As confidentially submitted to the Securities and Exchange Commission on May 8, 2019. This draft registration statement has not been publicly filed with the Securities and Exchange Commission and all information herein remains strictly confidential.

Registration No. 333-

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

FORM S-1
REGISTRATION STATEMENT
UNDER
THE SECURITIES ACT OF 1933

ADAPTIVE BIOTECHNOLOGIES CORPORATION

(Exact name of registrant as specified in its charter)

Washington	2836	27-0907024
(State or other jurisdiction of incorporation or organization)	(Primary Standard Industrial Classification Code Number)	(I.R.S. Employer Identification Number)

1551 Eastlake Avenue East, Suite 200
Seattle, Washington 98102
(206) 659-0067
(Address, including zip code, and telephone number, including area code, of registrant's principal executive offices)

Chad Robins
Chief Executive Officer
1551 Eastlake Avenue East, Suite 200
Seattle, Washington 98102
(206) 659-0067
(Name, address, including zip code, and telephone number, including area code, of agent for service)

Copies to:

Andrew Ledbetter Tyler Hollenbeck Kevin Criddle DLA Piper LLP (US) 701 Fifth Avenue, Suite 6900 Seattle, Washington 98104 (206) 839-4800	Stacy Taylor General Counsel Adaptive Biotechnologies Corporation 1551 Eastlake Avenue East, Suite 200 Seattle, Washington 98102 (206) 659-0067	James Evans Robert Freedman Amanda Rose Fenwick & West LLP 1191 Second Avenue, Floor 10 Seattle, Washington 98101 (206) 389-4510

Approximate date of commencement of proposed sale to the public: As soon as practicable after this registration statement becomes effective.

If any of the securities being registered on this Form are to be offered on a delayed or continuous basis pursuant to Rule 415 under the Securities Act of 1933, check the following box: ☐

If this Form is filed to register additional securities for an offering pursuant to Rule 462(b) under the Securities Act, please check the following box and list the Securities Act registration statement number of the earlier effective registration statement for the same offering: ☐

If this Form is a post-effective amendment filed pursuant to Rule 462(c) under the Securities Act, check the following box and list the Securities Act registration statement number of the earlier effective registration statement for the same offering: ☐

If this Form is a post-effective amendment filed pursuant to Rule 462(d) under the Securities Act, check the following box and list the Securities Act registration statement number of the earlier effective registration statement for the same offering: ☐

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

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

If an emerging growth company, indicate by check mark if the registrant has elected not to use the extended transition period for complying with any new or revised financial accounting standards provided pursuant to Section 7(a)(2)(B) of the Securities Act. ☐

CALCULATION OF REGISTRATION FEE

Title of Each Class of Securities to be Registered	Proposed Maximum Aggregate Offering Price[(1)(2)]	Amount of Registration Fee
Common Stock, $0.0001 par value per share	$	$

(1) The proposed maximum aggregate offering price includes the offering price of additional shares that the underwriters have the option to purchase.
(2) Estimated solely for the purpose of calculating the registration fee in accordance with Rule 457(o) of the Securities Act of 1933, as amended.

The registrant hereby amends this registration statement on such date or dates as may be necessary to delay its effective date until the registrant shall file a further amendment which specifically states that this registration statement shall thereafter become effective in accordance with Section 8(a) of the Securities Act of 1933, as amended, or until the registration statement shall become effective on such date as the Commission, acting pursuant to said Section 8(a), may determine.

The information in this preliminary prospectus is not complete and may be changed. These securities may not be sold until the registration statement filed with the Securities and Exchange Commission is effective. This preliminary prospectus is not an offer to sell nor does it seek an offer to buy these securities in any jurisdiction where the offer or sale is not permitted.

SUBJECT TO COMPLETION, DATED , 2019

Shares

Common Stock

This is an initial public offering of shares of common stock of Adaptive Biotechnologies Corporation. We are offering shares of our common stock to be sold in this offering.

Prior to this offering, there has been no public market for our common stock. It is currently estimated that the initial public offering price per share will be between $ and $ per share.

We have applied to list our common stock on The Nasdaq Global Select Market under the symbol “ADPT.”

We are an “emerging growth company” as defined under the federal securities laws and, as such, have elected to comply with certain reduced public company reporting requirements for this prospectus and may elect to do so in future filings.

Investing in our common stock involves a high degree of risk. See the “Risk Factors” section beginning on page 13 of this prospectus to read about factors you should consider before buying shares of our common stock.

Neither the Securities and Exchange Commission nor any other regulatory body has approved or disapproved of the securities offered hereby, or passed upon the adequacy or accuracy of this prospectus. Any representation to the contrary is a criminal offense.

	Per share	Total
Initial public offering price	$	$
Underwriting discounts(1)	$	$
Proceeds, before expenses, to us	$	$

(1) See the “Underwriting” section of this prospectus for additional information regarding underwriting compensation.

To the extent that the underwriters sell more than shares of common stock, the underwriters have the option to purchase up to an additional shares from us at the initial public offering price less the underwriting discount.

The underwriters expect to deliver the shares against payment in New York, New York on , 2019.

Goldman Sachs & Co. LLC **J.P. Morgan** **BofA Merrill Lynch**

Cowen **Guggenheim Securities**

William Blair **BTIG**

Prospectus dated , 2019.

TABLE OF CONTENTS

	Page
Prospectus Summary	1
The Offering	9
Summary Financial Data	11
Risk Factors	13
Special Note Regarding Forward-Looking Statements	76
Market and Industry Data	78
Use of Proceeds	79
Dividend Policy	80
Capitalization	81
Dilution	84
Selected Financial Data	87
Management's Discussion and Analysis of Financial Condition and Results of Operations	88
Business	102
Management	145
Executive Compensation	156
Certain Relationships and Related Party Transactions	167
Principal Shareholders	170
Description of Capital Stock	172
Shares Eligible for Future Sale	178
Material U.S. Federal Income Tax Consequences to Non-U.S. Holders	180
Underwriting	185
Legal Matters	190
Experts	190
Additional Information	190
Index to Financial Statements	F-1

You should rely only on the information contained in this prospectus and any free writing prospectus prepared by or on behalf of us or to which we have referred you. Neither we nor any of the underwriters have authorized anyone to provide you with information that is different. This prospectus is an offer to sell only the securities offered hereby and only under circumstances and in jurisdictions where it is lawful to do so. The information contained in this prospectus is accurate only as of the date of this prospectus, regardless of the time of delivery of this prospectus or of any sale of the securities offered hereby. Our business, financial condition, results of operations and prospects may have changed since that date.

Neither we nor any of the underwriters have taken any action that would permit this offering or possession or distribution of this prospectus in any jurisdiction where action for that purpose is required, other than in the United States. Persons who have come into possession of this prospectus in a jurisdiction outside the United States are required to inform themselves about and to observe any restrictions relating to this offering and the distribution of this prospectus.

PROSPECTUS SUMMARY

The following summary highlights information contained elsewhere in this prospectus. It may not contain all the information that may be important to you. You should read this entire prospectus carefully, including "Risk Factors" and "Management's Discussion and Analysis of Financial Condition and Results of Operations," and our historical financial statements and related notes, before making an investment decision. In this prospectus, unless the context requires otherwise, all references to "we," "our," "us," "Adaptive" and the "Company" refer to Adaptive Biotechnologies Corporation.

Overview

We are advancing the field of immune-driven medicine by harnessing the inherent biology of the adaptive immune system to transform the diagnosis and treatment of disease. We believe the adaptive immune system is nature's most finely tuned diagnostic and therapeutic for most diseases, but the inability to decode it has prevented the medical community from fully leveraging its capabilities. Our immune medicine platform applies our proprietary technologies to read the diverse genetic code of a patient's immune system and understand precisely how it detects and treats disease in that patient. We capture these insights in our dynamic clinical immunomics database, which is underpinned by computational biology and machine learning, and use them to develop and commercialize clinical products and services that we are tailoring to each individual patient. We have two commercial products and services and a robust pipeline of clinical products and services that we are designing to diagnose, monitor and enable the treatment of diseases such as cancer, autoimmune conditions and infectious diseases. Since our inception in 2009, we have characterized over 20 billion immune receptors, established partnerships and commercial relationships with over 125 biopharmaceutical companies and launched two product lines. Our goal is to understand the adaptive immune system and translate it into new products with unprecedented scale, precision and speed.

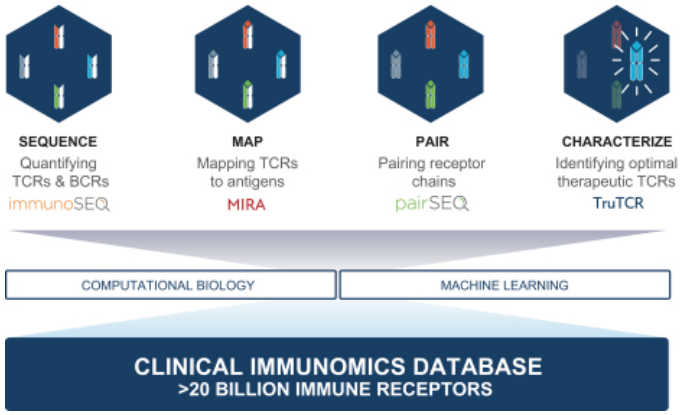
Our immune medicine platform is the foundation for our expanding suite of products and services. The cornerstone of our platform and core immunosequencing product, immunoSEQ, serves as our underlying research and development engine and generates revenue from academic and biopharmaceutical customers. Our first clinical diagnostic product, clonoSEQ, is the first test authorized by the FDA for the detection and monitoring of minimal residual disease in patients with select blood cancers. Leveraging our collaboration with Microsoft, we are also developing a diagnostic product, immunoSEQ Dx, that may enable early detection of many diseases from a single blood test. Our therapeutic product candidates, being developed under our collaboration agreement with Genentech, leverage our platform to identify specific immune cells to develop into cellular therapies in oncology. We believe this approach has the potential to be applicable to patients across a wide range of cancers.

Immune-driven medicine is one of the largest global addressable markets in healthcare. We estimate the potential market opportunity for our portfolio to be greater than $48 billion, including research products, clinical diagnostics and cellular therapies. We believe this market will grow over time as clinicians increasingly appreciate the importance of the immune system in the diagnosis and treatment of disease and as our pipeline of products and services continues to expand.

Our Immune Medicine Platform

The adaptive immune system is comprised of specialized cells, called T cells and B cells, which hold the instructions for diagnosing and treating most diseases. These instructions enable these cells to identify, bind and destroy pathogens or human cells presenting foreign signals of disease ("antigens") using receptors on their cell surface. Unlike all other genes in the human genome, the

genetic sequences of T cell receptors ("TCRs") and B cell receptors ("BCRs") rearrange over time, creating massive genetic diversity. The resulting diversity of the adaptive immune repertoire, which consists of over 100 million different genes in a healthy adult compared to approximately 30,000 genes in the static human genome, gives the immune system the ability to detect and respond to millions of different antigens associated with human disease. A platform that fully reveals the enormous diversity and scale of the immune system to develop clinical products must be able to reliably and repeatedly measure the relative frequency of each disease-specific immune cell, even those present in blood at only 1 out of 1,000,000 cells.



Our immune medicine platform performs the following key functions related to immune receptors:

- *Sequence.* immunoSEQ sequences single chains of "Y-shaped" TCRs or BCRs using next-generation sequencing ("NGS"), enabling us to understand the quantity and diversity of T and B cells in a biological sample. This provides deep insights into individual and collective immune responses at a scale that is thousands of times greater than was previously possible.
- *Map.* MIRA (Multiplexed Identification of T cell Receptor Antigen Specificity) maps millions of TCRs to thousands of clinically relevant antigens. Combined with immunoSEQ, MIRA elucidates what potential diseases a patient's immune system has been exposed to or is actively fighting.
- *Pair.* pairSEQ builds on immunoSEQ by using a combinatorial strategy to accurately pair both chains of Y-shaped immune cell receptors at high-throughput, which is challenging to do at scale using other methods because the two chains of the Y-shaped receptors are located on different chromosomes. The ability to accurately pair both chains of the receptors in a sample enables us to reconstruct receptors for therapeutic purposes.
- *Characterize.* TruTCR characterizes binding, cytotoxicity and safety properties of antigen-specific, paired TCRs to identify a subset that is therapeutic-grade, enabling the discovery and development of optimal clinical candidates to be engineered into TCR-mediated cellular therapies.

The massive amount of data generated by our immune medicine platform is stored in our dynamic clinical immunomics database of over 30 billion immune receptors, of which we have data

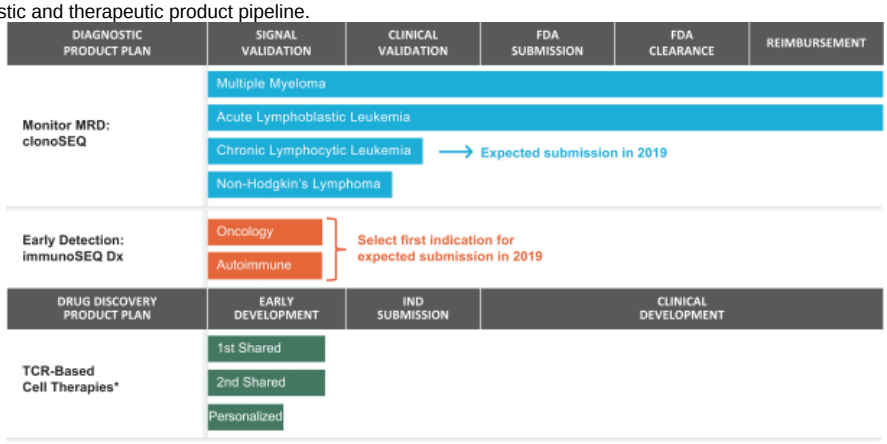
rights to over 20 billion. We believe the application of machine learning, supported by our collaboration with Microsoft, has the potential to exponentially accelerate our ability to derive novel insights from this database and use them to inform our robust product development efforts.

Our Current Products and Pipeline

Our current portfolio includes commercial products and services in life sciences research and clinical diagnostics, and we are developing products and services in both clinical diagnostics and drug discovery.

Life Sciences Research. Our immunoSEQ research service and kit are used to answer research questions that inform current and future clinical trials ("translational research") and to discover new prognostic and diagnostic signals. Our technology has been used for research purposes by over 2,000 academic researchers and more than 125 biopharmaceutical companies and incorporated into over 480 clinical trials since our inception in 2009. We intend to initiate development of a next generation, sample-type agnostic research use only ("RUO") kit, which we expect to enable global distribution of our research product. We are working to analytically validate the improved version of immunoSEQ so that all research data generated using immunoSEQ can be used for clinical validation of potential diagnostic applications.

We also use immunoSEQ for our own internal clinical product development efforts as the foundational technology for our clinical diagnostic and therapeutic product pipeline.



* Product candidates in development as part of our worldwide collaboration and license agreement with Genentech. The "1st Shared" and "2nd Shared" product candidates refer to the two lead product candidates that will use "off-the-shelf" TCRs identified against cancer antigens shared among patients.

Clinical Diagnostics. Our clonoSEQ diagnostic test detects and monitors the remaining number of cancer cells that are present in a patient's body during and after treatment, known as minimal residual disease ("MRD"). clonoSEQ was granted marketing authorization from the U.S. Food and Drug Administration ("FDA") under the *de novo* process, in September 2018 for patients with multiple

myeloma (“MM”) and B cell acute lymphoblastic leukemia (“ALL”) to monitor their MRD from bone marrow samples. In January 2019, clonoSEQ received Medicare coverage aligned with the FDA label and National Comprehensive Cancer Network (“NCCN”) guidelines for longitudinal monitoring in MM and ALL. clonoSEQ is also available for use in other lymphoid cancers as a laboratory developed test (“LDT”). clonoSEQ testing has been ordered by clinicians in nearly 300 healthcare systems and institutions, including 27 of the 28 NCCN centers in the United States, and used by more than 30 biopharmaceutical companies in over 120 clinical trials. We continue to invest in the commercial success of clonoSEQ by establishing a specialized sales organization and infrastructure in the United States and by exploring partnerships with diagnostic companies in other parts of the world. We believe clonoSEQ has broad applicability and we intend to file to expand the clonoSEQ FDA label to multiple additional indications, starting with chronic lymphocytic leukemia (“CLL”) in 2019, followed by non-Hodgkin’s lymphomas (“NHL”), to further expand its usage. Importantly, we are also generating data for submission to validate the use of clonoSEQ to monitor MRD from blood samples, which is less invasive than bone marrow samples, and may facilitate more frequent monitoring and broader physician adoption.

Leveraging Microsoft Corporation’s (“Microsoft”) machine learning capabilities to create a map of the interaction between the immune system and disease (“TCR-Antigen Map”), we are developing a diagnostic product, immunoSEQ Dx, that may enable early detection of many diseases from a single blood test. In 2019, we plan to confirm the first indications to bring to the FDA for review while continuing signal validation in several additional indications. We believe we are uniquely positioned to rapidly identify signals for early detection across many disease states simultaneously because our immune medicine platform works with retrospective sample sets and uses machine learning and computational statistics to continuously improve our detection and accuracy without requiring large cohorts of prospective patients.

Drug Discovery. Our TruTCR process characterizes TCRs against shared antigens for use in the development of therapeutics. In December 2018, we entered into an exclusive collaboration with Genentech, Inc. (“Genentech”) to leverage this capability for the development of cellular therapies in oncology. We are pursuing two product development pathways for novel T cell immunotherapies in which Genentech intends to use TCRs screened by our immune medicine platform to engineer and manufacture cellular medicines:

- *Shared Products.* The shared products will use “off-the-shelf” TCRs identified against cancer antigens shared among patients (“Shared Products”).
- *Personalized Product.* The personalized product will use patient-specific TCRs identified by real-time screening of TCRs against cancer antigens in each patient (“Personalized Product”).

In parallel, we plan to evaluate an investment in facilities for the screening of patient-specific TCRs to shorten the time from patient blood draw to infusion of the Personalized Product. We believe this investment would position us to potentially pursue additional opportunities outside of this collaboration, including cellular therapy in other disease states and cancer vaccines.

Our Competitive Strengths

We aim to harness the inherent biology of the adaptive immune system to develop clinical products and services that improve human health by leveraging our core competitive strengths.

- *Our immune medicine platform is uniquely capable of supporting clinical products.* We have developed a platform that is capable of reading and translating the massive genetic diversity of

the adaptive immune system and its selective response to disease. Specifically, our platform *sequences* immune receptors and *maps* them to antigens for diagnostic applications, *pairs* receptor chains and *characterizes* antigen-specific, paired receptors to identify optimal clinical targets for therapeutic use. We are the only company that can perform all of these functions—and we do so at an unprecedented scale to develop novel clinical diagnostic and therapeutic products.

- *Our clinical immunomics database provides a robust product development engine.* Our dynamic clinical immunomics database of over 20 billion immune receptors, now being annotated with antigens using machine learning, drives our ability to rapidly discover and develop potential diagnostic and therapeutic applications. Our aim is to translate the natural capabilities of the immune system into the clinic by capturing the millions of diverse unique receptors present in a patient's blood.
- *Clinical applicability spans diagnostic and therapeutic product potential.* Our ability to accumulate, synthesize and process billions of immunomic datapoints to generate multiple clinical diagnostic and therapeutic applications across disease areas provides optionality to our commercial pipeline. Each of our products also has broad applicability, enabling robust product lifecycle extensions.
- *Regulatory and reimbursement expertise will help inform future clinical product development.* Having successfully obtained FDA marketing authorization and Medicare coverage for clonoSEQ, we believe we have developed valuable core capabilities that will facilitate future product development through to regulatory approval and reimbursement. We believe this capability will inform future development of other clinical products, including our early detection tests.
- *Transformational collaborations with industry leaders validate our platform.* Our collaborations with industry-defining leaders such as Genentech and Microsoft validate our unique approach to advancing the promise of immune-driven medicine. We will continue to seek opportunities to optimize our ever-growing clinical immunomics database to drive product development and commercial success and facilitate efficient use of capital.
- *Strong intellectual property protects our immune medicine platform and its applications.* We have filed 375 patent applications, 234 of which have issued as of March 31, 2019, covering improvements in sequencing methods and new ways to leverage adaptive immune receptors for life sciences research, clinical diagnostic and drug discovery applications.

