, New York and of the United States District Court of the Southern District of New York, and any appellate court from any thereof, in any action or proceeding arising out of or relating to this Agreement and the transactions contemplated herein, or for recognition or enforcement of any judgment, and each of the Company and the Investors irrevocably and unconditionally agrees that all claims in respect of any such action or proceeding may be heard and determined in such New York state court or, to the fullest extent permitted by applicable law, in such federal court. Each of the Company and the Investors hereto agrees that a final judgment in any such action or proceeding shall be conclusive and may be enforced in other jurisdictions by suit on the judgment or in any other manner provided by law.

(c) Each of the Company and the Investors irrevocably and unconditionally waives, to the fullest extent permitted by applicable law, any objection that it may now or hereafter have to the laying of venue of any action or proceeding arising out of or relating to this Agreement and the transactions contemplated herein in any court referred to in Section 3.4(b) hereof. Each of the Company and the Investors hereby irrevocably waives, to the fullest extent permitted by applicable law, the defense of an inconvenient forum to the maintenance of such action or proceeding in any such court.

(d) EACH OF THE COMPANY AND THE INVESTORS HEREBY IRREVOCABLY WAIVES, TO THE FULLEST EXTENT PERMITTED BY APPLICABLE LAW, ANY RIGHT IT MAY HAVE TO A TRIAL BY JURY IN ANY LEGAL PROCEEDING DIRECTLY OR INDIRECTLY ARISING OUT OF OR RELATING TO THIS AGREEMENT OR THE TRANSACTIONS CONTEMPLATED HEREBY (WHETHER BASED ON CONTRACT, TORT OR ANY OTHER THEORY). EACH OF THE COMPANY AND THE INVESTORS (A) CERTIFIES THAT NO REPRESENTATIVE, AGENT OR ATTORNEY OF ANY OTHER PERSON HAS REPRESENTED, EXPRESSLY OR OTHERWISE, THAT SUCH OTHER PERSON WOULD NOT, IN THE EVENT OF LITIGATION, SEEK TO ENFORCE THE FOREGOING WAIVER AND (B) ACKNOWLEDGES THAT EACH OF THE COMPANY AND THE INVESTORS HAS BEEN INDUCED TO ENTER INTO THIS AGREEMENT BY, AMONG OTHER THINGS, THE MUTUAL WAIVERS AND CERTIFICATIONS IN THIS SECTION.

3.5. Successors, Assigns and Transferees. Any and all rights, duties and obligations hereunder shall not be assigned, transferred, delegated or sublicensed by any party hereto without the prior written consent of the other party; provided, however, that the Investors shall be entitled to transfer Registrable Securities to one or more of their affiliates and, solely in connection therewith, may assign their rights hereunder in respect of such transferred Registrable Securities, in each case, so long as such Investor is not relieved of any liability or obligations

hereunder, without the prior consent of the Company. Any transfer or assignment made other than as provided in the first sentence of this Section 3.5 shall be null and void. Subject to the foregoing and except as otherwise provided herein, the provisions of this Agreement shall inure to the benefit of, and be binding upon, the successors, permitted assigns, heirs, executors and administrators of the parties hereto. The Company shall not consummate any recapitalization, merger, consolidation, reorganization or other similar transaction whereby stockholders of the Company receive (either directly, through an exchange, via dividend from the Company or otherwise) equity (the “Other Equity”) in any other entity (the “Other Entity”) with respect to Registrable Securities hereunder, unless prior to the consummation thereof, the Other Entity assumes, by written instrument, the obligations under this Agreement with respect to such Other Equity as if such Other Equity were Registrable Securities hereunder or otherwise provides substantially similar rights to the Investors.

3.6. Entire Agreement. This Agreement, together with any exhibits hereto, constitute the entire agreement between the parties relating to the subject matter hereof and all previous agreements or arrangements between the parties, written or oral, relating to the subject matter hereof are superseded.

3.7. Waiver. No failure on the part of either party hereto to exercise any power, right, privilege or remedy under this Agreement, and no delay on the part of either party hereto in exercising any power, right, privilege or remedy under this Agreement, shall operate as a waiver thereof; and no single or partial exercise of any such power, right, privilege or remedy shall preclude any other or further exercise thereof or of any other power, right, privilege or remedy.