Our Strategy

Our focus is to leverage our immune medicine platform and competitive strengths to develop transformative clinical solutions accessible to patients around the world.

- *Advance the promise of immune-driven medicine.* We facilitate the development of the immune medicine field by providing a platform to encourage generation of immunomics data to facilitate a deeper understanding of, and biological discovery from, the adaptive immune system. We leverage the unique capability of our platform to translate a patient's immune system with the scale, precision and speed required to enable the development of personalized products, including clinical diagnostic tests for disease monitoring and early detection, as well as immune-based therapeutics.
- *Rapidly identify and advance new products, leveraging foundational technology.* Integrate proven chemistry into our clinical products in development, avoiding the need to re-engineer

new products for every clinical application. We do this by serially identifying new applications of immunoSEQ Dx for early detection of disease using retrospective datasets without requiring live cells from large cohorts of patients, and by characterizing TCRs for therapeutic use. As our platform expands into new indications across cancer, autoimmune conditions and infectious diseases, we believe we will benefit from economies of scale and drive margin improvement over time.

- *Entrench our products and services in clinical drug development with biopharmaceutical collaborators.* Position our platform as the gold standard for the validation of potential immune-driven clinical discoveries in late-stage clinical trials. Since inception, our products and services have been used by more than 125 biopharmaceutical companies and incorporated into over 480 clinical trials, and clonoSEQ has proven to be the MRD test of choice for select registrational trials. To deepen our established position as a partner of choice, we provide end-to-end support, including hypothesis-driven trial design, extensive data analyses, parallel regulatory support, compliant data transfers and novel target screening. These synergistic relationships advance the development and adoption of our own clinical products and also inform drug development for our partners.
- *Drive the commercial adoption of distributed, reimbursed and regulated clinical products.* Expand distribution and drive usage of our products and services, including the development of clinical *in vitro* diagnostic ("IVD") kits. Leverage the commercial infrastructure built for clonoSEQ to submit clinical data for regulatory clearance of our products and services, engage in payor conversations and provide robust billing and patient access infrastructure for multiple clinical applications.
- *Maintain an entrepreneurial, scientifically rigorous, data-driven and inclusive corporate culture.* Fuel the promise and potential that our platform offers to help patients better manage their disease by translating insights from our world-class team, which includes 79 people with medical or doctoral degrees with expertise in biology, chemistry, bioinformatics, software, drug discovery, development and commercialization, into clinical products and services. We plan to continue to expand our team to advance the promise of immune-driven medicine.

Risks Associated with Our Business

Our business is subject to a number of risks and uncertainties of which you should be aware before making an investment decision, including those highlighted in the "*Risk Factors*" section of this prospectus immediately following this prospectus summary. Among others, these risks relate to:

- our significant net losses since inception, expected net losses in the future and need for significant investments in products and services;
- our ability to leverage our immune medicine platform to discover, develop, commercialize and obtain regulatory clearance, authorization and approval for our products and services, particularly in light of the novelty of immune medicine and our methods;
- our ability to develop our TCR-Antigen Map and yield insights from it that are commercially viable;
- our collaboration with Genentech and ability to develop and commercialize cellular therapeutics, including our ability to achieve milestones and realize the intended benefits of the collaboration;
- our laboratory operations, including errors or defects in our products or services and our reliance on a limited number of suppliers, and in some cases single suppliers, for our equipment and materials;

- our limited experience with the development and commercialization of cellular therapeutics;
- market acceptance of our products and services, and our limited sales and marketing experience;
- our expected reliance on collaborators for development and clinical testing of therapeutic product candidates, which may fail at any time due to a number of possible unforeseen events;
- our ability to increase our capacity, manage the evolution of our products and services, stay current in our rapidly changing industry, expand our workforce and otherwise manage our growth;
- the loss of any member of our senior management team, or of the support of key opinion leaders;
- the extensive regulation of our industry, including reimbursement coverage decisions; and
- the validity of our patents, protection of our trade secrets and related intellectual property matters.

See the "*Risk Factors*" section of this prospectus for additional information about the risks we face.

Implications of Being an Emerging Growth Company

We are an "emerging growth company" as defined in the Jumpstart Our Business Startups Act of 2012 ("JOBS Act"). As such, we may take advantage of reduced disclosure and other requirements otherwise generally applicable to public companies, including:

- presenting only two years of audited financial statements and related financial disclosure;
- not being required to have our registered independent public accounting firm attest to management's assessment of our internal control over financial reporting;
- presenting reduced disclosure about our executive compensation arrangements; and
- not being required to hold non-binding advisory votes on executive compensation or golden parachute arrangements.

We have taken advantage of some of these reduced disclosure and other requirements and, pursuant to Section 107 of the JOBS Act, we have elected to take advantage of the extended transition period for complying with new or revised accounting standards until those standards would otherwise apply to private companies. Accordingly, the information we provide to you may be different than you might get from other public companies in which you hold securities.

We will remain an emerging growth company until the earliest of (i) the last day of the fiscal year following the fifth anniversary of the closing of this offering, (ii) the last day of the fiscal year in which we have total annual gross revenue of at least $1.07 billion, (iii) the last day of the fiscal year in which we are deemed to be a "large accelerated filer" as defined in Rule 12b-2 under the Securities Exchange Act of 1934, as amended ("Exchange Act"), which would occur if the market value of our common stock held by non-affiliates exceeded $700.0 million as of the last business day of the second fiscal quarter of such year or (iv) the date on which we have issued more than $1.0 billion in non-convertible debt securities during the prior three-year period.

Corporate Information

We were incorporated in the State of Washington on September 8, 2009 under the name Adaptive TCR Corporation. On December 21, 2011, we changed our name to Adaptive

Biotechnologies Corporation. In January 2015, we acquired Sequenta, Inc. (“Sequenta”), a San Francisco, California-based company that was also developing an NGS test for MRD (“Sequenta Acquisition”). Our principal executive offices are located at 1551 Eastlake Avenue East, Suite 200, Seattle, Washington 98102, and our telephone number is (206) 659-0067. We maintain a website at www.adaptivebiotech.com. Information contained on or that can be accessed through our website is neither a part of, nor incorporated by reference into, this prospectus, and you should not consider information on our website to be part of this prospectus.

We own various U.S. federal trademarks, applications and unregistered trademarks, including our company name, product and service names and other trade or service marks. All other trademarks or trade names referred to in this prospectus are the property of their respective owners. Solely for convenience, the trademarks and trade names in this prospectus are referred to without the symbols ® and ™, but such references should not be construed as any indicator that their respective owners will not assert, to the fullest extent under applicable law, their rights thereto.

THE OFFERING

Common stock offered by us	shares
Option to purchase additional shares	We have granted the underwriters an option to purchase up to additional shares of common stock from us. The underwriters can exercise this option at any time within 30 days from the date of this prospectus.
Common stock to be outstanding immediately after this offering	shares (or shares if the underwriters exercise in full their option to purchase additional shares).
Use of proceeds	We estimate that the net proceeds from this offering will be approximately $ million, or $ million if the underwriters exercise in full their option to purchase additional shares of our common stock, assuming an initial public offering price of $ per share, the midpoint of the price range set forth on the cover page of this prospectus, after deducting the estimated underwriting discounts and commissions and estimated offering expenses. We expect to use the net proceeds from this offering primarily to fund commercial and marketing activities associated with our clinical products and services, continued research and development for our drug discovery initiatives and ongoing investments in our TCR-Antigen Map related activities. We expect to use the remainder, if any, to scale our laboratory operations with our anticipated growth, for working capital and for other general corporate purposes. For a more complete description of our intended use of the proceeds from this offering, see the "*Use of Proceeds*" section of this prospectus.
Risk Factors	See the "*Risk Factors*" section of this prospectus and other information included in this prospectus for a discussion of factors that you should consider carefully before deciding to invest in our common stock.
Proposed Nasdaq Global Select Market symbol	"ADPT"

The number of shares of common stock to be outstanding after this offering is based on 105,651,630 shares of common stock outstanding as of December 31, 2018, which includes (i) the conversion of all outstanding shares of our convertible preferred stock into an aggregate of 92,790,094 shares of our common stock upon the closing of this offering and (ii) the issuance of 20,000 shares of common stock upon the exercise of an outstanding common stock warrant immediately prior to the closing of this offering that would otherwise expire, and excludes:

- 56,875 shares of common stock issuable upon the exercise of a warrant to purchase shares of convertible preferred stock outstanding as of December 31, 2018, with an exercise price of $2.64 per share;
- 35,032 shares of common stock issuable upon the exercise of a warrant to purchase shares of common stock outstanding as of December 31, 2018, with an exercise price of $0.33 per share;

- 264,677 shares of common stock issuable upon the exercise of stock options to purchase shares of convertible preferred stock outstanding as of December 31, 2018, under our Sequenta, Inc. 2008 Stock Plan ("Sequenta Plan"), which we assumed in connection with our Sequenta Acquisition, with a weighted-average exercise price of $0.44 per share;
- 14,893,253 shares of common stock issuable upon the exercise of stock options outstanding as of December 31, 2018, under our 2009 Equity Incentive Plan ("2009 Plan"), with a weighted-average exercise price of $4.59 per share, and 3,093,831 shares of common stock issuable upon the exercise of stock options issued after December 31, 2018, under our 2009 Plan, with a weighted-average exercise price of $7.43 per share;
- shares of common stock that will become available for future issuance under our 2019 Equity Incentive Plan ("2019 Plan") (which includes all shares reserved for issuance under our 2009 Plan) upon the effectiveness of the registration statement of which this prospectus forms a part; and
- shares of common stock that will become available for future issuance under our 2019 Employee Stock Purchase Plan ("ESPP") upon the effectiveness of the registration statement of which this prospectus forms a part.

Unless otherwise indicated, all information in this prospectus assumes or gives effect to:

- the filing of our amended and restated articles of incorporation and the effectiveness of our amended and restated bylaws upon the closing of this offering;
- the conversion of all outstanding shares of convertible preferred stock into an aggregate of 92,790,094 shares of common stock upon the closing of this offering;
- the conversion of an outstanding warrant to purchase our convertible preferred stock into a warrant to purchase an aggregate of 56,875 shares of our common stock upon the closing of this offering;
- the conversion of all outstanding stock options to purchase our convertible preferred stock into stock options to purchase an aggregate of 264,677 shares of our common stock upon the closing of this offering;
- no exercise or termination of outstanding options or warrants after December 31, 2018; and
- no exercise by the underwriters of their option to purchase up to additional shares of common stock in this offering.

SUMMARY FINANCIAL DATA

The summary financial data set forth below should be read together with our financial statements and the related notes to those statements, as well as the "*Selected Financial Data*" and "*Management's Discussion and Analysis of Financial Condition and Results of Operations*" sections of this prospectus. The statements of operations data for the years ended December 31, 2017 and 2018 and the balance sheet data as of December 31, 2018 have been derived from our audited financial statements included elsewhere in this prospectus. Our historical results are not necessarily indicative of results that may be expected in the future.

	Year Ended December 31,	
	2017	2018
	(in thousands, except share and per share data)	
Statements of Operations Data:		
Revenue:		
Sequencing revenue	$ 22,759	$ 32,978
Development revenue	15,689	22,685
Total revenue	38,448	55,663
Operating expenses:		
Cost of revenue	15,680	19,668
Research and development	31,995	39,157
Sales and marketing	16,765	24,486
General and administrative	15,949	20,409
Amortization of intangible assets	1,694	1,699
Restructuring	840	—
Total operating expenses	82,923	105,419
Loss from operations	(44,475)	(49,756)
Interest and other income, net	1,644	3,309
Net loss	$ (42,831)	$ (46,447)
Fair value adjustment to Series E-1 convertible preferred stock options	135	102
Net loss attributable to common shareholders	$ (42,696)	$ (46,345)
Net loss per share attributable to common shareholders, basic and diluted	$ (3.50)	$ (3.67)
Weighted-average shares used in computing net loss per share attributable to common shareholders, basic and diluted	12,196,998	12,629,778
Unaudited pro forma net loss per share attributable to common shareholders, basic and diluted(1)		$ (0.44)
Unaudited pro forma weighted-average shares used in computing pro forma net loss per share attributable to common shareholders, basic and diluted		105,470,520

(1) See Note 17 to our financial statements appearing at the end of this prospectus for details on the calculation of basic and diluted net loss per share and the calculation of basic and diluted pro forma net loss per share.

	As of December 31, 2018		
	Actual	Pro Forma(1)	Pro Forma As Adjusted(2)(3)
		(in thousands)	
Balance Sheet Data:			
Cash, cash equivalents and marketable securities	$ 165,018	$ 165,027	$
Working capital(4)	157,918	157,927	
Total assets	332,688	332,697	
Total liabilities	29,942	29,606	
Convertible preferred stock	560,858	—	—
Total shareholders' (deficit) equity	(258,112)	303,091	

(1) Pro forma amounts give effect to: (i) the automatic conversion of all of our outstanding shares of convertible preferred stock into an aggregate of 92,790,094 shares of common stock, immediately upon the closing of this offering; (ii) the issuance of 20,000 shares of our common stock upon the exercise of an outstanding warrant to purchase our common stock, immediately prior to the closing of this offering that would otherwise expire; and (iii) the conversion of an outstanding warrant to purchase our convertible preferred stock into a warrant to purchase an aggregate of 56,875 shares of our common stock upon the closing of this offering.

(2) Pro forma, as adjusted amounts reflect pro forma adjustments described in footnote (1) as well as the sale of shares of our common stock in this offering at an assumed initial public offering price of $ per share of common stock, the midpoint of the price range set forth on the cover page of this prospectus, and after deducting the estimated underwriting discounts and commissions and estimated offering expenses.

(3) Each $1.00 increase (decrease) in the assumed initial public offering price of $ per share of common stock, the midpoint of the price range set forth on the cover page of this prospectus, would increase (decrease) our pro forma as adjusted amounts of each of cash, cash equivalents and marketable securities, working capital, total assets and total shareholders' (deficit) equity by approximately $ million, assuming that the number of shares of common stock offered by us, as set forth on the cover page of this prospectus, remains the same, and after deducting the estimated underwriting discounts and commissions. We may also increase or decrease the number of shares we are offering. Each increase (decrease) of 1,000,000 shares in the number of shares of common stock offered by us would increase (decrease) our pro forma as adjusted amounts of each of cash, cash equivalents and marketable securities, working capital, total assets and total shareholders' (deficit) equity by approximately $ million, assuming that the assumed initial price to the public remains the same, and after deducting the estimated underwriting discounts and commissions.

(4) We define working capital as current assets less current liabilities.

RISK FACTORS

Investing in our common stock involves a high degree of risk. You should carefully consider the following risks and uncertainties, together with all other information in this prospectus, including our financial statements and related notes and the "Management's Discussion and Analysis of Financial Condition and Results of Operations" section of this prospectus before investing in our common stock. Any of the risk factors we describe below could adversely affect our business, financial condition, results of operations or prospects. The market price of our common stock could decline if one or more of these risks or uncertainties actually occur, causing you to lose all or part of your investment in our common stock. Additional risks that we currently do not know about or that we currently believe to be immaterial may also impair our business, financial condition, operating results and prospects.

Risks Relating to Our Business

We have incurred significant losses since inception, we expect to incur losses in the future and we may not be able to generate sufficient revenue to achieve and maintain profitability.

We have incurred significant losses since our inception. For the years ended December 31, 2017 and 2018, we incurred net losses of $42.8 million and $46.4 million, respectively. As of December 31, 2018, we had an accumulated deficit of $295.9 million. We have funded our operations principally from the sale of our convertible preferred stock, and to a lesser extent sequencing and development revenue. We have devoted most of our financial resources to the research and development of products and services under our immune medicine platform. We expect to continue to incur significant expenses and operating losses for the foreseeable future as we continue to invest in the development of products and services utilizing our immune medicine program to support the validation of additional clinical diagnostic and therapeutic products and services. In addition, following the closing of this offering, we expect to incur additional costs associated with operating as a public company, including expenses related to legal, accounting, regulatory, maintaining compliance with exchange listing and Securities and Exchange Commission ("SEC") requirements, director and officer insurance premiums and investor relations. We will need to generate significant additional revenue to achieve and sustain profitability. Our failure to achieve or sustain profitability could negatively impact the value of our common stock.

We expect to make significant investments in our continued research and development of new products and services, which may not be successful.

We are seeking to leverage our immune medicine platform to develop a pipeline of future disease-specific research, diagnostic and therapeutic products and services. For example, we are attempting to extend clonoSEQ into additional indications and sample types, and we are developing our TCR-Antigen Map with a view toward developing immunoSEQ Dx, a diagnostic test that may enable early detection of multiple diseases from a single blood test. In addition, we are developing certain therapeutic product candidates under our collaboration agreement with Genentech by leveraging our platform to identify TCRs that can be engineered into personalized cellular immunotherapies. We expect to incur significant expenses to advance these development efforts, but they may not be successful.

Developing new products and services is a speculative and risky endeavor. Products or services that initially show promise may fail to achieve the desired results or may not achieve acceptable levels of analytical accuracy or clinical utility. We may need to alter our products in development and repeat clinical studies before we identify a potentially successful product or service. Product development is expensive, may take years to complete and can have uncertain outcomes. Failure can occur at any stage of the development. If, after development, a product or service appears successful, we or our

collaborators may, depending on the nature of the product or service, still need to obtain FDA and other regulatory clearances, authorizations or approvals before we can market it. The FDA's clearance, authorization or approval pathways are likely to involve significant time, as well as additional research, development and clinical study expenditures. The FDA may not clear, authorize or approve any future product or service we develop. Even if we develop a product or service that receives regulatory clearance, authorization or approval, we or our collaborators would need to commit substantial resources to commercialize, sell and market it before it could be profitable, and the product or service may never be commercially successful. Additionally, development of any product or service may be disrupted or made less viable by the development of competing products or services.

New potential products and services may fail any stage of development or commercialization and if we determine that any of our current or future products or services are unlikely to succeed, we may abandon them without any return on our investment. If we are unsuccessful in developing additional products or services, our potential for growth may be impaired.

If we are not successful in leveraging our immune medicine platform to discover, develop and commercialize additional products and services, our ability to expand our business and achieve our strategic objectives would be impaired.

A key element of our strategy is to leverage our immune medicine platform to discover, develop and potentially commercialize additional products and services beyond our current portfolio to diagnose and treat various disease states. In particular, for clonoSEQ we are attempting to generate sufficient clinical evidence to support a new regulatory submission to add additional lymphoid cancers beyond ALL and MM, while also adding blood as a validated sample type. If we are unable to extend clonoSEQ into other indications or to use additional sample types, our platform may face a broader obstacle to using our immunosequencing data for commercially viable products and services.

Identifying new products and services requires substantial technical, financial and human resources, whether or not any products or services are ultimately developed or commercialized. We may pursue what we believe is a promising opportunity to leverage our platform only to discover that certain of our risk or resource allocation decisions were incorrect or insufficient, or that individual products, services or our science in general has technology or biology risks that were previously unknown or underappreciated. Our strategy of pursuing the value of our immune medicine platform over a long time horizon and across a broad array of human diseases may not be effective. In the event material decisions in any of these areas turn out to be incorrect or sub-optimal, we may experience a material adverse impact on our business and ability to fund our operations and we may never realize what we believe is the potential of our immune medicine platform.

Our efforts to develop our TCR-Antigen Map may not be successful, and it may not yield the insights we expect at all or on a timetable that allows us to develop or commercialize any new diagnostic products.

We are leveraging our collaboration with Microsoft to develop our TCR-Antigen Map. Together we are using immunosequencing, proprietary computational modeling and machine learning to map TCR sequences to the antigens they bind. However, we may not be successful in developing a comprehensive TCR-Antigen Map for any number of reasons. Our collaboration with Microsoft is in the early stages, and our computations and algorithmic-based methods are largely untested and may not allow us to accurately pair TCR sequences to a meaningful number of antigens. As a result, it may require significantly more time and resources for us to determine how to use machine learning to accelerate our mapping process, which could adversely impact our ability to develop or commercialize new diagnostic products or services. In addition, even with the aid of machine learning, we expect the TCR-Antigen Map to take us several years to develop.