3.8. Severability. If any part of this Agreement is declared invalid or unenforceable by any court of competent jurisdiction, such declaration shall not affect the remainder of the Agreement and the invalidated provision shall be revised in a manner that shall render such provision valid while preserving the parties’ original intent to the maximum extent possible.

3.9. Titles and Subtitles. The titles and subtitles used in this Agreement are used for convenience only and are not to be considered in construing or interpreting this Agreement. All references in this Agreement to sections, paragraphs and exhibits shall, unless otherwise provided, refer to sections and paragraphs hereof and exhibits attached hereto.

3.10. Counterparts. This Agreement may be executed in any number of counterparts, each of which shall be enforceable against the parties that execute such counterparts (including by facsimile or other electronic means), and all of which together shall constitute one instrument.

3.11. Term and Termination. The Investors’ rights to demand the registration of the Registrable Securities under this Agreement, as well as the Company’s obligations under Section 2.2 hereof, shall terminate automatically once all Registrable Securities cease to be Registrable Securities pursuant to the terms of Section 2.9 of this Agreement.

[Remainder of Page Intentionally Left Blank; Signature Page Follows]

IN WITNESS WHEREOF, the parties hereto have executed this Registration Rights Agreement effective as of the day, month and year first above written.

ATRECA, INC.

By: /s/ John Orwin
Name: John Orwin
Title: Chief Executive Officer

[Signature Page to Registration Rights Agreement]

IN WITNESS WHEREOF, the parties hereto have executed this Registration Rights Agreement effective as of the day, month and year first above written.

667, L.P.

By: BAKER BROS. ADVISORS LP, management company and investment adviser to 667, L.P., pursuant to authority granted to it by Baker Biotech Capital, L.P., general partner to 667, L.P., and not as the general partner

By: /s/Scott Lessing
Scott L. Lessing
President

BAKER BROTHERS LIFE SCIENCES, L.P.

By: BAKER BROS. ADVISORS LP, management company and investment adviser to Baker Brothers Life Sciences, L.P., pursuant to authority granted to it by Baker Brothers Life Sciences Capital, L.P., general partner to Baker Brothers Life Sciences, L.P., and not as the general partner

By: /s/ Scott Lessing
Scott L. Lessing
President

[Signature Page to Registration Rights Agreement]

Schedule A

The Investors

667, L.P.
BAKER BROTHERS LIFE SCIENCES, L.P.

To the above Investors:
Baker Brothers Investments
860 Washington St., 3rd Floor
New York, NY 10014

With a copy to:
Akin Gump Strauss Hauer & Feld LLP
Attn: Jeffrey Kochian
One Bryant Park
New York, NY 10036-6745

ATRECA, INC.

NON-EMPLOYEE DIRECTOR COMPENSATION POLICY

Approved by the Board of Directors: May 23, 2019

Effective Date: June 19, 2019

Amended January 27, 2020

Each member of the Board of Directors (the “**Board**”) of Atreca, Inc. (the “**Company**”) who is a non-employee director of the Company (each such member, a “**Non-Employee Director**”) will receive the compensation described in this Non-Employee Director Compensation Policy (the “**Director Compensation Policy**”) for his or her Board service following the closing of the initial public offering of the Company’s common stock (the “**IPO**”).

The Director Compensation Policy will be effective upon the execution of the underwriting agreement in connection with the IPO (the date of such execution being referred to as the “**IPO Date**”). The Director Compensation Policy may be amended at any time in the sole discretion of the Board or the Compensation Committee of the Board.

A Non-Employee Director may decline all or any portion of his or her compensation by giving notice to the Company prior to the date cash is to be paid or equity awards are to be granted, as the case may be.

Annual Cash Compensation

Commencing at the beginning of the first calendar quarter following the IPO Date, each Non-Employee Director will receive the cash compensation set forth below for service on the Board. The annual cash compensation amounts will be payable in equal quarterly installments, in arrears no later than 30 days following the end of each quarter in which the service occurred, prorated for any partial quarter of service. All annual cash fees are vested upon payment.

1. Annual Board Service Retainer:
 - a. All Eligible Directors: \$35,000
 - b. Lead Independent Director (as applicable): \$35,000 (in addition to above)
 - c. Chair of the Board (as applicable): \$35,000 (in addition to above)

2. Annual Committee Member Service Retainer:
 - a. Member of the Audit Committee: \$7,500
 - b. Member of the Compensation Committee: \$5,000
 - c. Member of the Nominating and Corporate Governance Committee: \$4,000
 - d. Member of the Research and Development Committee: \$5,000

3. Annual Committee Chair Service Retainer (in lieu of Committee Member Service Retainer):
 - a. Chair of the Audit Committee: \$15,000
 - b. Chair of the Compensation Committee: \$10,000
 - c. Chair of the Nominating and Corporate Governance Committee: \$8,000
 - d. Chair of the Research and Development Committee: \$10,000

Equity Compensation

Equity awards will be granted under the Company's 2019 Equity Incentive Plan, as amended from time to time, or any successor equity incentive plan (the "**Plan**"). All stock options granted under the Director Compensation Policy will be Nonstatutory Stock Options (as defined in the Plan), with a term of ten years from the date of grant (subject to earlier termination upon a termination of the Non-Employee Director's Continuous Service (as defined in the Plan)) and an exercise price per share equal to 100% of the Fair Market Value (as defined in the Plan) of a share of the Company's Class A common stock on the date of grant.

(a) Automatic Equity Grants.

(i) **Initial Grant for New Directors.** Without any further action of the Board, each person who, after the IPO Date, is elected or appointed for the first time to be a Non-Employee Director will automatically, upon the date of his or her initial election or appointment to be a Non-Employee Director, be granted a Nonstatutory Stock Option to purchase 24,000 shares of Company Class A common stock (the "**Initial Grant**"). Each Initial Grant will vest in a series of three successive equal annual installments over the three-year period measured from the date of grant, subject to the Non-Employee Director's Continuous Service through each applicable vesting date.

(ii) **Annual Grant.** Without any further action of the Board, at the close of business on the date of each annual meeting of the Company's stockholders (each, an "**Annual Meeting**") following the IPO, each person who is then a Non-Employee Director will automatically be granted a Nonstatutory Stock Option to purchase 12,000 shares of Company Class A common stock (the "**Annual Grant**"). Each Annual Grant will vest upon the earlier of the one (1) year anniversary of the grant date or the day prior to the Company's next Annual Meeting occurring after the grant date, subject to the Non-Employee Director's Continuous Service through the vesting date.

(b) **Change in Control.** Notwithstanding the foregoing vesting schedules, for each Non-Employee Director who remains in Continuous Service with the Company until immediately prior to the closing of a Change in Control (as defined in the Plan), the shares subject to his or her then-outstanding equity awards that were granted pursuant to the Director Compensation Policy will become fully vested immediately prior to the closing of such Change in Control.

(c) **Remaining Terms.** The remaining terms and conditions of each stock option, including transferability, will be as set forth in the Company's standard Option Agreement, in the form adopted from time to time by the Board.

Expenses

The Company will reimburse Non-Employee Directors for ordinary, necessary and reasonable out-of-pocket travel expenses to cover in-person attendance at and participation in Board and committee meetings; *provided*, that the Non-Employee Director timely submits to the Company appropriate documentation substantiating such expenses in accordance with the Company's travel and expense policy, as in effect from time to time.

ATRECA, INC.

PERFORMANCE BONUS PLAN

Approved by the Compensation Committee of the Board of Directors: March 10, 2020

PURPOSE

The Atreca, Inc. Performance Bonus Plan (the “*Plan*”) is designed to allow all eligible Atreca, Inc. (“*Atreca*” or “*Company*”) employees eligibility for a discretionary bonus based on the Company’s and the individual employee’s performance. The primary purpose of the Plan is to create a standardized and transparent bonus plan to reward strong corporate and individual performance.

Typically, the Company will evaluate corporate and individual performance and pay discretionary bonuses, if any, on an annual basis.

PLAN YEAR

The “*Plan Year*” is the Company’s calendar year: January 1 through December 31.