The TCR-Antigen Map we are developing may not yield clinically actionable insights on a timetable that is commercially viable, or at all. Our goal is to leverage the TCR-Antigen Map to develop a diagnostic product, immunoSEQ Dx, that may enable early detection of many diseases from a single blood test. However, we are still validating early detection testing for a set of discrete diseases where antigen specificity is well-known, and we do not expect to validate more than one indication in 2019. If our computational modeling and machine learning efforts do not accelerate the pace at which we can validate association of TCR sequences to the antigens they bind, the timetable for our business model may not be commercially viable. Even if we can accelerate this timeline, our products and services derived from our novel technologies may have product or service level errors. If we are unable to make meaningful progress in our TCR-Antigen Map and successfully use it to develop and commercialize new diagnostic products or services, our business and results of operations will suffer.

We are exposed to risks associated with our agreement with Genentech, and we may not realize the advantages we expect from it.

In December 2018, we entered into a worldwide collaboration and license agreement with Genentech ("Genentech Agreement"), with the goal of accelerating the development and commercialization of novel cancer-specific antigen and neoantigen directed T cell therapies for the treatment of a broad range of tumor types. Under the terms of the Genentech Agreement, we received $300.0 million in an initial upfront payment in February 2019, and may receive approximately $1.8 billion in additional payments over time upon achievement of specified development, regulatory and commercial milestones. In addition, Genentech will pay us royalties on sales of products commercialized under the agreement. We may not be successful in achieving these milestones, and products developed under the Genentech Agreement may not be commercialized in the timeframe we expect, achieve significant sales, or be commercialized at all.

We are exposed to numerous risks associated with the Genentech Agreement, including sharing a measure of control over the operations of our research and development portions of the collaboration with Genentech and Genentech having sole control over the commercialization of any products developed via the collaboration. The Genentech Agreement also prevents us from, among other things, developing or commercializing TCR-based cellular therapies outside the scope of the collaboration in the field of oncology on our own or with any third party. Our collaboration involves risks that are different from the risks involved in independently conducting operations, including that Genentech may:

- have or develop economic or business interests that are inconsistent with ours;
- take actions contrary to our instructions, requests, policies or objectives;
- take actions that reduce our return on investment for this collaboration;
- fail to distinguish itself from biosimilar competition; or
- take actions that harm our reputation or restrict our ability to run our business.

Genentech's degree of control over collaboration development and commercialization efforts may impact the amounts we receive under the Genentech Agreement. For example, Genentech may decide not to pursue commercialization of product candidates at all, or it may agree to pay royalties to third parties or adopt a pricing model that reduces the amount of royalties we might otherwise expect. It is also possible that effective cell therapies will not be developed under the Genentech Agreement or, if developed, approved by the FDA or comparable regulatory authorities outside of the United States. Genentech may also terminate the Genentech Agreement at its convenience, at any time and without cause.

We may not be able to perform our product research, development and commercialization related obligations under the Genentech Agreement, including performing TCR screening activities for product

candidates being developed and commercialized under that agreement. For example, in the event a product is commercialized under the Genentech Agreement, as the volume of product sales grows, we will likely need to continue to increase our workflow capacity for sample intake, customer service and general process improvements, and expand our internal quality assurance program to support TCR screening on a larger scale within expected turnaround times. We will likely need additional certified laboratory scientists and other scientific and technical personnel for the Personalized Product to identify and target therapeutically relevant, patient-specific neoantigens. We will likely also need to acquire additional laboratory space and equipment, which can take several months or more to procure, set up and validate. These process enhancements and increases in scale, expansion of personnel, laboratory space and equipment may not be successfully implemented, and we may not have adequate space in our existing laboratory facilities to accommodate the required expansion. If we cannot satisfy our obligations, Genentech is entitled to trigger a technology transfer of our TCR screening process (specific to the Personalized Product) or terminate the Genentech Agreement. In addition, due to our significant obligations under the Genentech Agreement, we may face challenges in keeping existing customers, collaborators and suppliers and obtaining new customers, including any biopharmaceutical customers that are actual or potential competitors with Genentech.

If we support the commercialization of one or more products under the Genentech Agreement, we may need to incorporate new equipment, implement new technology systems and laboratory processes and hire new personnel with different qualifications. Failure to manage this growth or transition could result in turnaround time delays, higher product costs, declining product quality, deteriorating customer service and slower responses to competitive challenges. A failure in any one of these areas could make it difficult for us to meet market expectations for our products, and could damage our reputation and the prospects for our business, both under the Genentech Agreement and otherwise. As a result, our relationship with Genentech may not result in the realization of its anticipated benefits.

We have limited experience with the development and commercialization of cellular therapeutics, and future TCR-based cellular therapies may never be successfully developed and commercialized as part of our Genentech collaboration.

We have limited experience with the development of cellular therapeutics, and no experience with the commercialization, marketing and distribution of cellular therapeutics. Our therapeutic product candidates are at an early stage of discovery and development under our Genentech collaboration, and we are continuing to develop our TruTCR process being used under that collaboration to develop TCR-based cellular therapies for the treatment of cancer. Under our Genentech collaboration, Genentech has invested significant financial resources to develop future TCR-based cellular therapies, including conducting preclinical studies and other early research and development activities, and providing general and administrative support for these operations. Our future success is dependent on our and Genentech's ability to successfully develop therapeutic product candidates, and Genentech's ability, where applicable, to obtain regulatory and marketing approval for, and then successfully commercialize, cellular therapeutics. We and Genentech have not yet developed and commercialized any cellular therapeutics, and we may not be able to do so.

We currently use, and in the future expect to increase our use of, collaborators for several aspects of our operations, and if we cannot maintain current and enter new relationships with collaborators, our business will suffer.

We have limited resources to conduct our life sciences research, clinical diagnostics and drug discovery operations and have not yet fully established infrastructure for sales, marketing or distribution in connection with our products and services. Accordingly, we have entered into collaboration agreements under which our collaborators have provided, and may in the future provide,

funding and other resources for developing and potentially commercializing our products and services. In particular, we have entered into the Genentech Agreement, with the goal of accelerating the development and commercialization of T cell therapies for the treatment of a broad range of tumor types, and a strategic collaboration agreement with Microsoft ("Microsoft Agreement"), which provides us with access to Microsoft's research and machine learning technologies that we are using to develop our TCR-Antigen Map. These collaborations may result in our incurring significant expenses in pursuit of potential products and services, and we may not be successful in identifying, developing or commercializing any potential products or services.

Our future success depends in part on our ability to maintain these relationships and to establish new relationships. Many factors may impact the success of such collaborations, including our ability to perform our obligations, our collaborators' satisfaction with our products and services, our collaborators' performance of their obligations to us, our collaborators' internal priorities, resource allocation decisions and competitive opportunities, the ability to obtain regulatory approvals, disagreements with collaborators, the costs required of either party to the collaboration and related financing needs, and operating, legal and other risks in any relevant jurisdiction. In addition to reducing our revenue or delaying the development of our future products and services, the loss of one or more of these relationships may reduce our exposure to research, data, clinical trials or computing technologies that facilitate the collection and incorporation of new information into our clinical immunomics database. All of the risks relating to product and service development, regulatory clearance, authorization or approval and commercialization described in this prospectus apply to us derivatively through the activities of our collaborators.

We engage in conversations with companies regarding potential collaborations on an ongoing basis. These conversations may not result in a commercial agreement. Even if an agreement is reached, the resulting relationship may not be successful, and any products and services developed as part of the collaboration may not produce successful outcomes. Speculation in the industry about our existing or potential collaborations can be a catalyst for adverse speculation about us, or our products or services, which can adversely affect our reputation and our business.

Significant additional research and development and, in certain instances, clinical trials or validation will be required before we can potentially seek regulatory clearance, authorization or approval for, or commercialize any of our products or services in development.

We are developing a pipeline of immune-driven diagnostics and therapeutics, including immunoSEQ Dx and cellular therapies in oncology, but significant additional research and development activities and clinical trials or validations could be required before we and our collaborators will have a chance to achieve additional commercially viable products. Our research and development efforts remain subject to all of the risks associated with the development of new products and services based on immune-driven diagnostics and immune-mediated therapies. Development of the underlying technology may be affected by unanticipated technical or other problems, among other research and development issues, and the possible insufficiency of funds needed to complete development of these products and services. Safety, regulatory and efficacy issues, clinical hurdles or other challenges may result in delays and cause us to incur additional expenses that would increase our losses. If we and our collaborators cannot complete, or if we experience significant delays in developing, our clinical diagnostics or cellular therapies, particularly after incurring significant expenditures, our business may fail and investors may lose the entirety of their investment.

Prior to obtaining regulatory clearances, authorizations or approvals for the commercial sale of any new products or services, we must demonstrate that our products and services are both safe and effective for use in each target disease indication. Clinical studies may be necessary to demonstrate that a product or service is safe and effective. Clinical testing or validation is expensive and can take

many years to complete, and its outcome is inherently uncertain. Failure can occur at any time. For therapeutics, the results of preclinical studies and early clinical trials of products and services in development may not be predictive of the results of later-stage clinical trials, and initial success in clinical trials may not be indicative of results obtained when clinical trials are completed. There is typically an extremely high rate of failure as therapeutic products in development proceed through clinical trials. Products in later stages of clinical trials or validation also may fail to show the desired safety and efficacy profile despite having progressed through non-clinical studies and initial clinical trials or validations. Any delays in the development of our products and services may harm our business, financial condition and prospects significantly.

Errors or defects in our products or services could harm our reputation, decrease market acceptance of our products or services or expose us to product liability claims.

We are creating new products and services, many of which are initially based on largely untested technologies. As all of our products and services progress, we or others may determine that we made product or service level scientific or technological mistakes. The testing processes utilize a number of complex and sophisticated biochemical, informatics, optical and mechanical processes, many of which are highly sensitive to external factors. An operational or technology failure in one of these complex processes or fluctuations in external factors may result in less efficient processing or variation between testing runs. Refinements to our processes may initially result in unanticipated issues that reduce the efficiency or increase variability. In particular, sequencing, which is a key component of these processes, could be inefficient with higher than expected variability thereby increasing total sequencing costs and reducing the number of samples we can process in a given time period. Therefore, inefficient or variable processes can cause variability in our operating results and damage our reputation.

In addition, our laboratory operations could result in any number of errors or defects. Our quality assurance system may fail to prevent us from inadvertent problems with samples, sample quality, lab processes including sequencing, software, data upload or analysis, raw materials, reagent manufacturing, assay quality or design, or other components or processes. In addition, our assays may have quality or design errors, and we may have inadequate procedures or instrumentation to process samples, assemble our proprietary primer mixes and commercial materials, upload and analyze data, or otherwise conduct our laboratory operations. If we provide products or services with undiscovered errors to our customers, our clinical diagnostics may falsely indicate a patient has a disease or fail to detect disease in a patient who requires treatment. We believe our customers are likely to be particularly sensitive to product and service defects, errors and delays, including if our products and services fail to indicate the presence of residual disease with high accuracy from clinical specimens or if we fail to list or inaccurately indicate the presence or absence of disease in our test report. In drug discovery, such errors may interfere with our collaborators' clinical studies or result in adverse safety or efficacy profiles for their products in development. This may harm our customers' businesses and may cause us to incur significant costs, divert the attention of key personnel, encourage regulatory enforcement action against us, create a significant customer relations problem for us and cause our reputation to suffer. We may also be subject to warranty and liability claims for damages related to errors or defects in our products or services. Any of these developments could harm our business and operating results.

Our current and future products and services may never achieve significant commercial market acceptance.

Our success depends on the market's confidence that we can provide immune-driven research, diagnostic and therapeutic products and services that improve clinical outcomes, lower healthcare costs and enable better biopharmaceutical development. Failure of our products and services, or those jointly developed with our collaborators, to perform as expected could significantly impair our operating

results and our reputation. We believe patients, clinicians, academic institutions and biopharmaceutical companies are likely to be particularly sensitive to defects, errors, inaccuracies, delays and toxicities in or associated with our products and services. Furthermore, inadequate performance of these products or services may result in lower confidence in our immune medicine platform in general.

We and our collaborators may not succeed in achieving significant commercial market acceptance for our current or future products and services due to a number of factors, including:

- our ability to demonstrate the clinical utility of our immune medicine platform and related products and services and their potential advantages over existing life sciences research, clinical diagnostic and drug discovery technologies to academic institutions, biopharmaceutical companies and the medical community;
- our ability, and that of our collaborators, to secure and maintain FDA and other regulatory clearance, authorization or approval for our products;
- the agreement by third-party payors to reimburse our diagnostics, the scope and extent of which will affect patients' willingness or ability to pay for our diagnostics and will likely heavily influence physicians' decisions to recommend our tests;
- the rate of adoption of our immune medicine platform and related products and services by academic institutions, clinicians, key opinion leaders, advocacy groups and biopharmaceutical companies; and
- the impact of our investments in product innovation and commercial growth.

Additionally, our customers and collaborators may decide to decrease or discontinue their use of our products and services due to changes in their research and development plans, failures in their clinical trials, financial constraints, the regulatory environment, negative publicity about our products and services, competing products or the reimbursement landscape, all of which are circumstances outside of our control. We may not be successful in addressing these or other factors that might affect the market acceptance of our products and services and technologies. Failure to achieve widespread market acceptance of our immune medicine platform and related products and services would materially harm our business, financial condition and results of operations.

We rely on a limited number of suppliers or, in many cases, single suppliers, for laboratory equipment and materials and may not be able to find replacements or immediately transition to alternative suppliers.

We rely on a limited number of suppliers, or in many cases single suppliers, to provide certain sequencers and equipment that we use in our laboratory operations, as well as reagents and other laboratory materials for our products and services. An interruption in our laboratory operations, kit distribution or technology transfer could occur if we encounter delays, quality issues or other difficulties in securing these sequencers, equipment, reagents or other materials, and if we cannot then obtain an acceptable substitute. In addition, we would likely be required to incur significant costs and devote significant efforts to find new suppliers, acquire and qualify new equipment, validate new reagents and revalidate aspects of our existing assays, which may cause delays in our processing of samples or development and commercialization of products and services. Any such interruption could significantly affect our business, financial condition, results of operations and reputation.

In particular, we have purchased and rely on the Illumina NextSeq System. Illumina, Inc. ("Illumina") supplies us with reagents that have been designed for use solely with this sequencer and Illumina is the sole provider of maintenance and repair services for the Illumina NextSeq System. We also license our laboratory information management software from Illumina and receive services from

Illumina related to that software. We believe there are only a few other equipment manufacturers that are currently capable of supplying the equipment necessary for our laboratory operations, including sequencers and various associated reagents. The use of sequencers manufactured by a company other than Illumina would require us to alter our laboratory operations. Transitioning to and qualifying a new sequencer would be time-consuming and expensive, may result in interruptions in our laboratory operations, could affect the performance specifications of our laboratory operations or could require that we revalidate the reagents of our immunoSEQ kits, immunoSEQ Dx or clonoSEQ diagnostic testing services, and could require us to obtain additional clearance, authorization, approval, accreditation, or licensure for the changes. We may not be able to secure and implement alternative sequencers, associated reagents and other materials without experiencing interruptions in our workflow. In the case of an alternative supplier to Illumina, any replacement sequencers and various associated reagents may not be available or may not meet our quality control and performance requirements for our laboratory operations. If we should encounter delays or difficulties in securing, reconfiguring or revalidating the equipment and reagents we require for our products and services, our business, financial condition, results of operations and reputation could be adversely affected. In addition, Illumina is not obligated to meet all of our requirements for reagent supply. In the event Illumina ceases or slows its production of, or is otherwise unwilling or unable to continue to supply the sequencer regents necessary for and currently used in our business at or near current pricing, we may be required to purchase different reagents from Illumina or to purchase from a different reagent vendor under terms and conditions which could be less favorable to us. Any disruption in Illumina's operations or the suppliers of our reagents could impact our supply chain and laboratory operations of our immune medicine platform and our ability to conduct our business and generate revenue.

We have limited experience in marketing and selling products and services, and if we are unable to expand our direct sales and marketing force or partner with collaborators in certain product areas and markets to adequately address our customers' needs, our business may be adversely affected.

We have limited experience in marketing and selling our research and diagnostic products and services and no experience marketing and selling therapeutic products and services. Accordingly, we or our collaborators may not be able to market and sell our current or future products and services effectively enough to support our planned growth.

Our research and diagnostic sales and marketing efforts are targeted at a large and diverse market with highly specialized segments, including department heads, laboratory directors, principal investigators, core facility directors, clinicians, payors and research scientists and pathologists at leading academic institutions, biopharmaceutical companies, research institutions and contract research organizations. As a result, we believe it is necessary for our sales representatives to have relevant, specialized market experience. Our internal sales organization is currently small, and competition for experienced sales and marketing personnel is intense. We may not be able to attract and retain personnel or be able to build or adequately train an efficient and effective sales organization, which could negatively impact sales and market acceptance of our clinical diagnostics and limit our revenue growth and potential profitability. We are also seeking distribution partners, particularly for our improved immunoSEQ RUO kit by researchers who want to perform immunosequencing in their local labs. We may not be able engage a distribution partner on favorable terms, or at all.

We established a collaboration with Genentech for the research, development, marketing, promotion, distribution and sale of TCR-based cellular therapies for the treatment of cancer. Under the Genentech Agreement, Genentech has the sole right and authority to commercialize products developed under that agreement. It will be Genentech's responsibility to locate, qualify and engage distribution partners, clinicians and local hospitals with industry experience and knowledge to effectively market and sell products developed under that agreement. Genentech may not be able to

engage distribution partners, clinicians or hospitals on favorable terms, or at all. If Genentech's sales and marketing efforts with respect to products developed under the Genentech Agreement are not successful, we may not achieve significant market acceptance for our drug discovery services and platform, which would materially and adversely impact our business operations.

If we or our collaborators experience any of a number of possible unforeseen events in connection with clinical trials, our or their ability to conduct further clinical trials of, obtain regulatory clearance, authorization or approval of or commercialize future products and services or improvements to current products and services, could be delayed or prevented.

We or our collaborators may experience numerous unforeseen events during, or as a result of, clinical trials that could delay or prevent our or their ability to conduct further clinical trials or obtain regulatory clearance, authorization or approval of or commercialize future products and services or improvements to current products and services, including:

Evolving Regulatory Requirements and Policies

- the area of "precision medicine" or "personalized medicine" and its regulation may be subject to ongoing changes in terms of regulatory requirements and governmental policies, in ways we cannot predict;

Trial Design

- regulatory authorities or ethical review boards, including institutional review boards ("IRBs"), may not authorize commencement of a clinical trial or conduct a clinical trial at a prospective trial site;
- there may be delays in reaching or failure to reach agreement on acceptable clinical trial contracts or clinical trial protocols with prospective trial sites;
- the FDA or other regulatory authorities may disagree with a clinical trial design or a sponsor's interpretation of data and may change the requirements for product clearance, authorization or approval even after they have reviewed and commented on the clinical trial design;
- differences in trial design between early stage clinical trials and later-stage clinical trials may make it difficult to extrapolate the results of earlier clinical trials to later clinical trials;
- the FDA or other regulatory authorities may disagree about whether study endpoints are clinically meaningful;
- the number of patients, or amount of data, required for clinical trials, or improvements to current products, may be larger than anticipated, patient enrollment in these clinical trials may be slower than anticipated or patients may drop out of clinical trials at a higher rate than anticipated;

Testing

- changes may be made to product candidates after commencing clinical trials, which may require that previously completed stages of clinical testing be repeated or delay later stages of testing, for example, we, or our collaborators, may pursue one or more different product development pathways for our T cell immunotherapies;
- clinical trials may fail to satisfy the applicable regulatory requirements of the FDA or other regulatory authorities responsible for oversight of the conduct of clinical trials in other countries;

- regulators may elect to impose a clinical hold, or governing IRBs, data safety monitoring board or ethics committees may elect to suspend or terminate our clinical research or trials for various reasons, including non-compliance with regulatory requirements or a finding that the participants are being exposed to unacceptable risks to their health or the privacy of their health information being disclosed;
- the cost of clinical trials of future products and services, or improvements to current products and services, may be greater than we anticipate;
- we may not have sufficient capacity in our laboratories to perform testing as requested or volumes requested or with the requested turnaround times necessary for clinical trials;
- the supply or quality of materials or data necessary to conduct clinical trials of future products and services, or improvements to current products and services, may be insufficient or inadequate;

Trial Outcomes

- the outcome of our collaborators' preclinical studies and early clinical trials may not be predictive of the success of later clinical trials, and interim results of a clinical trial do not necessarily predict final results;
- product candidates may be associated with negative or inconclusive results in clinical trials, and we or our collaborators may decide to deprioritize or abandon these product candidates, or regulatory authorities may require us to abandon them or impose onerous changes or requirements, which could lead to deprioritization or abandonment;
- product candidates may have undesirable side effects which could lead to serious adverse events, or other unexpected characteristics. One or more of such effects or events could cause regulators to impose a clinical hold on the applicable trial, or cause us, our collaborators or their investigators, IRBs or ethics committees to suspend or terminate the trial of that product candidates;
- clinical trials may suggest or demonstrate that products or services are not as efficacious or safe as other similar diagnostics or therapies; and
- preclinical and clinical data are often susceptible to varying interpretations and analyses, and our products and services in development may fail to obtain regulatory clearance, authorization or approval, even if they perform satisfactorily in preclinical studies and clinical trials.