ELIGIBILITY

All regular, full-time employees of the Company (and certain regular part-time employees), who have been notified in writing of their eligibility are considered eligible Plan Participants (“*Plan Participants*”). Exempt and non-exempt employees are eligible to be Plan Participants.

In order to earn and receive payment of a bonus under the Plan, Plan Participants must be active employees of the Company on the date that bonuses are paid under the Plan. As explained below, the dates of bonus payments will be determined solely by the Company.

Plan Participants must be in good standing as defined solely by the Company in order to be eligible to receive the bonus under the Plan.

Eligible employees who join the Company after January 1 but before November 1 may be eligible to receive a prorated bonus for that Plan Year. Employees who join the Company during this time period will be notified by the Company of their eligibility to participate in the Plan. Employees who join the Company after November 1 will not be eligible to participate in the Plan for that Plan Year. Any prorated bonus will correspond to the amount of time the Plan Participant was an active employee of the Company during that Plan Year.

Plan Participants on a Company-approved leave of absence may be eligible for a partial or prorated bonus in the Company’s discretion.

BONUS TARGETS

Each Plan Participant has a target bonus amount, expressed as a percentage of the Plan Participant’s Base Pay (as defined below) earned during the Plan Year, determined by a Plan Participant’s level at the

Company, among other factors (the “**Bonus Target**”). The amount of a Plan Participant’s actual bonus will be determined as described below.

For purposes of the Plan, “**Base Pay**” means the actual base earnings of a Plan Participant for the Plan Year, excluding any bonuses, commissions, reimbursements, fringe benefits, and any other compensation that is not part of a Plan Participant’s base salary/hourly wage. Base Pay will be determined before any deductions for taxes or benefits and deferrals of compensation pursuant to any Company-sponsored plan.

BONUS WEIGHTING

Each Plan Participant’s bonus amount will be determined based on the applicable weighting between corporate and individual performance, based on a Plan Participant’s level at the Company, as follows:

Level	Weighting (corporate performance/individual performance) (%)
Chief Executive Officer (“ CEO ”)	100% corporate performance/0% individual performance
Vice President and above	75% corporate performance/25% individual performance
Below Vice President	50% corporate performance/50% individual performance

DETERMINATION OF BONUS AMOUNTS

The exact amount of a Plan Participant’s actual bonus (if any) will be determined by the Company’s Board of Directors (the “**Board**”), the Compensation Committee of the Board (the “**Compensation Committee**”), the CEO, and/or other members of the Company’s management, as applicable and in its/their discretion, and will be based on a variety of factors deemed relevant including:

- The Company’s performance, including without limitation, achievement of its annual corporate performance objectives and results; and
- The Plan Participant’s performance, including without limitation, achievement of his or her annual individual performance objectives and results.

Shortly after the end of the Plan Year, the Board and the Company’s management will evaluate the Company’s achievement of its annual corporate performance objectives and results and determine the total pool for all bonuses. Shortly thereafter, each Plan Participant’s manager, in consultation with the Compensation Committee, the CEO, and/or other members of the Company’s management, as applicable, and Human Resources, will evaluate each Plan Participant’s annual individual performance, including without limitation, achievement of his or her annual individual performance objectives and results, performance of his or her general job duties and responsibilities, and qualitative factors related to his or her individual performance and the Company’s values, among other factors.

All bonus amounts (if any) will be subject to upward or downward adjustment by, and approval of, the Board, the Compensation Committee, the CEO, or other members of the Company’s management, as applicable.

No bonuses or bonus amounts are guaranteed for any Plan Participants for any Plan Year.

BONUS PAYMENTS

Plan Participants may earn and be paid a bonus following the close of the Plan Year, and in any event bonuses (if any) will be paid no later than March 15 of the following year. The exact dates of bonus payments, if any, will be determined by the Company, in its sole discretion.

Bonus approval decisions and bonus payment amounts will be final and binding. The Plan Participant must be an active employee on the date of payment in order for bonus amount to be earned.

For the avoidance of doubt, it is intended that the Plan satisfy the exemption from the application of Section 409A of the Internal Revenue Code of 1986, as amended, and the Treasury Regulations and other guidance issued thereunder and any state law of similar effect provided under Section 1.409A-1(b)(4) of the Treasury Regulations as “short term deferrals,” and the Plan shall be administered and interpreted to the greatest extent possible in compliance with such intent. All bonus payments earned under the Plan will be made net of all applicable taxes and withholdings.

MISCELLANEOUS

Participation in this Plan is not an agreement (express or implied) between the Plan Participant and the Company that the Company will employ the Plan Participant for any specific period of time, nor does it contemplate any agreement for continuing or long-term employment. Except as may otherwise be specified in a Plan Participant’s individual employment agreement, the Plan Participant and the Company each have the right to terminate the employment relationship at any time, with or without cause and with or without advance notice. This at-will employment relationship can only be modified by an agreement signed by the Plan Participant and the CEO.

No Plan Participant shall attempt to earn a bonus by engaging in any conduct which violates any anti-trust laws, other laws, or the Company’s ethical standards, policies, or practices. A Plan Participant shall not pay, offer to pay, assign or give any part of his or her bonuses, compensation, or anything else of value to any agent, customer, supplier or representative of any customer or supplier, or to any other person, as an inducement or reward for direct or indirect assistance in earning a bonus. Any violation of this Plan, or the Company’s ethical standards, policies, or practices, will mean that a Plan Participant is not employed in good standing, and could subject the employee to disciplinary action up to and including termination of employment, in addition to revocation of any bonus under this Plan to which the employee otherwise would be entitled.

This document highlights the principal features of the Plan, but it does not describe every situation that can occur. The Company and the Board retain the right to interpret, revise, modify or terminate the Plan at its sole discretion at any time. Furthermore, the Company reserves the right to make any reasonable adjustments to the Plan without advance notice to Plan Participants, including but not limited to project assignments, level and/or salary changes affecting Bonus Targets, the ability to award bonus payments beyond Bonus Targets for exceptional performance, or as otherwise necessary to reflect business and economic conditions. The Company further retains full and final discretion to determine whether a Plan Participant has earned any bonus pursuant to the Plan. All such determinations will be final and binding.

Except as otherwise determined in writing by the CEO or the Board, as applicable, this document replaces and supersedes any previous performance bonus plans and any written or verbal representations regarding annual performance bonuses, including any provisions stated in the Plan Participant’s offer letter or employment agreement specifying eligibility, amount, and participation in any incentive or bonus program which are inconsistent with this Plan. Participation in the Plan during the Plan Year will not convey any entitlement to participate in this or future plans or to the same or similar bonus benefits or opportunities.

CONSENT OF INDEPENDENT REGISTERED PUBLIC ACCOUNTING FIRM

We consent to the incorporation by reference in the Registration Statement on Form S-8 (No. 333-232278) of our report dated March 11, 2020 relating to the consolidated financial statements of Atreca, Inc., which appears in this Annual Report on Form 10-K.

/s/ OUM & CO. LLP

San Francisco, California
March 11, 2020

CERTIFICATIONS

I, John A. Orwin, certify that:

1. I have reviewed this Form 10-K of Atreca, Inc.;
2. Based on my knowledge, this report does not contain any untrue statement of a material fact or omit to state a material fact necessary to make the statements made, in light of the circumstances under which such statements were made, not misleading with respect to the period covered by this report;
3. Based on my knowledge, the financial statements, and other financial information included in this report, fairly present in all material respects the financial condition, results of operations and cash flows of the registrant as of, and for, the periods presented in this report;
4. The registrant's other certifying officer and I are responsible for establishing and maintaining disclosure controls and procedures (as defined in Exchange Act Rules 13a-15(e) and 15d-15(e)) for the registrant and have:
 - (a) Designed such disclosure controls and procedures, or caused such disclosure controls and procedures to be designed under our supervision, to ensure that material information relating to the registrant, including its consolidated subsidiaries, is made known to us by others within those entities, particularly during the period in which this report is being prepared;
 - (b) Evaluated the effectiveness of the registrant's disclosure controls and procedures and presented in this report our conclusions about the effectiveness of the disclosure controls and procedures, as of the end of the period covered by this report based on such evaluation; and
 - (c) Disclosed in this report any change in the registrant's internal control over financial reporting that occurred during the registrant's most recent fiscal quarter (the registrant's fourth fiscal quarter in the case of an annual report) that has materially affected, or is reasonably likely to materially affect, the registrant's internal control over financial reporting; and
5. The registrant's other certifying officer(s) and I have disclosed, based on our most recent evaluation of internal control over financial reporting, to the registrant's auditors and the audit committee of the registrant's board of directors (or persons performing the equivalent functions):
 - (a) All significant deficiencies and material weaknesses in the design or operation of internal control over financial reporting which are reasonably likely to adversely affect the registrant's ability to record, process, summarize and report financial information; and
 - (b) Any fraud, whether or not material, that involves management or other employees who have a significant role in the registrant's internal control over financial reporting.