Delays of this nature could also allow competitors to bring products to market before we or our collaborators do, potentially impairing our ability to successfully commercialize our products and services in development and harming our business and results of operations. Any delays in the development of our products and services or those jointly developed with our collaborators may significantly harm our business, financial condition and prospects. 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 clearance, authorization or approval of products and services in development.

We will need to develop and expand our workforce, commercial infrastructure and laboratory operations to support anticipated growth in demand for our products and services, and we may encounter difficulties in managing this development and expansion and in meeting fluctuations in this demand.

We will need to expand our workforce, commercial infrastructure and laboratory operations to support anticipated growth in demand for our products and services. If we are unable to support

fluctuations in the demand for our products and services, including ensuring that we have adequate capacity to meet increased demand, our business could suffer. As of March 31, 2019, we had 346 full-time employees and we expect to increase the number of employees and the scope of our operations as we continue to develop our clinical diagnostic products and services. As we and our collaborators commercialize additional products and services, we may need to incorporate new equipment, implement new technology systems and laboratory processes and hire new personnel with different qualifications. For example, in connection with our Genentech collaboration, we may need to procure additional laboratory space and personnel to allow us to increase TCR screening times with respect to product candidates being developed under the Genentech Agreement. Failure to manage this growth or transition could result in turnaround time delays, higher service costs, declining service quality, deteriorating customer service and slower responses to competitive challenges. A failure in any one of these areas could make it difficult for us to meet market expectations for our products and services, and could damage our reputation and the prospects for our business.

To manage our anticipated expansion, we must continue to implement and improve our managerial, operational and financial systems, expand our facilities and continue to recruit and train additional qualified personnel. Also, our management team may need to divert a disproportionate amount of its attention away from its day-to-day activities and devote a substantial amount of time to managing these development activities. Due to our limited resources and early stage of growth, we may not be able to effectively manage this simultaneous execution and the expansion of our operations or recruit and train additional qualified personnel. This may result in weaknesses in our infrastructure, operational mistakes, slower development of our products and services, missed or delayed milestone achievement, loss of business opportunities, loss of employees and reduced productivity among remaining employees.

If our management is unable to effectively manage our expected development and expansion, our expenses may increase more than expected, our ability to generate or increase our revenue could be reduced and we may not be able to implement our business strategy. Our future financial performance, and our ability to develop and commercialize our products and services and compete effectively, will depend, in part, on our ability to effectively manage our future development and expansion.

Our operating results may fluctuate significantly, which makes our future operating results difficult to predict and could cause our operating results to fall below expectations or any guidance we may provide.

Our financial condition and operating results have varied in the past and will continue to fluctuate from quarter-to-quarter and year-to-year in the future due to a variety of factors, many of which are beyond our control. Factors relating to our business that may contribute to these fluctuations include the following, as well as other factors described elsewhere in this prospectus:

- the timing of upfront payments from our collaborators;
- our ability and that of our collaborators to develop and successfully commercialize our products and services;
- our ability to achieve collaboration-based milestones on currently contemplated timelines, or at all;
- availability and extent of reimbursement by governmental and private payors for our products and services;
- the ability of our clinical sales teams to convert physicians from using incumbent products in the market to clonoSEQ and new diagnostic products and services we may develop;

- our ability to drive repeat usage of the clonoSEQ diagnostic test by physicians and get reimbursed for that repeat usage by commercial and government payors for monitoring of MRD;
- the outcomes of research initiatives, clinical trials or other product development or approval processes conducted by us or our collaborators;
- the level of demand for our products and services, which may vary significantly;
- our relationships, and any associated exclusivity terms, with collaborators;
- our ability to manage our growth;
- our contractual or other obligations to provide resources to fund our products and services and to provide resources to our collaborations;
- delays or failures in advancement of future products in clinical trials by us or our collaborators;
- risks associated with the future international expansion of our business, including the potential to conduct clinical trials and commercialize our products and services in multiple international locations;
- our ability and that of our collaborators to consistently manufacture our products;
- our dependence on, and the need to attract and retain, key management and other personnel;
- our ability to obtain, protect and enforce our intellectual property rights;
- our ability to prevent the theft or misappropriation of our intellectual property, know-how or technologies;
- our ability to obtain additional capital that may be necessary to expand our business;
- our ability to accurately report our financial results in a timely manner;
- business interruptions such as power outages, strikes, acts of terrorism or natural disasters; and
- our ability to use our net operating loss ("NOL") carryforwards to offset future taxable income.

The cumulative effects of factors discussed above could result in large fluctuations and unpredictability in our quarterly and annual operating results. As a result, comparing our operating results on a period-to-period basis may not be meaningful. Investors should not rely on our past results as an indication of our future performance. In any particular period, our operating results could be below the expectations of securities analysts or investors, which could cause our stock price to decline.

While as a general matter we intend to periodically report on the status of our development initiatives, including anticipated next steps, we may not provide forward-looking guidance on the timing of those next steps. In addition, we do not control the timing of disclosure of any such milestones related to any of our products and services that are managed by our collaborators. Any disclosure by us or our collaborators of data that is perceived as negative may have a material adverse impact on our stock price or overall valuation. Our stock price may decline as a result of unexpected clinical trial results in one or more of our products and services, including adverse safety events reported for any of our products or services.

We have estimated the sizes of the markets for our current and future products and services, and these markets may be smaller than we estimate.

Our estimates of the annual addressable markets for our current products and services and those under development are based on a number of internal and third-party estimates, including, without

limitation, the number of patients who have developed one or more of a broad range of cancers, the number of individuals who are at a higher risk for developing one or more of a broad range of cancers, the number of individuals who have developed or are at a higher risk of developing certain autoimmune disorders, the number of individuals with certain infectious diseases we or our collaborators are able to treat through our products and services, the number of potential tests utilized per treatment course per patient and the assumed prices at which we can sell our current and future products and services for markets that have not been established. While we believe our assumptions and the data underlying our estimates are reasonable, these assumptions and estimates may not be correct and the conditions supporting our assumptions or estimates may change at any time, thereby reducing the predictive accuracy of these underlying factors. As a result, our estimates of the annual addressable market for our current or future products and services may prove to be incorrect. If the actual number of patients who would benefit from our products or services, the price at which we can sell future products and services or the annual addressable market for our products or services is smaller than we have estimated, it may impair our sales growth and have an adverse impact on our business.

If we do not compete effectively with scientific and commercial competitors, we may not be able to successfully commercialize our products and services.

The biotechnology and pharmaceutical industries, including the fields of life sciences research, clinical diagnostics and drug discovery are intense and highly competitive. These fields are characterized by rapidly advancing technologies and a strong emphasis on intellectual property. Given the breadth and promise of immune medicine, we face substantial competition from many different sources, including life sciences tools, diagnostics, pharmaceutical and biotechnology companies, academic research institutions and governmental agencies and public and private research institutions across various components of our platform and product and service offerings. Due to the significant interest and growth in immune-driven medicine more broadly, we expect the intensity of the competition to increase.

Specifically, in life sciences research, our immunoSEQ research services face competition from a number of companies, including, among others, Thermo Fisher Scientific Inc., ArcherDX, Inc., 10X Genomics, Inc., Invivoscribe, Inc., iRepertoire, Inc., QIAGEN N.V., Takara Bio Inc., Fluidigm Corporation and Dolomite Bio (a brand of Blacktrace Holdings Ltd).

In clinical diagnostics, our clonoSEQ diagnostic test faces competition primarily from institutions performing flow cytometry in-house, particularly outside of the United States. Competitors with diagnostic technology platforms include Invivoscribe, Inc., ArcherDX, Inc. and Becton, Dickinson and Company. We may also face competition from companies developing early cancer detection testing products for indications that do not currently compete with clonoSEQ, including GRAIL, Inc., Guardant Health, Inc., Exact Sciences Corporation and Natera, Inc.

In drug discovery, clinical trials of immune-driven medicines are being undertaken by a number of industry and academic players. Direct competitors with a pipeline of preclinical and clinical TCR-based cellular therapy candidates include GlaxoSmithKline plc, Adaptimmune Therapeutics plc, Kite Pharma, Inc./Gilead Sciences, Inc., Juno Therapeutics, Inc./Celgene Corporation, bluebird bio, Inc., Immatics Biotechnologies GmbH, Neon Therapeutics, Inc. and several others.

Our competitors may have or will obtain the knowledge necessary to generate and characterize similar data to our known data for the purpose of identifying and developing products or services that could compete with any of our products or services. Further, immune medicine is being pursued by several biotechnology companies as well as by large-cap biopharmaceutical companies. Many of our current or potential competitors, either alone or with their collaboration partners, have significantly greater financial resources and expertise in research and development, manufacturing, regulatory approval and compliance, and sales and distribution than we do.

We could be adversely affected if we do not develop our life sciences research, clinical diagnostic and drug discovery products and services, obtain required regulatory and other clearances, authorizations or approvals, obtain or enforce patents covering our discoveries and launch our products and services before our competitors. Moreover, our competitors may succeed in developing immunosequencing-based life sciences research, clinical diagnostics and drug discoveries that circumvent our technologies, products or services. Our competitors may succeed in developing and commercializing research or diagnostic products or services that are more accurate, more convenient to use or more cost-effective than our products or services or therapeutic products that prove to be more safe, more effective, more convenient to administer or more cost-effective than any therapeutic products we may develop with our collaborators or that would render our technologies, products and services less competitive or obsolete. We expect competition to intensify in the fields in which we are involved as technical advances in these fields occur and become more widely known. For additional information regarding our competition, see the "*Business—Competition*" section of this prospectus.

The life sciences industry is subject to rapid change, which could make our immune medicine platform and related products and services that we develop obsolete.

Our industry is characterized by rapid changes, including technological and scientific breakthroughs, frequent new product and service introductions and enhancements and evolving industry standards, all of which could make our current and future products and services obsolete. Our future success will depend on our ability to keep pace with the evolving needs of our customers on a timely and cost-effective basis and to pursue new market opportunities that develop as a result of scientific and technological advances. In recent years, there have been numerous advances in technologies relating to life sciences research and the diagnosis and treatment of cancer, other diseases and autoimmune disorders. There have also been advances in technologies used to computationally analyze very large amounts of biologic information. If we do not update our products and services to reflect new scientific knowledge about immunosequencing, immunology, computational biology, software development, new disease diagnostics and therapies or the diseases we seek to treat, our products and services could become obsolete and sales of our current products and services and any future products and services we develop based on our immune medicine platform could decline or fail to grow as expected.

The loss of any member of our senior management team or our inability to attract and retain highly skilled scientists, clinicians and salespeople could adversely affect our business.

Our success depends on the skills, experience and performance of key members of our senior management team, including Chad Robins, our Chief Executive Officer and Co-Founder, Dr. Harlan Robins, our Chief Scientific Officer and Co-Founder, and Julie Rubinstein, our President. The individual and collective efforts of these employees will be important as we continue to develop products and services based on our immune medicine platform. The loss or incapacity of existing members of our executive management team could adversely affect our operations if we experience difficulties in hiring qualified successors. Our executive officers have signed employment agreements with us, but their service is at-will and may end at any point in time.

Our research and development initiatives and laboratory operations depend on our ability to attract and retain highly skilled scientists, technicians and software engineers. We may not be able to attract or retain qualified scientists, technicians or software engineers in the future due to the competition for qualified personnel among life science and technology businesses, particularly near our headquarters located in Seattle, Washington and our laboratory facilities located in South San Francisco, California. We also face competition from universities and public and private research institutions in recruiting and retaining highly qualified scientific personnel. We may have difficulties locating, recruiting or retaining qualified sales people. Recruiting, training and retention difficulties can

limit our ability to support our research and development and commercialization efforts. All of our employees are at-will, which means that either we or the employee may terminate their employment at any time.

In addition, we rely on consultants, contractors and advisors, including scientific and clinical advisors, to assist us in formulating our research and development, regulatory and commercialization strategy. Our consultants and advisors may provide services to other organizations and may have commitments under consulting or advisory contracts with other entities that may limit their availability to us. The loss of the services of one or more of our current consultants or advisors might impede the achievement of our research, development, regulatory and commercialization objectives. In addition, we have flexibly grown our workforce through the use of contractors and part time workers. We may not be able to retain the services of such personnel which might result in delays in the operation of our business.

If we lose the support of key thought leaders, it may be difficult to establish products and services enabled by our immune medicine platform as industry standards, which may limit our revenue growth and ability to achieve profitability.

We have established relationships with leading oncology, hematology, immunology, autoimmunity or inflammatory disease, transplantation and solid tumor thought leaders at premier academic and research institutions. If these key thought leaders determine that our immune medicine platform or our current or future products or services are not clinically effective, determine that alternative technologies are more effective or elect to use internally developed services, we could encounter significant difficulty validating our products or services, driving adoption or establishing our immune medicine platform as an industry standard, which would limit our revenue growth and our ability to achieve profitability. In addition, negative publications or reviews by clinicians, industry groups or other important stakeholders may negatively impact our revenue growth and ability to achieve profitability.

We depend on our information technology systems and any failure of these systems could harm our business.

We depend on information technology and telecommunications systems, including third-party cloud computing infrastructure, operating systems and artificial intelligence platforms, for significant elements of our operations, including our laboratory information management system, clinical immunomics database, immunoSEQ Analyzer, TCR-Antigen Map, laboratory workflow tools, customer and collaborator reporting and related functions. We also depend on our proprietary workflow software to support new product and service launches and regulatory compliance.

We use complex software processes and pipelines to manage samples and evaluate sequencing result data. These are subject to initial design or ongoing modifications which may result in unanticipated issues that could cause variability in patient results, leading to service disruptions or errors, resulting in liability.

We have installed, and expect to expand, a number of enterprise software systems that affect a broad range of business processes and functional areas, including systems handling human resources, financial controls and reporting, contract management, regulatory compliance and other infrastructure operations. In addition to these business systems, we have installed, and intend to extend, the capabilities of both our preventative and detective security controls by augmenting the monitoring and alerting functions, the network design and the automatic countermeasure operations of our technical systems. These information technology and telecommunications systems support a variety of functions, including laboratory operations, test validation, sample tracking, quality control, customer service support, billing and reimbursement, research and development activities, scientific

and medical curation and general administrative activities. In addition, our third-party billing and collections provider depends upon technology and telecommunications systems provided by outside vendors.

Information technology and telecommunications systems are vulnerable to damage from a variety of sources, including telecommunications or network failures, malicious human acts and natural disasters. Moreover, despite network security and back-up measures, some of our servers are potentially vulnerable to physical or electronic break-ins, computer viruses and similar disruptive problems. Despite the precautionary measures we have taken to prevent unanticipated problems that could affect our information technology and telecommunications systems, failures or significant downtime of these systems or those used by our collaborators or subcontractors could prevent us from conducting our comprehensive immunosequencing analysis, clinical diagnostics and drug discovery, preparing and providing reports to researchers, clinicians and our collaborators, billing payors, handling physician inquiries, conducting research and development activities and managing the administrative aspects of our business. Any disruption or loss of information technology or telecommunications systems on which critical aspects of our operations depend could have an adverse effect on our business and our reputation, and we may be unable to regain or repair our reputation in the future.

International expansion of our business exposes us to business, regulatory, political, operational, financial and economic risks associated with doing business outside of the United States.

Because we and our collaborators currently market our products and services outside of the United States and may market future products and services outside of the United States, if cleared, authorized or approved, our business is subject to risks associated with doing business outside of the United States, including an increase in our expenses and diversion of our management's attention from the development of future products and services. Accordingly, our business and financial results in the future could be adversely affected due to a variety of factors, including:

- multiple, conflicting and changing laws and regulations such as privacy security and data use regulations, tax laws, export and import restrictions, economic sanctions and embargoes, employment laws, anticorruption laws, regulatory requirements, reimbursement or payor regimes and other governmental approvals, permits and licenses;
- failure by us, our collaborators or our distributors to obtain regulatory clearance, authorization or approval for the use of our products and services in various countries;
- additional potentially relevant third-party patent rights;
- complexities and difficulties in obtaining intellectual property protection and enforcing our intellectual property;
- difficulties in staffing and managing foreign operations;
- complexities associated with managing multiple payor reimbursement regimes, government payors or patient self-pay systems;
- difficulties in negotiating favorable reimbursement negotiations with governmental authorities;
- logistics and regulations associated with shipping samples, including infrastructure conditions and transportation delays;
- limits in our ability to penetrate international markets if we are not able to conduct our immunosequencing or clinical diagnostic services locally;

- financial risks, such as longer payment cycles, difficulty collecting accounts receivable, the impact of local and regional financial crises on demand and payment for our products and services and exposure to foreign currency exchange rate fluctuations;
- natural disasters, political and economic instability, including wars, terrorism and political unrest, outbreak of disease, boycotts, curtailment of trade and other business restrictions;
- regulatory and compliance risks that relate to maintaining accurate information and control over sales and distributors' activities that may fall within the purview of the U.S. Foreign Corrupt Practices Act ("FCPA"), its books and records provisions, or its anti-bribery provisions, or laws similar to the FCPA in other jurisdictions in which we may now or in the future operate, such as the United Kingdom's Bribery Act of 2010; and
- onerous anti-bribery requirements of several member states in the European Union ("EU"), such as the United Kingdom's Bribery Act of 2010, and other countries that are constantly changing and require disclosure of information to which U.S. legal privilege may not extend.

Any of these factors could significantly harm our future international expansion and operations and, consequently, our revenue and results of operations.

We may never obtain approval in the EU or in any other foreign country for any of our products or services and, even if we do, we or our collaborators may never be able to commercialize them in any other jurisdiction, which would limit our ability to realize their full market potential.

In order to eventually market any of our current or future products and services in any particular foreign jurisdiction, we must establish and comply with numerous and varying regulatory requirements on a jurisdiction-by-jurisdiction basis regarding quality, safety, performance and efficacy. In addition, clinical trials or clinical investigations conducted in one country may not be accepted by regulatory authorities in other countries, and regulatory clearance, authorization or approval in one country does not guarantee regulatory clearance, authorization or approval in any other country. Approval processes vary among countries and can involve additional product testing and validation and additional administrative review periods.

Seeking foreign regulatory clearance, authorization or approval could result in difficulties and costs for us and our collaborators and require additional preclinical studies, clinical trials or clinical investigations which could be costly and time-consuming. Regulatory requirements and ethical approval obligations can vary widely from country to country and could delay or prevent the introduction of our products and services in those countries. The foreign regulatory clearance, authorization or approval process involves all of the risks and uncertainties associated with FDA clearance, authorization or approval. We currently sell our RUO kits outside of the United States and have completed a technology transfer process for research use to a site in Toulouse, France, but have no experience in obtaining regulatory clearance, authorization or approval in international markets. If we or our collaborators fail to comply with regulatory requirements in international markets or to obtain and maintain required regulatory clearances, authorizations or approvals in international markets, or if those approvals are delayed, our target market will be reduced and our ability to realize the full market potential of our products and services will be unrealized.

If our laboratory facilities become damaged or inoperable or we are required to vacate our existing facilities, our ability to conduct our laboratory processes and analysis and pursue our research and development efforts may be jeopardized.