Date: March 11, 2020

By: /s/ JOHN A. ORWIN
John A. Orwin
Chief Executive Officer
(Principal Executive Officer)

CERTIFICATIONS

I, Herbert Cross, certify that:

1. I have reviewed this Form 10-K of Atreca, Inc.;
2. Based on my knowledge, this report does not contain any untrue statement of a material fact or omit to state a material fact necessary to make the statements made, in light of the circumstances under which such statements were made, not misleading with respect to the period covered by this report;
3. Based on my knowledge, the financial statements, and other financial information included in this report, fairly present in all material respects the financial condition, results of operations and cash flows of the registrant as of, and for, the periods presented in this report;
4. The registrant's other certifying officer and I are responsible for establishing and maintaining disclosure controls and procedures (as defined in Exchange Act Rules 13a-15(e) and 15d-15(e)) for the registrant and have:
 - (a) Designed such disclosure controls and procedures, or caused such disclosure controls and procedures to be designed under our supervision, to ensure that material information relating to the registrant, including its consolidated subsidiaries, is made known to us by others within those entities, particularly during the period in which this report is being prepared;
 - (b) Evaluated the effectiveness of the registrant's disclosure controls and procedures and presented in this report our conclusions about the effectiveness of the disclosure controls and procedures, as of the end of the period covered by this report based on such evaluation; and
 - (c) Disclosed in this report any change in the registrant's internal control over financial reporting that occurred during the registrant's most recent fiscal quarter (the registrant's fourth fiscal quarter in the case of an annual report) that has materially affected, or is reasonably likely to materially affect, the registrant's internal control over financial reporting; and
5. The registrant's other certifying officer(s) and I have disclosed, based on our most recent evaluation of internal control over financial reporting, to the registrant's auditors and the audit committee of the registrant's board of directors (or persons performing the equivalent functions):
 - (a) All significant deficiencies and material weaknesses in the design or operation of internal control over financial reporting which are reasonably likely to adversely affect the registrant's ability to record, process, summarize and report financial information; and
 - (b) Any fraud, whether or not material, that involves management or other employees who have a significant role in the registrant's internal control over financial reporting.

Date: March 11, 2020

By: /s/ HERBERT CROSS
Herbert Cross
Chief Financial Officer
(Principal Financial and Accounting Officer)

CERTIFICATION

Pursuant to the requirement set forth in Rule 13a-14(b) of the Securities Exchange Act of 1934, as amended, (the "Exchange Act") and Section 1350 of Chapter 63 of Title 18 of the United States Code (18 U.S.C. §1350), John A. Orwin, Chief Executive Officer of Atreca, Inc. (the "Company"), and Herbert Cross, Chief Financial Officer of the Company, each hereby certifies that, to the best of his knowledge:

1. The Company's Annual Report on Form 10-K for the year ended December 31, 2019, to which this Certification is attached as Exhibit 32.1 (the "Annual Report"), fully complies with the requirements of Section 13(a) or Section 15(d) of the Exchange Act; and
2. The information contained in the Periodic Report fairly presents, in all material respects, the financial condition and results of operations of the Company.

Dated: March 11, 2020

In Witness Whereof, the undersigned has set his hands hereto as of the 11th day of March, 2020.

/s/ JOHN A.

ORWIN

John A. Orwin
Chief Executive Officer

/s/

CROSS

Herbert Cross
Chief Financial Officer

HERBERT

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 Atreca, Inc. under the Securities Act of 1933, as amended, or the Securities Exchange Act of 1934, as amended (whether made before or after the date of the Form 10-K), irrespective of any general incorporation language contained in such filing.