We operate laboratory facilities located in Seattle, Washington and South San Francisco, California. Our facilities and equipment could be harmed or rendered inoperable by natural or

man-made disasters, including war, fire, earthquake, power loss, communications failure or terrorism, which may render it difficult or impossible for us to operate our immune medicine platform for some period of time. The inability to perform our laboratory processes or to reduce the backlog of analysis that could develop if our facilities are inoperable, for even a short period of time, may result in the loss of customers or harm to our reputation, and we may be unable to regain those customers or repair our reputation in the future. Furthermore, our facilities and the equipment we use to perform our research and development work could be unavailable or costly and time-consuming to repair or replace. It would be difficult, time-consuming and expensive to rebuild our facilities, to locate and qualify new facilities or license or transfer our proprietary technologies to a third party, particularly in light of licensure and accreditation requirements. Even in the unlikely event we are able to find a third party with such qualifications to enable us to conduct our laboratory processes, we may be unable to negotiate commercially reasonable terms.

We carry insurance for damage to our property and the disruption of our business, but this insurance may not cover all of the risks associated with damage or disruption to our business, may not provide coverage in amounts sufficient to cover our potential losses and may not continue to be available to us on acceptable terms, if at all.

We may need to raise additional capital to fund our existing operations, develop additional products and services, commercialize new products and services or expand our operations.

Based on our current business plan, we believe the net proceeds from this offering, together with our current cash, cash equivalents and marketable securities and anticipated cash flow from operations, will be sufficient to meet our anticipated cash requirements over at least the next 12 months from the date of this prospectus. If our available cash and investment balances, net proceeds from this offering and anticipated cash flow from operations are insufficient to satisfy our liquidity requirements, including because of lower demand for our products and services as a result of risks described in this prospectus, we may seek to sell common or preferred equity or convertible debt securities, enter into a credit facility or another form of third-party funding or seek other debt financing.

We may consider raising additional capital in the future to expand our business, to pursue strategic investments, to take advantage of financing opportunities or for other reasons, including to:

- increase our sales and marketing efforts to drive market adoption of our life sciences research, clinical diagnostics and therapeutics;
- fund development efforts for our current and future products and services;
- expand our products and services into other disease indications and clinical applications;
- acquire, license or invest in technologies;
- acquire or invest in complementary businesses or assets; and
- finance capital expenditures and general and administrative expenses.

Our present and future funding requirements will depend on many factors, including:

- our ability to achieve revenue growth;
- our rate of progress in establishing payor coverage and reimbursement arrangements with domestic and international commercial third-party payors and government payors;
- the cost of expanding our laboratory operations and offerings, including our sales and marketing efforts;
- our rate of progress in, and cost of the sales and marketing activities associated with, establishing adoption of our immunoSEQ research services and kits, and reimbursement for

our clonoSEQ diagnostic test, our immunoSEQ Dx early detection test and cellular therapies developed under the Genentech Agreement;

- our rate of progress in, and cost of research and development activities associated with, products and services in research and early development;
- the effect of competing technological, product and market developments;
- costs related to international expansion; and
- the potential cost of and delays in product development as a result of any regulatory oversight applicable to our products and services.

The various ways we could raise additional capital carry potential risks. If we raise funds by issuing equity securities, dilution to our shareholders could result. Any preferred equity securities issued also could provide for rights, preferences or privileges senior to those of holders of our common stock. If we raise funds by issuing debt securities, those debt securities would have rights, preferences and privileges senior to those of holders of our common stock. The terms of debt securities issued or borrowings pursuant to a credit agreement could impose significant restrictions on our operations. If we raise funds through collaborations and licensing arrangements, we might be required to relinquish significant rights to our platform technologies or products and services or grant licenses on terms that are not favorable to us.

Our ability to use our NOL carryforwards and certain other tax attributes may be limited.

We have incurred net losses since our inception and we may never achieve or sustain profitability. Generally, losses incurred will carry forward until such losses expire (for losses generated prior to January 1, 2018) or are used to offset future taxable income, if any. Under Sections 382 and 383 of the Internal Revenue Code of 1986, as amended ("Code"), if a corporation undergoes an "ownership change," generally defined as a greater than 50 percentage point change in its equity ownership by certain shareholders over a three-year period, the corporation's ability to use its pre-ownership change NOL carryforwards and other pre-ownership change tax attributes, such as research tax credits, to offset its post-ownership change income or taxes may be limited. Under the December 2017 Tax Cuts and Jobs Act ("TCJA"), which significantly reformed U.S. tax law, federal NOLs incurred in 2018 and in future years may be carried forward indefinitely, but the deductibility of such federal NOLs is limited to 80% of annual taxable income. It is uncertain if and to what extent various states will conform to the TCJA. If there should be an ownership change, our ability to utilize our NOL carryforwards and credits could be limited. We have completed a study of our ownership changes and related tax losses, and believe $186.9 million of losses are not subject to permanent limitation with the exception of losses incurred by Sequenta which need to be assessed for ownership changes under Sections 382 and 383. The approximate value of those losses subject to potential limitation is $38.5 million. We may experience ownership changes in the future as a result of shifts in our stock ownership, which may be outside of our control, including in connection with this offering. As a result, if we earn net taxable income, our ability to use our pre-ownership change NOL carryforwards to offset such taxable income will be subject to limitations. Similar provisions of state tax law may also apply to limit our use of accumulated state tax attributes. As a result, even if we attain profitability, we may be unable to use a material portion of our NOL carryforwards and other tax attributes, which could adversely affect our future cash flows.

In addition, the TCJA reduced the corporate tax rate from a top marginal tax rate of 35% to a flat rate of 21%, limited the tax deduction for net business interest expense to 30% of adjusted taxable income, eliminated NOL carrybacks and modified or repealed many business deductions and credits, including reducing the business tax credit for certain clinical testing expenses incurred in the testing of

certain drugs for rare diseases or conditions generally referred to as “orphan drugs.” The U.S. Department of the Treasury and the U.S. Internal Revenue Service (“IRS”) have already issued and are expected to continue to provide guidance on the implementation of the TCJA. We continue to examine the impact this tax reform legislation may have on our business and the operations of our collaborators. However, the effect of the TCJA on our business and the operations of our collaborators, whether adverse or favorable, is uncertain and may not become evident for some period of time. We urge investors to consult with their legal and tax advisors regarding the implications of the TCJA on an investment in our common stock.

We could be adversely affected by violations of the FCPA and other worldwide anti-bribery laws.

As we expand geographically, commercialize our products and services, and attempt to obtain required clearances, authorizations or approvals required to offer products and services for sale, we or our collaborators may be deemed to do business outside the United States, including because international customers may be able to order our products and services. As a result, we or our collaborators would be subject to the FCPA, which prohibits companies and their intermediaries from making payments in violation of law to non-U.S. government officials for the purpose of obtaining or retaining business or securing any other improper advantage. In addition, our collaborators or any third-party distributors could be deemed to be our agents and we could be held responsible for their actions, including violations of the FCPA. Other U.S. companies in the life sciences industry have faced criminal penalties under the FCPA for allowing their agents to deviate from appropriate practices in doing business with non-U.S. government officials. We may also become subject to similar anti-bribery laws in the jurisdictions in which we may operate, including the United Kingdom’s Bribery Act of 2010, which also prohibits commercial bribery and makes it a crime for companies to fail to prevent bribery. These laws are complex and far-reaching in nature, and we may be required in the future to alter one or more of our practices to be in compliance with these laws. Accordingly, our expansion internationally will demand a high degree of vigilance, and any violations of these laws, or allegations of such violations, could disrupt our operations, involve significant management distraction, involve significant costs and expenses, including legal fees, and could result in a material adverse effect on our business, prospects, financial condition or results of operations. We could also suffer severe penalties, including criminal and civil penalties, disgorgement and other remedial measures.

We may acquire other businesses or form joint ventures or make investments in other companies or technologies that could negatively affect our operating results, dilute our shareholders’ ownership, increase our debt or cause us to incur significant expense.

We may pursue acquisitions of businesses and assets. We also may pursue joint ventures or investments that leverage our immune medicine platform and industry experience to expand our offerings or distribution. We have no experience forming joint ventures and little experience investing in or acquiring other companies. We may not be able to find suitable joint ventures, investment or acquisition candidates, and we may not be able to complete such transactions on favorable terms, if at all. If we make any acquisitions, we may not be able to integrate the acquired company successfully into our existing business, and we could assume unknown or contingent liabilities, including regulatory violations such as the FCPA or similar laws. Any future acquisitions also could result in the incurrence of debt, contingent liabilities or future write-offs of intangible assets or goodwill, any of which could have a material adverse effect on our financial condition, results of operations and cash flows. Integration of an acquired company also may disrupt ongoing operations and require management resources that we would otherwise focus on developing our existing business. We may experience losses related to investments in other companies, which could have a material negative effect on our results of operations and financial condition. We may not realize the anticipated benefits of any acquisition, technology license, collaboration or joint venture.

To finance any acquisitions or joint ventures, we may choose to issue shares of our common stock as consideration, which would dilute the ownership of our shareholders. Additional funds may not be available on terms that are favorable to us, or at all. If the price of our common stock is low or volatile, we may not be able to acquire other companies or fund a joint venture project using our stock as consideration.

Unfavorable U.S. or global economic conditions could adversely affect our business, financial condition or results of operations.

Our results of operations could be adversely affected by general conditions in the global economy and financial markets. The most recent global financial crisis caused extreme volatility and disruptions in the capital and credit markets. A severe or prolonged economic downturn could result in a variety of risks to our business, including weakened demand for our products and services and our ability to raise additional capital when needed on favorable terms, if at all. A weak or declining economy could strain our collaborators, possibly resulting in supply disruption, or cause delays in their payments to us. Any of the foregoing could harm our business and we cannot anticipate all of the ways in which the current economic climate and financial market conditions could adversely impact our business.

We use biological and hazardous materials that require considerable expertise and expense for handling, storage and disposal and may result in claims against us.

We work with materials, including chemicals, biological agents and compounds and samples that could be hazardous to human health and safety or the environment. Our operations also produce hazardous and biological waste products. Federal, state and local laws and regulations govern the use, generation, manufacture, storage, handling and disposal of these materials and wastes. Compliance with applicable environmental laws and regulations is expensive, and current or future environmental laws and regulations may restrict our operations. If we do not comply with applicable regulations, we may be subject to fines and penalties.

In addition, we cannot eliminate the risk of accidental injury or contamination from these materials or wastes, which could cause an interruption of our commercialization efforts, research and development programs, and business operations, as well as environmental damage resulting in costly cleanup and liabilities under applicable laws and regulations. Furthermore, environmental laws and regulations are complex, change frequently and have tended to become more stringent. We cannot predict the impact of such changes and cannot be certain of our future compliance. While our property insurance policy provides limited coverage in the event of contamination from hazardous and biological products and the resulting cleanup costs, we do not currently have any additional insurance coverage for legal liability for claims arising from the handling, storage or disposal of hazardous materials. Accordingly, in the event of contamination or injury, we could be liable for damages or penalized with fines in an amount exceeding our resources and our operations could be suspended or otherwise adversely affected.

If we were to be sued for product liability or professional liability, we could face substantial liabilities that exceed our resources.

The marketing, sale and use of our products and services could lead to the filing of product or professional liability claims were someone to allege that our products or services identified inaccurate, incomplete or untimely information regarding the sequence or antigen specificities of TCRs, BCRs or antigens analyzed or the clonality characterized, or MRD or malignancy detected, or that our products or services otherwise failed to perform as designed or intended. We could also be potentially exposed to claims relating to therapeutic failures of products commercialized under our collaborations, such as

a cellular therapy marketed by Genentech that is manufactured based on TCR-related sequences and data we provide. We may also be subject to liability for errors in, a misunderstanding of or inappropriate reliance upon, the information we provide in the ordinary course of our business activities. A product liability or professional liability claim could result in substantial damages and be costly and time-consuming for us to defend. Regardless of merit or eventual outcome, product liability and professional liability claims may result in:

- decreased demand for any products, services or clinical solutions that we have developed or may develop;
- loss of revenue;
- substantial monetary awards to patients or their families;
- significant time and costs to defend related litigation;
- withdrawal of clinical trial participants;
- the inability to commercialize any products, services or clinical solutions that we have developed or may develop; and
- injury to our reputation and significant negative media attention.

We maintain product and professional liability insurance, but this insurance may not fully protect us from the financial impact of defending against product liability or professional liability claims. Any product liability or professional liability claim brought against us, with or without merit, could increase our insurance rates or prevent us from securing insurance coverage in the future. Additionally, any product liability lawsuit could cause current collaborators to terminate existing agreements or potential collaborators to seek other companies, any of which could impact our results of operations.

We or our collaborators may be adversely affected by natural or man-made disasters or other business interruptions, such as cybersecurity attacks, and our business continuity and disaster recovery plans, or those of our collaborators, may not adequately protect us from the effects of a serious disaster.

Natural and man-made disasters and other events beyond our control could severely disrupt our operations, or those of our collaborators, and have a material adverse impact on our business, results of operations, financial condition and prospects. If a natural disaster, power outage, cybersecurity attack or other event occurred that prevented us from using all or a significant portion of our headquarters, damaged critical infrastructure, such as our laboratory facilities or those of our collaborators, limited our or our collaborators' ability to access or use our respective digital information systems or that otherwise disrupted our respective operations, it may be difficult or, in certain cases, impossible for us or our collaborators to continue our respective businesses for a substantial period of time. The disaster recovery and business continuity plans we and our collaborators currently have in place are limited and are unlikely to prove adequate in the event of a serious disaster or similar event. Our cybersecurity liability insurance may not cover any or all damages, depending on the severity and extent, we or our collaborators could sustain based on any breach of our respective computer security protocols or other cybersecurity attack. We may incur substantial expenses as a result of the limited nature of our respective disaster recovery and business continuity plans, which could have a material adverse impact on our business.

Risks Relating to Government Regulation

We conduct our business in a heavily regulated industry, and changes in regulations or violations of regulations may, directly or indirectly, reduce our revenue, adversely affect our results of operations and financial condition and harm our business.

The life sciences industry is highly regulated, and the regulatory environment in which we and our collaborators operate may change significantly and adversely to us in the future. Areas of the regulatory environment that may affect our ability to conduct business include, without limitation, federal and state laws relating to:

- laboratory testing, including the federal Clinical Laboratory Improvement Amendments of 1988 ("CLIA") and state laboratory licensing laws;
- the development, testing, use, distribution, promotion and advertising of research services, kits, clinical diagnostics and cellular therapies, including certain LDTs, which are regulated by the FDA under the Federal Food, Drug, and Cosmetic Act ("FDCA");
- test ordering, documentation of tests ordered, billing practices and claims payment under the U.S. Centers for Medicare & Medicaid Services ("CMS") and the U.S. Department of Health and Human Services ("HHS") Office of Inspector General ("OIG") enforcing those laws and regulations;
- cellular therapies, medical device and *in vitro* diagnostic clearance, marketing authorization or approval;
- laboratory anti-mark-up laws;
- the handling and disposal of medical and hazardous waste;
- fraud and abuse laws such as the False Claims Act, the Anti-Kickback Statute ("AKS"), the Criminal Health Care Fraud Statute and The Ethics in Physician Referrals Act ("Stark Law");
- Occupational Safety and Health Administration rules and regulations;
- the Health Insurance Portability and Accountability Act of 1996 ("HIPAA") and other federal and state medical data privacy and security laws;
- the Genetic Information Nondiscrimination Act ("GINA") and similar state laws; and
- coverage and restrictions on coverage and reimbursement for research services, kits, clinical diagnostics and cellular therapies and Medicare, Medicaid, other governmental payors and private insurers reimbursement levels.

In particular, the laws, regulations and policies governing the marketing of RUO products, LDTs and clinical diagnostic tests and services are extremely complex and in many instances there are no significant regulatory or judicial interpretations of these laws and regulations. For example, our immunoSEQ research services and kits offered as RUO could, in the future, be subject to greater regulation by the FDA pursuant to the medical device provisions of the FDCA beyond the current regulations governing RUO labeling. The FDA defines a medical device to include any instrument, apparatus, implement, machine, contrivance, implant, *in vitro* reagent or other similar or related article, including a component, part or accessory, intended for use in the diagnosis of disease or other conditions, or in the cure, mitigation, treatment or prevention of disease, in man or other animals. Our clonoSEQ diagnostic tests and related clinical products, including our clinical laboratory tests that are *in vitro* diagnostic products, are diagnostic products that are considered by the FDA to be medical devices, and are subject to the requirement for marketing authorization prior to commercialization. We obtained marketing authorization for clonoSEQ as currently commercially marketed through the FDA's *de novo* review and authorization process. Among other things, pursuant to the FDCA and its

implementing regulations, the FDA regulates the research, design, testing, manufacturing, safety, labeling, storage, recordkeeping, premarket clearance, authorization or approval, marketing and promotion, and sales and distribution of medical devices in the United States to ensure they are safe and effective. In addition, the FDA regulates the import and export of medical devices. If we do not comply with these requirements, or later become subject to these requirements and fail to adequately comply, our business operations may be harmed. These requirements may additionally cause delays in our or our collaborators' ability to market and sell our products or services, which may, directly or indirectly, reduce our revenue, adversely affect our results of operations and financial condition and harm our business.

The insurance coverage and reimbursement status of newly approved products and services, in a new category of diagnostics and therapeutics, is uncertain. Failure to obtain or maintain adequate coverage and reimbursement for current or future products and services could limit our ability, and that of our collaborators, to fully commercialize our products and services and decrease our ability to generate revenue.

The availability and extent of reimbursement by governmental and private payors is essential for most patients to be able to afford the clinical diagnostic tests and cellular therapeutics that we and our collaborators currently or plan to develop and sell. In addition, because our clinical diagnostics and therapeutic products and services represent new approaches to the research, diagnosis, detection and treatment of diseases, we cannot accurately estimate how our products and services, and those jointly created with our collaborators, would be priced, whether reimbursement could be obtained or any potential revenue generated. Sales of our products and services will depend substantially, both domestically and internationally, on the extent to which the costs of our products and services are paid by health maintenance, managed care, pharmacy benefit and similar healthcare management organizations, or reimbursed by government health administration authorities, private health coverage insurers and other third-party payors. If reimbursement is not available, or is available only to limited levels, we may not be able to successfully commercialize some of our products or services. Even if coverage is provided, the approved reimbursement amount may not be high enough to allow us to establish or maintain pricing sufficient to realize a sufficient return on our investment in any of our products or services. Changes in the reimbursement landscape may occur, which are outside of our control, and may impact the commercial viability of our products and services.

There is significant uncertainty related to the insurance coverage and reimbursement of newly cleared, authorized or approved products and services. In the United States, many significant decisions about reimbursement for new diagnostics and medicines are typically made by CMS, an agency within the HHS. CMS decides whether and to what extent a new diagnostic or medicine will be covered and reimbursed under Medicare. Private payors tend to follow CMS to a substantial degree. It is difficult to predict what CMS will decide with respect to reimbursement for novel products and services such as ours. Additionally, reimbursement agencies in Europe may be more conservative than CMS. For example, a number of cancer drugs have been approved for reimbursement in the United States and have not been approved for reimbursement, or have been approved under restricted conditions, in certain European countries.

Outside the United States, the reimbursement process and timelines vary significantly. Certain countries, including a number of member states of the EU, set prices and make reimbursement decisions for diagnostics and pharmaceutical products, or medicinal products, as they are commonly referred to in the EU, with limited participation from the marketing authorization or Conformité Européene (“CE”) mark holders, or may take decisions that are unfavorable to the authorization or CE mark holder where they have participated in the process. We cannot be sure that such prices and reimbursement decisions will be acceptable to us or our collaborators. If the regulatory authorities in these foreign jurisdictions set prices or make reimbursement criteria that are not commercially

attractive for us or our collaborators, our revenues and the potential profitability of our products and services in those countries would be negatively affected. An increasing number of countries are taking initiatives to attempt to control the healthcare budget by focusing cost-cutting efforts on medicinal products, and to a lesser extent, medical devices, provided under their state-run healthcare systems. These international price control efforts have impacted all regions of the world, but have been most prominent in the EU. Additionally, some countries require approval of the sale price of a product before it can be marketed or mandatory discounts or profit caps may be applied. Further, after the sale price is approved, it remains subject to review during the product lifecycle. In many countries, the pricing review period begins after marketing or product licensing approval is granted or the CE mark is obtained. As a result, we or our collaborators might obtain marketing approval for a product or service in a particular country, but then may experience delays in the reimbursement approval or be subject to price regulations that would delay the commercial launch of our product or service, possibly for lengthy time periods, which could negatively impact the revenues we are able to generate from the sale of that product or service in that particular country.

Moreover, increasing efforts by governmental and third-party payors, in the United States and abroad, to cap or reduce healthcare costs may cause such organizations to limit both coverage and level of reimbursement for newly cleared, authorized or approved devices and medicines and, as a result, they may not cover or provide adequate payment for our clinical diagnostics or the cellular therapies to be sold by us or our collaborators. For example, the U.S. government recently released a “blueprint,” or plan, to reduce the cost of drugs. This blueprint contains certain measures that HHS is already working to implement. At the state level, legislatures are increasingly passing legislation and implementing regulations designed to control pharmaceutical and biological program pricing, including price or patient reimbursement constraints, discounts, restrictions on certain product access and marketing cost disclosure and transparency measures, which are, in some cases, designed to encourage importation from other countries and bulk purchasing.

We expect to experience pricing pressures on our clinical diagnostics and cellular therapies sold by us and our collaborators due to the trend toward value-based pricing and coverage, the increasing influence of health maintenance organizations and additional legislative changes. The downward pressure on healthcare costs in general, particularly prescription drugs and surgical procedures and other treatments, has become very intense. As a result, increasingly high barriers are being erected to the entry of new products.

Our business could be harmed by the loss, suspension or other restriction on a license, certification or accreditation, or by the imposition of a fine or penalties, under CLIA, its implementing regulations or other state, federal and foreign laws and regulations affecting licensure or certification, or by future changes in these laws or regulations.

Federal law requires virtually all clinical laboratories to comply with CLIA, which generally involves becoming certified by the federal and state government for the testing that will be performed and complying with various operational, personnel, facilities administration, quality and proficiency testing requirements intended to ensure that testing services are accurate and reliable. CLIA certification is also a prerequisite to be eligible to bill state and federal healthcare programs, as well as many private third-party payors, for laboratory research and clinical diagnostic testing services. As a condition of our CLIA certification, our Seattle, Washington laboratory is subject to survey and inspection every other year, additional random inspections and surprise inspections based on complaints received by state or federal regulators. The biennial survey and inspection is conducted by CMS, a CMS agent or, if the laboratory holds a CLIA certificate of accreditation, a CMS-approved accreditation organization, such as the College of American Pathologists (“CAP”). Sanctions for failure to comply with CLIA requirements, including proficiency testing violations, may include suspension, revocation or limitation of a laboratory’s CLIA certificate, which is necessary to conduct business, as well as the imposition of

significant civil, administrative or criminal sanctions against the lab, its owners and other individuals. In addition, we are subject to regulation under certain state laws and regulations governing laboratory licensure. Some states, including Washington, have enacted laboratory licensure and compliance laws that are more stringent than CLIA. Changes in state licensure laws that affect our ability to offer and provide research and diagnostic products and services across state or foreign country lines could materially and adversely affect our business. In addition, state and foreign requirements for laboratory certification may be costly or difficult to meet and could affect our ability to receive specimens from certain states or foreign countries.

Any sanction imposed under CLIA, its implementing regulations or state or foreign laws or regulations governing licensure, or our failure to renew a CLIA certificate, a state or foreign license or accreditation, could have a material adverse effect on our business.

Changes in law relating to health insurance coverage and payment may adversely affect our business.

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 Affordable Care Act ("ACA") was passed, which substantially changes the way healthcare is financed by both governmental and private insurers, and significantly impacts the U.S. clinical diagnostic and biopharmaceutical industries. The ACA, among other things, increased the minimum Medicaid rebates owed by manufacturers under the Medicaid Drug Rebate Program, extended the rebate program to individuals enrolled in Medicaid managed care organizations, established annual fees and taxes on manufacturers of certain branded prescription drugs and medical devices, including laboratory kits, and promoted a new Medicare Part D coverage gap discount program. Considerable uncertainty remains regarding the implementation and impact of the ACA.

Some of the provisions of the ACA have yet to be fully implemented and certain provisions have been subject to judicial and Congressional challenges. The TCJA includes a provision repealing 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, which is commonly referred to as the "individual mandate." CMS has recently proposed regulations that would give states greater flexibility in setting benchmarks for insurers in the individual and small group marketplaces, which may have the effect of relaxing the essential health benefits required under the ACA for plans sold through such marketplaces. Further, on October 13, 2017, an Executive Order was signed terminating the cost-sharing reduction ("CSR") subsidies that reimburse insurers under the ACA. The loss of the CSR payments is expected to increase premiums on certain policies issued by qualified health plans under the ACA. Another Executive Order was signed directing federal agencies with authorities and responsibilities under the ACA to waive, defer, grant exemptions from or delay the implementation of any provision of the ACA that would impose a fiscal burden on states or a cost, fee, tax, penalty or regulatory burden on individuals, healthcare providers, health insurers or manufacturers of pharmaceuticals or medical devices. More recently, the U.S. District Court for the Northern District of Texas struck down the ACA, deeming it unconstitutional given that Congress repealed the individual mandate in the Jobs Act. Although this decision has been stayed pending the outcome of an appeal to the Fifth Circuit Court of Appeals, it is unclear how this decision, subsequent appeals and other efforts to repeal and replace the ACA will impact the ACA. It is also unclear how regulatory provisions and sub-regulatory guidance, which fluctuate continually, may affect interpretation and implementation of the ACA and its practical effects on our business.

The ACA has provided health insurance coverage or expanded Medicaid coverage for many Americans that were previously uninsured. Recent efforts to reduce the scope of the ACA, however, appear to have impeded the growth of the insured population. In addition, given the challenges to the

ACA at the federal and state levels, the future outlook for insurance coverage remains uncertain. Changes in the number of patients that can look to third-party payment to help afford our products and services may affect the demand for these products and services.

With the current presidential administration and Congress, there may be additional administrative or legislative changes, including reinstatement, modification, repeal or replacement of all, or certain provisions of, the ACA. However, it remains to be seen whether new legislation modifying the ACA will be enacted and, if so, precisely what the new legislation will provide, when it will be enacted and what impact it will have on the availability of healthcare and containing or lowering the cost of healthcare. The implications, if any, of a potential repeal or replacement of the ACA on our and our collaborators' business and financial condition are not yet clear.

The ACA levied an excise tax of 2.3% of the sale price of medical devices sold in the United States, on any entity that manufactures or imports medical devices, including laboratory kits, offered for sale in the United States. After being in effect for two years, the tax was temporarily suspended until December 31, 2019. We do not know if the tax will be further suspended, repealed or revised. The potential financial impact this tax may have on our business is unclear and may be negative.

Other legislative changes have been proposed and adopted since the ACA was enacted. For example, in August 2011, the Budget Control Act of 2011, as amended, reduced funding under certain conditions to several government programs, including aggregate reductions to Medicare payments to providers of up to 2% per fiscal year, which remain in effect through 2027. In addition, the CMS has promulgated or amended a number of cost containment and value-based reimbursement measures in the ordinary course of business, and is expected to continue revising its regulations and policies in response to changes in law, administration policy and market conditions.

Post approval or authorization, the delivery of healthcare in the EU, including the establishment and operation of health services and the pricing and reimbursement of medicines and devices, is almost exclusively a matter of national, rather than EU, law and policy. National governments and health service providers have different priorities and approaches to the delivery of healthcare and the pricing and reimbursement of products and services. In general, however, the healthcare budgetary constraints in most EU member states have resulted in restrictions on the pricing and reimbursement of medicines and devices. Coupled with ever-increasing EU and national regulatory burdens on those wishing to develop and market products and services, this could prevent or delay marketing approval of our and our collaborators' products in development, restrict or regulate post-approval activities, and affect our ability to commercialize any products or services for which we obtain marketing approval.

We expect that additional foreign, state and federal healthcare reform measures or proposals 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 products and services or additional pricing pressures. In the event that the pricing structures for healthcare products change materially and limit payments for our products and services, our business will be adversely impacted because our products or services may no longer be commercially viable based on their expected net present value, we may have invested significant resources in products and services that cannot be commercially developed or marketed, or we may determine that products or services that have reached an early phase of development cannot or will not be taken into further development. In addition, products or services that are part of our collaborations may no longer be deemed commercially viable to pursue based on our collaborators' assessments of the impact of any proposed, announced or legislated pricing reforms.

We cannot predict what healthcare reform initiatives may be adopted in the future. Further federal, state and foreign legislative and regulatory developments are likely, and we expect ongoing initiatives to increase downward pressure on drug and device pricing. Such reforms could have an

adverse effect on anticipated revenues from our products and services, including those that we jointly develop with our collaborators, and may affect our overall financial condition and ability to develop or obtain regulatory clearance, authorization or approval for our products and services.

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

The ability of the FDA to review and clear, authorize or approve new products can be affected by a variety of factors, including government budget and funding levels, ability to hire and retain key personnel, and statutory, regulatory and policy changes. In addition, government funding of the SEC and other government agencies on which our operations may rely, including those that fund research and development activities, is subject to the political process, which is inherently fluid and unpredictable.

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

We must maintain compliance with FDA requirements for our products and services and failure to maintain compliance with FDA requirements may prevent or delay the marketing of our products and services.

Even after we have obtained marketing authorization, as we have for clonoSEQ, we must comply with the scope of that clearance, authorization or approval. Failure to comply with those limitations or the additional, extensive and ongoing post-marketing obligations imposed by the FDA or other regulatory requirements of other regulatory agencies could result in unanticipated compliance expenditures, a range of administrative enforcement actions, injunctions and criminal prosecution. FDA post-market obligations include, among other things, compliance with the FDA Quality System Regulation (“QSR”), establishing registration and device listings, labeling requirements, reporting of certain adverse events and malfunctions, and reporting of certain recalls. In addition, circumstances may arise that cause us to recall equipment used in connection with our products and services. Such recalls could have an adverse effect on our ability to provide those products and services, which in turn would adversely affect our financial condition. Our collaborators will also be required to maintain FDA clearance, authorization or approval for the products and services that we jointly develop. Any failure by us or our collaborators to maintain such clearance, authorization or approval could impair or cause a delay in our ability to profit from these collaborations.

Products and services offered RUO may be subject to regulatory scrutiny.

Certain of our products are currently labeled and sold for RUO and not for the diagnosis or treatment of disease. Because such products are not intended for diagnostic use, and the products do not include clinical or diagnostic claims or provide directions for use as diagnostic products, they are

not subject to the same level of regulation by the FDA as medical devices. In particular, while the FDA regulations require that RUO products be appropriately labeled, "For Research Use Only," the regulations do not subject such products to the FDA's pre- and post-market controls for medical devices. Pursuant to FDA guidance on RUO products, a company may not make clinical or diagnostic claims about an RUO product or provide clinical directions or clinical support services to customers of RUO products. A product labeled RUO but deemed by the FDA to be intended for clinical diagnostic use may be viewed by the FDA as adulterated and misbranded under the FDCA and subject to FDA enforcement action. The FDA considers the totality of the circumstances surrounding distribution and use of a product labeled as RUO, including how the product is marketed and to whom, when determining its intended use. If the FDA were to disagree with our RUO classification or modify its approach to regulating products labeled for RUO, we could experience reduced revenue or increased compliance and other costs, which could adversely affect our business, prospects, results of operations and financial condition. In the event that the FDA requires marketing authorization of our RUO products in the future, the FDA may not ultimately grant any clearance, authorization or approval requested by us in a timely manner, or at all.

Future changes in FDA enforcement discretion for LDTs could subject our operations to much more significant regulatory requirements.

In addition to offering the FDA *de novo* marketing authorized version of clonoSEQ as a test for MRD in certain blood cancers, we also currently offer an LDT version of this test and other NGS-based LDTs for MRD ("NGS-based MRD"). The FDA has a policy of enforcement discretion with respect to LDTs whereby the FDA does not actively enforce its medical device regulatory requirements for such tests. However, in October 2014, the FDA issued two draft guidance documents stating that the FDA intended to modify its policy of enforcement discretion with respect to LDTs in a risk-based manner consistent with the existing classification of medical devices. Although the FDA halted finalization of the guidance in November 2016 to allow for further public discussion on an appropriate oversight approach to LDTs and to give Congressional authorizing committees the opportunity to develop a legislative solution, it is unclear if Congress or the FDA will modify the current approach to the regulation of LDTs in a way that would subject our current or future services marketed as LDTs to the enforcement of FDA regulatory requirements. The FDA Commissioner and the Director of the Center for Devices and Radiological Health ("CDRH") have expressed significant concerns regarding disparities between some LDTs and *in vitro* diagnostics that have been reviewed, cleared, authorized or approved by the FDA. If the FDA were to determine that NGS-based MRD tests offered as LDTs are not within the policy for LDTs for any reason, including new rules, policies or guidance, or due to changes in statute, our tests may become subject to extensive FDA requirements or otherwise impact our business. If the FDA were to disagree with our LDT status or modify its approach to regulating LDTs, we could experience reduced revenue or increased costs, which could adversely affect our business, prospects, results of operations and financial condition. If required, the regulatory marketing authorization process required to bring our current or future LDTs into compliance may involve, among other things, successfully completing additional clinical validations and submitting to and obtaining clearance from the FDA for a premarket clearance (510(k)) submission or authorization for a *de novo* or approval of a Premarket Approval Application ("PMA"). Furthermore, pending legislative proposals, if passed, such as the Verifying Accurate, Leading-edge IVCT Development Act of 2018, could create new or different regulatory and compliance burdens on us and could have a negative effect on our ability to keep products on the market or develop new products, which could have a material effect on our business. In the event that the FDA requires marketing authorization of our LDTs in the future, the FDA may not ultimately grant any clearance, authorization or approval requested by us in a timely manner, or at all. In addition, if the FDA inspects our laboratory in relation to the marketing of our FDA-authorized clonoSEQ test, any enforcement action the FDA takes might not be limited to the FDA-authorized clonoSEQ test and could encompass our NGS-based MRD testing service.

For each product and service we are developing that requires FDA premarket review prior to marketing, the FDA may not grant clearance, authorization or premarket approval and failure to obtain necessary approvals for our future products and services would adversely affect our ability to grow our business.

Before we begin to manufacture, label and market additional clinical diagnostic products for commercial diagnostic use in the United States, we may be required to obtain either clearance, marketing authorization or approval from the FDA, unless an exemption applies or the FDA exercises its enforcement discretion and refrains from enforcing its requirements. For example, the FDA currently has a policy of refraining from enforcing its medical device requirements with respect to LDTs, which the FDA considers to be a type of *in vitro* diagnostic test that is designed, manufactured and used within a single properly licensed laboratory.

The process of obtaining PMA is much more rigorous, costly, lengthy and uncertain than the 510(k) clearance process. In the PMA approval process, the FDA must determine that a proposed device is safe and effective for its intended use based, in part, on extensive data, including, but not limited to, technical, preclinical, clinical trial, manufacturing and labeling data. Conversely, in the 510(k) clearance process, the FDA must determine that a proposed device is "substantially equivalent" to a legally marketed "predicate" device in order for the product to be cleared for marketing. To be "substantially equivalent," the proposed device must have the same intended use as the predicate device, and either have the same technological characteristics or if it has different technological characteristics as the predicate device, the proposed device must be as safe and effective as, and not raise different questions of safety or effectiveness than, the predicate device. Clinical data is sometimes required to support substantial equivalence. For lower-risk devices that would otherwise automatically be placed into Class III, which require a PMA because no predicate device is available and the devices do not fall within an existing 510(k)-exempt classification, an applicant may submit a *de novo* request to down classify the device into Class II or Class I, which would not require a PMA. In the *de novo* process, the FDA must determine that general and special controls are sufficient to provide reasonable assurance of the safety and effectiveness of a device, which is low to moderate risk and has no predicate. In other words, the applicant must justify the "down-classification" to Class I or II for a new product type that would otherwise automatically be placed into Class III, but is lower risk. Clinical data may be required. For laboratory tests for which FDA clearance, authorization or approval is required, the FDA may also require data to support analytical and clinical validity.

The 510(k), *de novo* and PMA processes can be expensive and lengthy and require the payment of significant fees, unless an exemption applies. The FDA's 510(k) clearance pathway usually takes from three to nine months from submission, but it can take longer for a novel type of product. The FDA's *de novo* classification pathway usually takes from six to 12 months, but for many applicants can take up to 18 months or more.

The process of obtaining a PMA generally takes from one to three years, or even longer, from the time the PMA is submitted to the FDA until an approval is obtained. Any delay or failure to obtain necessary regulatory clearances, authorizations or approvals would have a material adverse effect on our business, financial condition and prospects.

The FDA can delay, limit or deny clearance, authorization or approval of a device for many reasons, including:

- the inability to demonstrate to the satisfaction of the FDA that the products are safe or effective for their intended uses;
- the disagreement of the FDA with the design, conduct or implementation of the clinical trials or the analysis or interpretation of data from preclinical studies, analytical studies or clinical trials;

- serious and unexpected adverse device effects experienced by participants in clinical trials;
- the data from preclinical studies, analytical studies and clinical trials may be insufficient to support clearance, authorization or approval, where required;
- the inability to demonstrate that the clinical and other benefits of the device outweigh the risks;
- an advisory committee, if convened by the FDA, may recommend against approval of a PMA or other application or may recommend that the FDA require, as a condition of approval, additional preclinical studies or clinical trials, limitations on approved labeling or distribution and use restrictions, or even if an advisory committee makes a favorable recommendation, the FDA may still not approve the product;
- the FDA may identify deficiencies in our marketing application;
- the FDA may identify deficiencies in our or our collaborators' manufacturing processes, facilities or analytical methods;
- the potential for policies or regulations of the FDA or applicable foreign regulatory bodies to change significantly in a manner rendering clinical data or regulatory filings insufficient for clearance, authorization or approval; and
- the FDA or foreign regulatory authorities may audit clinical trial data and conclude that the data is not sufficiently reliable to support a PMA application.

There are numerous FDA personnel assigned to review different aspects of marketing submissions, which can present uncertainties based on their ability to exercise judgment and discretion during the review process. During the course of review, the FDA may request or require additional data and information, and the development and provision of these data and information may be time-consuming and expensive. The process of obtaining regulatory clearances, authorizations or approvals to market a medical device can be costly and time-consuming, and we may not be able to obtain these clearances, authorizations or approvals on a timely basis, or at all for our products in development. If we are unable to obtain clearance, authorization or approval for any products for which we plan to seek clearance, authorization or approval, our business may be harmed.

Modifications to our products with FDA marketing authorization may require new FDA clearances, authorizations or approvals, or may require us to cease marketing or recall the modified clinical diagnostic products or future clinical products until clearances are obtained.

Any modification to a 510(k)-cleared device that significantly affects its safety or effectiveness, or that constitutes a major change in its intended use, could require a new 510(k) clearance, a new *de novo* authorization or approval of a PMA. The FDA requires every manufacturer to make this determination in the first instance, but the FDA may review any manufacturer's decision. The FDA may not agree with our decisions regarding whether new clearances, authorizations or approvals are necessary.

For any product approved pursuant to a PMA, we would be required to seek supplemental approval for many types of modifications to the approved product. The FDA requires manufacturers in the first instance to determine whether a PMA supplement or other regulatory filing is needed or whether the change may be reported via the PMA Annual Report, but may disagree with a company's assessment.

If the FDA disagrees with our determination, which it may not review until we submit an annual report or the FDA conducts an inspection or other inquiry, and requires us to seek new clearances, authorizations or approvals for modifications to our previously cleared, authorized or approved clinical

diagnostic products for which we have concluded new clearances, authorizations or approvals are unnecessary, we may be required to cease marketing or distribution of these clinical diagnostic products or to recall the modified products until we obtain clearance, authorization or approval. We may also be subject to enforcement action, including, among other things, significant regulatory fines or penalties.

Our employees, principal investigators, consultants and collaborators may engage in misconduct or other improper activities, including non-compliance with regulatory standards and requirements and insider trading.

We are exposed to the risk of fraud or other misconduct by our employees, consultants and those of our collaborators. Misconduct by these parties could include intentional failures to comply with the regulations of the FDA and non-U.S. regulators, comply with healthcare fraud and abuse laws and regulations in the United States and abroad, 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 improper marketing, fraud, misconduct, kickbacks, bribery, self-dealing and other abusive practices. These laws and regulations may restrict or prohibit a 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 studies, which could result in regulatory sanctions and cause serious harm to our reputation. We currently have a code of conduct applicable to all of our employees, but it is not always possible to identify and deter employee misconduct. In addition, our code of conduct and the other 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 comply with these laws or regulations. If any such investigations or actions are instituted against us and we are not successful in defending ourselves or asserting our rights, those actions could result in the imposition of significant fines or other sanctions, which could have a significant impact on our business. We currently have a compliance program in accordance with the elements of an effective program outlined by the OIG, which could help mitigate damages, but cannot prevent all misconduct. Whether or not we are successful in defending against such actions or investigations, we could incur substantial costs, including legal fees, and divert the attention of management in defending ourselves against any of these claims or investigations.

If third-party payors, including commercial payors and government healthcare programs, do not provide coverage of, or adequate reimbursement for, our clinical diagnostic products, our commercial success will be negatively affected.

Our revenue depends in part on achieving broad coverage and reimbursement for our diagnostic tests from payors, including both commercial and government payors. Certain large commercial payors have issued policies that decline to cover testing methods that they regard as experimental or investigational. Other payors may issue similar non-coverage policies. If payors do not provide coverage of, or do not provide adequate reimbursement for, a substantial portion of the price of our diagnostic tests, we may need to seek payment from the patient where this is not precluded by law or contract, which may adversely affect demand for our tests. Coverage determinations by a payor may depend on a number of factors, including, but not limited to, a payor’s determination that a certain diagnostic test is appropriate, medically necessary or cost-effective. If we are unable to provide payors with sufficient evidence of the clinical utility and validity of our diagnostic tests, they may not provide coverage, or may provide limited coverage, which will adversely affect our revenues and our ability to succeed. To the extent that more competitors enter our markets, the availability of coverage and the reimbursement rate for our tests and new diagnostic products may decrease as we encounter pricing pressure from our competitors.

Each payor makes its own decision regarding coverage of our tests and the applicable payment rates, and payors may not provide adequate coverage or reimbursement for our current or future products. Although we may contract with certain payors, working with payors through contract or otherwise to assure reimbursement is time-consuming and costly and outcomes are uncertain. In addition, the determinations by a payor whether to cover our clinical diagnostic product and the amount it will reimburse for them are often made on an indication-by-indication basis. In cases where there is no coverage policy or we do not have a contracted rate for reimbursement as a participating provider, the patient is typically responsible for a greater share of the cost of the test, which may result in further delay of our revenue, increase our collection costs or decrease the likelihood of collection. Through our Adaptive Assist patient support program, we provide clonoSEQ diagnostic tests for reduced rates or without charge to qualified low-income patients that may result in payors requiring us to provide evidence of eligibility of such patients to pay reduced out-of-pocket amounts.

Our claims for reimbursement from payors may be denied upon submission, and we may need to take additional steps to receive payment, such as appealing the denials. Such appeals and other processes are time-consuming, expensive and may not result in payment. Payors may perform audits of historically paid claims and attempt to recoup funds years after the funds were initially distributed if the payors believe the funds were paid in error or determine that our clonoSEQ diagnostic tests or other clinical diagnostic products were medically unnecessary. In addition, similar to federal payors, state and federal laws permit commercial payors to seek civil and criminal penalties against a manufacturer if they feel they have been defrauded. If a payor audits our claims and issues a negative audit finding, and we are not able to overturn the audit findings through appeal, the recoupment may result in a material adverse effect on our revenue. Additionally, in some cases commercial payors for whom we are not a participating provider may elect at any time to review claims previously paid and determine the amount they paid was too much. In these situations, the payor will typically notify us of their decision and then offset whatever amount they determine they overpaid against amounts they owe us on current claims. We do not have a mechanism to dispute these retroactive adjustments and we cannot predict when, or how often, a payor might engage in these reviews.

Future Medicare payment rates are uncertain.

In March 2018, CMS issued a National Coverage Determination (“NCD”) for molecular diagnostic laboratory testing services utilizing a NGS methodology, which includes our clinical diagnostic products, for Medicare beneficiaries with advanced cancer. In the NCD, CMS states that such tests are covered nationally when: (i) performed in a CLIA-certified laboratory; (ii) ordered by a treating physician; (iii) the patient meets certain clinical and treatment criteria; (iv) the test is approved or cleared by the FDA as a companion *in vitro* diagnostic for an FDA-approved or cleared indication for use in that patient’s cancer; and (v) results are provided to the treating physician for management of the patient using a report template to specify treatment options. The NCD also states that each Medicare Administrative Contractor (“MAC”) may determine coverage of other NGS tests in its jurisdiction for patients with advanced cancer when the test is performed by a CLIA-certified laboratory, ordered by a treating physician and the patient meets the same clinical and treatment criteria required of nationally covered NGS tests under the NCD.

In January 2019, Noridian Healthcare Solutions (“Noridian”), the MAC that processes our laboratory’s Medicare Part B claims, issued written guidance based on the MAC authority to cover NGS tests not explicitly covered under the NCD that provides coverage for our FDA-authorized clonoSEQ test for assessment of MRD in patients with ALL or MM. Because all clonoSEQ tests are performed within Noridian’s jurisdiction, this policy applies to all of our testing billed under Medicare Part B. At the same time, three other MACs issued the same guidance.

Noridian's guidance (A56270, clonoSEQ Assay for Assessment of MRD in Patients with Specific Lymphoid Malignancies) provides for payment for a single episode of testing and considers testing for MRD with clonoSEQ to constitute a series of assays to be billed at the start of each episode of testing. Medicare's Part B payment rate for clonoSEQ, because the test is billed with a "miscellaneous" code, is determined by the MAC. Noridian has agreed to pay our claims for clonoSEQ at an adequate rate, which will be reviewed annually. This guidance may not persist in its current form and it may not be followed by other MACs or Medicare Advantage ("MA") plans. And because MA plans are not required to reimburse lab tests at the Medicare Part B rate to in-network labs, if we become in-network for a given MA plan, our reimbursement may be lower than what we previously received from Noridian. It is possible that Noridian will further limit or even withdraw coverage or reduce its reimbursement amount, which will negatively affect our revenue. It is also possible CMS will revise or clarify the NCD in a way that will further limit or withdraw coverage for clonoSEQ. Further, if in the future we were to develop kits for sale to other laboratories, Part B coverage of those tests would be governed by the coverage policies of the MACs where these laboratories are located, which may be different from Noridian's policy or may not cover clonoSEQ at all. Noridian's policy has been adopted by three other MACs participating in the MolDx program, but it may not necessarily be followed by other MACs. Finally, if clinicians increase the frequency of testing for their Medicare-covered patients and our rate for a single episode of testing is not correspondingly increased, our costs would increase without a corresponding increase in revenue, and our financial results would be negatively impacted.

Under Medicare Part B, payment for most diagnostic laboratory tests is made under the Clinical Laboratory Fee Schedule ("CLFS"), which assigns payment amounts to tests based on billing codes. Under the Protecting Access to Medicare Act of 2014 ("PAMA"), certain laboratories that receive the majority of their Medicare revenue from payments made under the CLFS or Medicare's Physician Fee Schedule are required to report to CMS every three years, or annually for "advanced diagnostic laboratory tests," commercial payor payment rates and volumes for tests they perform and that are assigned specific billing codes. PAMA has special provisions relating to "advanced diagnostic laboratory tests," as defined by the statute, and these provisions affect the rate-setting at the time of launch and the periodicity of rate reporting and revision. Laboratories that fail to report the required payment information may be subject to substantial civil monetary penalties. Currently, the only test we offer commercially, our clonoSEQ diagnostic test, is coded with a "miscellaneous" code, and under CMS' guidance laboratories do not report rates and volumes for such tests. If, in the future, clonoSEQ or any of our tests are assigned a specific code we would be required to report commercial payor payment data on those tests. Payments for tests billed under miscellaneous codes are determined by the MACs, which also have discretion to change those payment rates.

CMS uses the data reported by laboratories to calculate a payment rate for each CLFS test, other than those coded with miscellaneous codes and certain others, based on the volume-weighted median of the private payor rates. These rates apply for three years, except that payment rates for advanced diagnostic laboratory tests apply for one year. This rate-setting apparatus is not currently applicable to clonoSEQ because clonoSEQ is coded with a miscellaneous code. If, in the future, clonoSEQ is assigned a specific code or if we offer other tests with specific codes, this apparatus would apply. Under these circumstances, Medicare's payment rates would be determined by the rates we and other laboratories, if any, with tests that share the specific codes we use, obtain from commercial payors. In that case, if we are unable to obtain and maintain adequate reimbursement rates from commercial payors, this may adversely affect our Medicare rates. If Noridian reduces our payment rate or MA plans pay us less than Noridian, this would adversely affect our financial condition, results of operations, cash flow and revenue. In addition, CMS is considering changes to its NCD for molecular diagnostic laboratory testing services using a NGS methodology. Any changes made by CMS to the NCD could affect our Medicare rates and those of other laboratory testing services covered by the NCD.

In some circumstances, our tests may be furnished to hospital inpatients and paid by Medicare under different rules. For example, when a specimen is obtained from a patient who is at the time classified by Medicare as a hospital inpatient, Medicare would not make a separate payment for the test and we would have to look to the hospital for payment. We do not know how often this will occur or whether hospitals will resist paying us for our tests. In this situation, Medicare coverage would be determined by the MAC for the jurisdiction where the hospital is located, which may not cover our tests.

Our RUO, clinical diagnostic and therapeutic products or services, and those jointly developed with our collaborators, may in the future be subject to product or service recalls. A recall of products or services, either voluntarily or at the direction of the FDA or another governmental authority, or the discovery of serious safety issues with our or our collaborators' products or services, could have a significant adverse impact on us.

The FDA has the authority to require the recall of commercialized products or services that are subject to FDA regulation. Manufacturers may, under their own initiative, recall a product or service if any deficiency is found. The FDA requires that certain corrections and removals, including recalls intended to reduce a health risk, be reported to the FDA within ten working days of initiating such correction or removal. For reportable corrections and removals, companies are required to make additional periodic submissions to the FDA after initiating the recall, and often engage with the FDA on their recall strategy prior to initiating the recall. A government-mandated or voluntary recall by us, one of our distributors or our collaborators could occur as a result of an unacceptable health risk, component failures, failures in laboratory processes, malfunctions, manufacturing errors, design or labeling defects, or other deficiencies and issues. Recalls of any of our commercialized products or services or those jointly developed with our collaborators would divert managerial and financial resources and adversely affect our reputation, results of operations and financial condition. We may also be subject to liability claims, be required to bear other costs or take other actions that may negatively impact our future sales and our ability to generate profits. Companies are also required to maintain certain records of corrections and removals, even if these do not require reporting to the FDA. We or our collaborators may initiate voluntary recalls involving our commercialized products or services in the future that we determine do not require FDA notification. If the FDA disagrees with our determinations, they may require us to report those actions as recalls. A future recall announcement by us or our collaborators could harm our reputation with customers and negatively affect our results of operations and financial condition. In addition, the FDA or other agency could take enforcement action for failing to report the recalls when they were conducted.

If we or our collaborators initiate a recall, including a correction or removal, for one of our commercialized products or services, issue a safety alert, or undertake a field action or recall to reduce a health risk, this could lead to increased scrutiny by the FDA, other governmental and regulatory enforcement bodies, and our or our collaborators' customers regarding the quality and safety of our products and services, and to negative publicity, including FDA alerts, press releases, or administrative or judicial actions. Furthermore, the submission of these reports could be used against us by competitors and cause customers to delay purchase decisions or cancel orders, which would harm our reputation.

Any additional commercialized products and services or any future products and services that obtain regulatory clearance, authorization, approval, accreditation or licensure will remain subject to regulatory scrutiny and our failure to maintain our regulatory clearances, authorizations, approvals, accreditations or licensures could adversely affect our reputation, business and results of operations.

Even if we or our collaborators obtain regulatory clearance, authorization, approval, accreditation or licensure in a jurisdiction for our products and services, the applicable regulatory authority may still impose significant restrictions on the indicated uses or marketing of our products and services, or impose ongoing requirements for potentially costly post-approval studies or post-market surveillance of

our or our collaborators' manufacturing and distribution. Advertising for certain devices and labeling, including promotional labeling, for all devices must comply with FDA requirements. In addition, device advertising and promotion may also be subject to other federal and state laws. For example, the FDA shares jurisdiction over the regulation of device advertising with the U.S. Federal Trade Commission ("FTC"). Advertising for devices characterized as restricted by the FDA is subject to specified FDA requirements, while advertising for non-restricted devices is regulated by the FTC.

If we or our collaborators fail to comply with applicable regulatory requirements following clearance, authorization, approval, accreditation or licensure of any of our products and services, a regulatory agency may:

- initiate an inspection of our or our collaborators' facilities;
- issue an untitled or warning letter asserting that we or our collaborators are in violation of law;
- seek an injunction or impose civil or criminal penalties or monetary fines;
- suspend or withdraw regulatory clearance, authorization or approval, or revoke a license or accreditation;
- suspend any ongoing clinical studies;
- delay or refuse clearance, authorization or approval of a pending regulatory submission or supplement submitted by us or our collaborators;
- impose restrictions on our or our collaborators' cleared, authorized, approved, accredited or licensed products or services;
- seize or recall the product or service;
- partially suspend or entirely shut down our or our collaborators' manufacturing or laboratory operations;
- issue advisories or other field actions;
- impose operating restrictions;
- refuse to allow us or our collaborators to enter into supply contracts, including government contracts; or
- refer matters to U.S. the Department of Justice ("DOJ") or other enforcement or regulatory bodies.

Any government investigation of alleged violations of law could require us to expend significant time and resources in response and could generate negative publicity. The occurrence of any event or penalty described above may inhibit our and our collaborators' ability to commercialize any cleared, authorized or approved products and services and generate revenues.

If any of our diagnostic products or services cause or contribute to a death or serious injury, or malfunction in certain ways, we will be required to report such death, serious injury or malfunction under applicable medical device reporting regulations, and such events can result in voluntary corrective actions or agency enforcement actions.

Under FDA medical device reporting ("MDR") regulations, medical device manufacturers are required to report to the FDA information that a device has or may have caused or contributed to a death or serious injury or has malfunctioned in a way that would likely cause or contribute to a death or serious injury if the malfunction of the device or one of our similar devices were to recur. If such a

death, serious injury or malfunction were to occur, and we or our collaborators are unable to demonstrate that the adverse events were caused by factors other than our or our collaborator's products and services, regulatory authorities could order us to cease further development of, or deny clearance, authorization or approval of, any of our or our collaborators' products and services for any or all targeted indications. Even if we and our collaborators are able to demonstrate that any serious adverse events are not related to our products and services, such occurrences could affect patient recruitment or the ability of enrolled trial participants to complete the trial. Moreover, if we or our collaborators elect, or are required, to delay, suspend or terminate any clinical trial of any product in development, the commercial prospects of such product in development may be harmed and our ability to generate product revenues may be delayed or eliminated. Any of these occurrences may harm our and our collaborators' ability to identify and develop future products and services, and may significantly harm our business, financial condition, result of operations and prospects.

We are subject to various laws and regulations, such as healthcare fraud and abuse laws, false claim laws and health information privacy and security laws, among others, and failure to comply with these laws and regulations may have an adverse effect on our business.

Healthcare providers, physicians, hospitals and third-party payors often play a primary role in the recommendation and prescription of any currently marketed products and services for which we may obtain clearance, authorization or approval. Our current and future arrangements with healthcare providers, physicians, hospitals and third-party payors, and our sales, marketing and educational activities related to our products and services, may expose us to broadly applicable fraud and abuse and other healthcare laws and regulations at the federal and state level that may constrain our business or financial arrangements, and the relationships through which we market, sell and distribute our products and services. In addition, our operations are also subject to various federal and state fraud and abuse, physician payment transparency, and privacy and security laws, including, without limitation:

- The AKS, which prohibits, among other things, persons and entities, including clinical laboratories, from knowingly and willfully soliciting, receiving, offering or paying remuneration, whether directly or indirectly, overtly or covertly, in case or in kind, to induce or reward or in return for either the referral of an individual or the purchase, lease, order or recommendation of an item or service reimbursable, in whole or in part, under a federal healthcare program such as Medicare or Medicaid. The AKS has been interpreted broadly to apply to, among other things, arrangements between clinical laboratories and prescribers and purchasers of our tests. The term "remuneration" expressly includes kickbacks, bribes or rebates and has been broadly interpreted to include anything of value, including gifts, discounts, waivers of payment, ownership interests and any goods or services provided at less than their fair market value. We are also subject to the Beneficiary Inducement Statute set forth in the civil monetary penalty provisions of the AKS. There are several statutory exceptions and regulatory safe harbors protecting certain common activities from prosecution or other regulatory sanctions, however, these exceptions and safe harbors are drawn narrowly, and practices that do not fit squarely within an exception or safe harbor may be subject to scrutiny. The failure to meet all of the requirements of a particular statutory exception or regulatory safe harbor does not make the conduct *per se* illegal under the AKS. Instead, the legality of the arrangement will be evaluated on a case-by-case basis based on a cumulative review of the facts and circumstances to determine whether one purpose of the remuneration in the arrangement was to induce referrals or generate business that is payable by a federal healthcare program. A violation of the AKS may be grounds for the government or a whistleblower to assert that a claim for payment of items or services resulting from such violation constitutes a false or fraudulent claim for purposes of the False Claims Act. Moreover, certain AKS safe harbors currently protecting rebates paid by device manufacturers to third parties may later be repealed pursuant to a

pending regulatory proposal. Our practices may not meet all of the criteria for safe harbor protection from AKS liability in all cases. A person or entity does not need to have actual knowledge of the AKS or specific intent to violate any AKS provisions to have committed a violation.

- The Substance Use-Disorder Prevention that Promoted Opioid Recovery and Treatment for Patients and Communities Act of 2018 ("SUPPORT Act"), which was signed into law in October 2018. Section 8122 of the SUPPORT Act, known as Eliminating Kickbacks in Recovery Act of 2018 ("EKRA"), establishes an all-payor anti-kickback prohibition that extends to arrangements with recovery homes, clinical laboratories and clinical treatment facilities. EKRA includes a number of statutory exceptions, and directs agencies to develop further exceptions. Current EKRA exceptions in some cases reference, and in others differ from, the AKS safe harbors. Significantly, the EKRA prohibitions apply to the soliciting or receipt of remuneration for any referrals to recovery homes, clinical treatment facilities or clinical laboratories, whether or not related to the treatment of substance use disorders. Further, the EKRA prohibitions cover the payment or offer of remuneration to induce a referral to, or in exchange for, an individual using the services of such providers. EKRA creates additional risk that relationships with referral sources could be problematic.
- Federal civil and criminal false claims laws and civil monetary penalty laws, including the False Claims Act, which prohibits individuals or entities from, among other things, knowingly presenting, or causing to be presented, claims for payment to, or approval by, the federal government that are false, fictitious or fraudulent, or knowingly making, using or causing to be made or used a false record or statement material to a false or fraudulent claim to avoid, decrease or conceal an obligation to pay money to the federal government. As a result of a modification made by the Fraud Enforcement and Recovery Act of 2009, a claim includes "any request or demand" for money or property presented to the federal government. The False Claims Act also permits a private individual acting as a "whistleblower" to bring actions on behalf of the federal government alleging violations of the False Claims Act and to share in any monetary recovery. In addition, AKS violations implicate the False Claims Act. Conduct that results in a False Claims Act violation may also implicate various federal criminal statutes.
- HIPAA, which imposes criminal and civil liability for knowingly and willfully executing, or attempting to execute, a scheme to defraud or to obtain, by means of false or fraudulent pretenses, representations or promises, any money or property owned by, or under the control or custody of, any healthcare benefit program, including private third-party payors, and knowingly and willfully falsifying, concealing or covering up by trick, scheme or device, a material fact or making any materially false, fictitious or fraudulent statement in connection with the delivery of or payment for healthcare benefits, items or services. Similar to the AKS, a person or entity does not need to have actual knowledge of HIPAA or specific intent to violate any HIPAA provisions to have committed a violation.
- The Stark Law, which is directed at "self-referral," prohibits, with certain exceptions, referrals for certain designated health services ("DHS"), including laboratory services, that are covered by Medicare and Medicaid by physicians who personally, or through a family member, have an investment or ownership interest in, or a compensation arrangement with, an entity performing the tests. The prohibition also extends to payment for any testing referred in violation of the Stark Law. Because the Stark Law is a strict liability statute, proof of specific intent to violate the law is not a required element of a violation. Any person who engages in a scheme to circumvent the Stark Law's referral prohibition may be fined up to $100,000 for each such arrangement or scheme. In addition, any person who presents or causes to be presented a claim to Medicare or Medicaid in violation of the Stark Law is subject to civil monetary penalties of up to $15,000 per bill submission, an assessment of up to three times the amount claimed and possible exclusion from participation in federal governmental payor programs, and those

claims are considered false claims for which the parties to the arrangement may be liable under the False Claims Act. Bills submitted in violation of the Stark Law may not be paid by Medicare or Medicaid, and any person collecting any amounts with respect to any such prohibited bill is obligated to refund such amounts. Many states have comparable laws that are not limited to Medicare and Medicaid referrals. The Stark Law also places an annual cap, currently at $416 for 2019, on the amount of non-monetary compensation, which consists of meal spend and educational items, that a company can spend on a physician in the aggregate. This annual cap requires careful tracking and coordination and if it is exceeded, as long as the amount exceeded is less than 50% of the total annual cap and is recouped from the physician within 180 calendar days or before the end of the calendar year, it is not a violation. This "return" option may only be used once every three years with respect to the same referring physician. We occasionally enter into financial relationships, usually compensation relationships, such as a consulting arrangement, with physicians who refer patients for testing. If these arrangements do not meet the Stark Law's requirements, any claims submitted to Medicare or Medicaid could violate the law and put both the physician referral source and us at risk.

- The administrative simplification provisions of HIPAA, as amended and supplemented by the Health Information Technology for Economic and Clinical Health Act of 2009 ("HITECH") impose, among other things, obligations, including mandatory contractual terms, with respect to safeguarding the privacy, security and transmission of protected health information ("PHI") held by certain healthcare providers, health plans and healthcare clearinghouses, known as covered entities, and their respective business associates. Among other things, HITECH made certain aspects of HIPAA's rules, notably the "HIPAA Security Rule," directly applicable to business associates, independent contractors or agents of covered entities that create, receive, maintain or transmit PHI in connection with providing a function on behalf of, or a service to, a covered entity. HITECH also created four new tiers of civil monetary penalties, amended HIPAA to make civil and criminal penalties directly applicable to business associates and gave state attorneys general new authority to file civil actions for damages or injunctions in federal court to enforce the federal HIPAA regulation and seek attorney's fees and costs associated with pursuing federal civil actions. The HHS Office for Civil Rights ("OCR") has increased its focus on compliance and continues to train state attorneys general for enforcement purposes. The OCR has recently increased both its efforts to audit HIPAA compliance and its level of enforcement, with one recent penalty exceeding $16 million.
- GINA, which restricts employers and health insurance companies from requiring or using the results of genetic tests in specific contexts and does not provide a private right of action. A number of states have also adopted laws regarding genetic tests, some aligned with GINA and some with broader applicability, including granting broader rights to individuals.
- The federal physician payment transparency requirements ("Physician Payments Sunshine Act") created under the ACA, and its implementing regulations, which requires applicable manufacturers of covered drugs, devices, biologics and medical supplies for which payment is available under Medicare, Medicaid or the State Children's Health Insurance Program, with certain exceptions, to annually report to HHS information related to certain payments or other transfers of value made or distributed to physicians and teaching hospitals, or to entities or individuals at the request of, or designated on behalf of, physicians and teaching hospitals, as well as ownership and investment interests held by physicians and their immediate family members. The Physician Payments Sunshine Act has been extended to payments and transfers of value to physician assistants, nurse practitioners and other mid-level healthcare providers, with reporting requirements going into effect in 2022 for payments and transfers of value made to these practitioners in 2021. In addition, certain state and local laws may impose additional transparency and healthcare compliance requirements on medical device

manufacturers, as well as certain restrictions or limits on interactions with healthcare professionals.

- The Federal Trade Commission Act ("FTCA"), which the FTC interprets to require taking appropriate steps to secure consumers' personal information and considers the failures to do so to constitute unfair acts or practices in or affecting commerce in violation of Section 5(a) of the FTCA. The FTC expects a company's data security measures to be reasonable and appropriate in light of the sensitivity and volume of consumer information it holds, the size and complexity of its business, and the cost of available tools to improve security and reduce vulnerabilities. Medical data is considered sensitive data that merits stronger safeguards, and the FTC's guidance for appropriately securing consumers' personal information is consistent with what is required by the HIPAA Security Rule. Some states, most notably Massachusetts and Nevada, also have adopted laws requiring the implementation of security measures to protect personal information, and all 50 states and the District of Columbia, Puerto Rico and Guam, have adopted breach notification laws.
- Analogous state laws and regulations, such as state anti-kickback, self-referral and false claims laws, which may apply to items or services reimbursed by any third-party payor, including commercial insurers, and in some cases even in self-pay scenarios. In addition, some state laws require life sciences companies to comply with the industry's voluntary compliance guidelines and the relevant compliance guidance promulgated by the federal government, or to impose transparency requirements or restrictions on marketing activities.
- Various state, federal and foreign laws and regulations govern our ability to communicate, prospect, advertise and market our products and services through email, phone, text messages, facsimile and online methods.

Because of the breadth of these laws and the narrowness of the exceptions and safe harbors available under them, it is possible that certain of our business activities could be subject to challenge under one or more of such laws. The scope and enforcement of each of these laws is uncertain and subject to rapid change in the current environment of healthcare reform, especially in light of the lack of applicable precedent and regulations. Federal and state enforcement bodies have recently increased their scrutiny of the ongoing interactions between healthcare companies and healthcare providers, which has led to a number of investigations, prosecutions, convictions and settlements in the healthcare industry. Ensuring that business arrangements with third parties comply with applicable healthcare laws, as well as responding to possible investigations by government authorities, can be time- and resource-consuming and can divert management's attention from our business.

If our operations are found to be in violation of any of the health regulatory laws described above or any other laws that apply to us, we may be subject to penalties, including, but not limited to, criminal, civil and administrative penalties, damages, fines, disgorgement, individual imprisonment, possible exclusion from participation in government healthcare programs, injunctions, private *qui tam* actions brought by individual whistleblowers in the name of the government and the curtailment or restructuring of our operations, as well as additional reporting obligations and oversight if we become subject to a corporate integrity agreement or other agreement to resolve allegations of non-compliance with these laws, any of which could adversely affect our ability to operate our business and our results of operations.

Our collection, use and disclosure of personal information, including health and employee information, is subject to state, federal and foreign privacy and security regulations, and our failure to comply with those regulations or to adequately secure the information we hold could result in significant liability or reputational harm.

The privacy and security of personal information stored, maintained, received or transmitted, including electronically, is a major issue in the United States and abroad. While we strive to comply with all applicable privacy and security laws and regulations, including, in our case, our own posted privacy policies, legal standards for privacy, including but not limited to ‘‘unfairness’’ and ‘‘deception,’’ as enforced by the FTC and state attorneys general, these laws and regulations continue to evolve and any failure or perceived failure to comply may result in proceedings or actions against us by government entities or others, or could cause us to lose customers, which could have a material adverse effect on our business. Recently, there has been an increase in public awareness of privacy issues in the wake of revelations about the data-collection activities of various government agencies and in the number of private privacy-related lawsuits filed against companies. Concerns about our practices with regard to the collection, use, retention, disclosure or security of personal information or other privacy-related matters, even if unfounded and even if we are in compliance with applicable laws, could damage our reputation and harm our business. Additionally, we receive personal information, including PHI from third parties, and if such third parties breach their representations to us regarding their compliance with applicable privacy and security laws, we could be exposed to proceedings or actions by government agencies or others.

Numerous foreign, federal and state laws and regulations govern the collection, dissemination, use and confidentiality of personal information, including genetic, biometric and health information, including state privacy, data security and breach notification laws, federal and state consumer protection and employment laws, HIPAA, GINA, the General Data Protection Regulation (“GDPR”) and other foreign data protection laws. These laws and regulations are increasing in complexity and number, may change frequently and sometimes conflict.

The HIPAA privacy, security and breach notification regulations, including the expanded requirements under HITECH, establish comprehensive federal standards with respect to the uses and disclosures of PHI by health plans, healthcare providers, including laboratories, and healthcare clearinghouses, in addition to setting standards to protect the confidentiality, integrity and security of PHI. The regulations establish a complex regulatory framework on a variety of subjects, including:

- the circumstances under which uses and disclosures of PHI are permitted or required without a specific authorization by the patient;
- a patient’s rights to access, amend and receive an accounting of certain disclosures of PHI;
- requirements to notify individuals if there is a breach of their unsecured PHI;
- the contents of notices that must be provided to patients regarding our privacy practices for PHI;
- administrative, technical and physical safeguards required of entities that use or receive PHI; and
- the safeguarding of PHI.

Penalties for violations of these laws vary. For instance, penalties for failure to comply with a requirement of HIPAA and HITECH vary significantly, and include civil monetary penalties of up to $50,000 per violation, which cap has been increased to account for inflation, not to exceed $1.5 million per calendar year, which cap has been increased to account for inflation, for each provision of HIPAA that is violated and, in certain circumstances, criminal penalties with fines up to $250,000 per violation

and imprisonment. However, a single breach can result in findings of violations of multiple provisions, leading to possible penalties in excess of $1.5 million for violations in a calendar year. Any person who knowingly obtains or discloses PHI in violation of HIPAA may face a criminal penalty of up to $50,000 and up to one year of imprisonment. The criminal penalties increase if the wrongful conduct involves false pretenses or the intent to sell, transfer or use identifiable health information for commercial advantage, personal gain or malicious harm. In addition, responding to government investigations regarding alleged violations of these and other laws and regulations, even if they ultimately result in no findings of violations or no penalties imposed, can consume our resources and impact our business and, if public, harm our reputation.

Computer networks are vulnerable to breach and unauthorized persons may in the future be able to exploit weaknesses in the security systems of our computer networks and gain access to PHI. Additionally, we share PHI with third-party contractors, and while they are contractually obligated under business associate agreements to safeguard and maintain the confidentiality of PHI, their indemnification of us would not insulate us from reputational harm. Unauthorized persons may be able to gain access to PHI stored in such third-party contractors' computer networks. Any wrongful use or disclosure of PHI by us or our third-party contractors, including disclosure due to data theft or unauthorized access to our or our third-party contractors' computer networks, could subject us to fines or penalties that could adversely affect our business and results of operations. Although HIPAA and the regulations promulgated thereunder do not provide for a private right of action, we could incur damages under state laws to private parties for the wrongful use or disclosure of confidential health information or other private personal information.

Further, various states, such as California and Massachusetts, have implemented similar privacy laws and regulations, such as the California Confidentiality of Medical Information Act, that impose restrictive requirements regulating the use and disclosure of health information and other personal information. These laws and regulations are not necessarily preempted by HIPAA, but they afford greater protection to individuals than HIPAA. Where state laws are more protective, we and our collaborators must comply with the stricter provisions where they apply. In addition to fines and penalties imposed upon violators, some of these state laws also afford private rights of action to individuals who believe their personal information has been misused. California's patient privacy laws, for example, provide for penalties of up to $250,000 and permit injured parties to sue for damages. The California Consumer Privacy Act ("CCPA"), which goes into effect on January 1, 2020 and will be enforceable by the California Attorney General the sooner of six months after the publication of the final regulators or July 1, 2020, creates new data privacy obligations for covered companies and provides new privacy rights to California residents, including the right to access, delete, obtain and opt in or opt out of certain use, sharing or sale of their personal information and to sue for statutory damages for certain security breaches. Although legislators have stated that they intend to propose amendments to the CCPA before its enforcement date and that the California Attorney General will issue clarifying regulations, there is no certainty that the CCPA's burdens will be significantly altered. And although the CCPA includes limited exceptions from its prescriptions, including exceptions for certain information collected as part of clinical trials, as specified in the law, and for PHI collected by covered entities or business associates subject to HIPAA, as specified in the law, the CCPA may regulate or impact our processing of PHI and other personal information depending on the context. It remains unclear what, if any, modifications will be made to this legislation or how it will be interpreted. The interplay of federal and state laws may be subject to varying interpretations by courts and government agencies, creating complex compliance issues for us and our customers and potentially exposing us to additional expense, adverse publicity and liability. Further, as regulatory focus on privacy, security and data use issues continues to increase and laws and regulations concerning the protection of personal information expand and become more complex, these potential risks to our immune medicine platform and related products and services could intensify. Changes in laws or regulations associated with the enhanced protection of certain types of sensitive data, such as PHI,

along with increased customer demand for enhanced data security infrastructure, could greatly increase the cost of providing our products and services, decrease demand for our products and services, reduce our revenue and subject us to additional liabilities.

In addition, the interpretation and application of consumer, health-related and data protection laws, especially with respect to genetic samples and data, in the United States, the EU and elsewhere, are often uncertain, contradictory and in flux. We may eventually operate in a number of countries outside of the United States whose laws may in some cases be more stringent than the requirements in the United States. For example, the EU has specific requirements relating to cross-border transfers of personal data to certain jurisdictions, including to the United States. In addition, some countries have stricter consumer notice or consent requirements relating to personal data collection, use or sharing, have more stringent requirements relating to organizations' privacy programs and provide stronger individual rights. Moreover, international privacy and data security regulations may become more complex and result in greater penalties. For instance, as of May 25, 2018, the GDPR, has replaced the EU Data Protection Directive with respect to the collection and use of personal data of data subjects in the EU and the European Economic Area ("EEA"). The GDPR applies extra-territorially under certain circumstances and imposes stringent requirements on controllers and processors of personal data, including, for example, requirements to obtain consent or other legal bases from individuals to process their personal data, provide robust disclosures to individuals, accommodate a set of individual data rights, provide data security breach notifications within 72 hours after discovering the breach, limit retention of personal information and apply enhanced protections to health data and other special categories of personal data. The GDPR also applies to pseudonymized data, which is defined as "the processing of personal data in such a way that the data can no longer be attributed to a specific data subject without the use of additional information," and imposes additional obligations when we contract with third-party processors in connection with the processing of any personal data. The GDPR provides that EU member states may make their own further laws and regulations limiting the processing of personal data, including genetic, biometric or health data, which could limit our ability to use and share personal data, could cause our costs to increase and could harm our financial condition. Failure to comply with the requirements of the GDPR and the applicable national data protection laws of the EU member states may result in fines of up to €20 million or up to 4% of the total worldwide annual turnover of our preceding fiscal year, whichever is higher, and other administrative penalties. Further, as the GDPR has only recently become enforceable, enforcement priorities and official interpretations of certain provisions are still unclear. To comply with the new data protection rules imposed by the GDPR, we may be required to put in place additional mechanisms ensuring compliance, which may result in other substantial expenditures. This may be onerous and adversely affect our business, financial condition, results of operations and the profitability of our platform of products and services. Failure to comply with the GDPR and other countries' privacy or data security-related laws, rules or regulations could result in material penalties imposed by regulators, affect our compliance with contracts entered into with our collaborators and other third-party payors, and have an adverse effect on our business and financial condition. Currently, the GDPR is only applicable to us as a processor, but as we continue to expand into the European market, the GDPR will have direct applicability to us as a controller.

The GDPR also imposes strict rules on the transfer of personal data out of the EU to the United States. These obligations may be interpreted and applied in a manner that is inconsistent from one jurisdiction to another and may conflict with other requirements or our practices. In addition, these rules are consistently under scrutiny. For example, following a decision of the Court of Justice of the EU in October 2015, the transfer of personal data to U.S. companies that had certified as members of the U.S. Safe Harbor Scheme ("Safe Harbor Scheme") was declared invalid. In July 2016, the European Commission adopted the EU-U.S. Privacy Shield Framework ("Privacy Shield Framework") which replaced the Safe Harbor Scheme. The Privacy Shield Framework is reviewed by European authorities annually, and there is currently litigation challenging other EU mechanisms for adequate data transfers.

It is uncertain whether the Privacy Shield Framework or the standard contractual clauses might similarly be invalidated by European courts.

Organizations operating in Canada and covered by the Personal Information Protection and Electronic Documents Act ("PIPEDA"), or equivalent Canadian provincial laws, must obtain an individual's consent when they collect, use or disclose that individual's personal information. Individuals have the right to access and challenge the accuracy of their personal information held by an organization, and personal information may only be used for the purposes for which it was collected. If an organization intends to use personal information for another purpose, it must again obtain that individual's consent.

Because of the breadth of these data protection laws and the narrowness of their exceptions and safe harbors, it is possible that our business or data protection policies could be subject to challenge under one or more of such laws. The scope and enforcement of each of these laws is uncertain and subject to rapid change in the current environment of heightened regulatory focus on data privacy and security issues. If our operations are found to be in violation of any of the data protection laws described above or any other laws that apply to us, we may be subject to penalties, including, but not limited to, criminal, civil and administrative penalties, damages, fines, disgorgement, individual imprisonment, possible exclusion from participation in government healthcare programs, injunctions, private *qui tam* actions brought by individual whistleblowers in the name of the government, class action litigation and the curtailment or restructuring of our operations, as well as additional reporting obligations and oversight if we become subject to a corrective action plan or other agreement to resolve allegations of non-compliance with these laws, any of which could adversely affect our ability to operate our business and our results of operations.

Security breaches, loss of data and other disruptions could compromise confidential, personal and sensitive information related to our business or prevent us from accessing critical information and expose us to liability, which could adversely affect our business and our reputation.

In the ordinary course of our business, we and our collaborators collect and store sensitive data, including PHI, personal information, credit card and other financial information, intellectual property and proprietary business information owned or controlled by ourselves or our customers, third-party payors, our collaborators, government entities, insurance companies and other parties. We manage and maintain our applications and data through a combination of on-site systems and cloud-based data centers. We utilize external security and infrastructure vendors to manage components of our data centers. We also transmit sensitive data, including patient data, telephonically, through our website and pursuant to arrangements with multiple third-party vendors and their subcontractors. These applications and data encompass a wide variety of critical business information, including research and development information, patient data, commercial information and financial information. We face a number of risks related to protecting this critical information, including loss-of-access risk, unauthorized access, use, disclosure or modification, and the risk of our inability to adequately monitor, audit and modify our respective control over our critical information. This risk extends to the data we entrust to the third-party vendors and subcontractors that help us manage this sensitive data or otherwise process it on our behalf.

The secure processing, storage, maintenance and transmission of this critical information are vital to our operations and business strategy, and we devote significant resources to protecting such information. Although we take reasonable measures to protect sensitive and proprietary data from unauthorized access, use or disclosure, no security measures can be perfect and our respective information technology and infrastructure may be vulnerable to attacks by hackers or viruses or breached due to employee error, malfeasance or other malicious or inadvertent disruptions. Any such

breach or interruption could compromise our networks and the information stored there could be accessed by unauthorized parties, publicly disclosed, lost or stolen. Any such access, breach or other loss of information could result in legal claims or proceedings, liability under federal or state laws that protect the privacy of personal information, such as HIPAA or HITECH, and regulatory penalties. Notice of breaches may be required to be provided to affected individuals, the Secretary of HHS or other federal, state and foreign regulators, the media or state attorneys general. Such a notice could harm our reputation and ability to compete. Although we have implemented security measures and formal, dedicated enterprise security programs to prevent unauthorized access to patient and other personal data, such data is currently accessible through multiple channels and we may experience one or more data breaches. Unauthorized access, loss or dissemination could also disrupt our operations and damage our reputation, which could adversely affect our results of operations and financial condition.

No TCR-based cellular therapies have been approved in this new potential category of medicines and may never be approved as a result of efforts by others or us. TCR-based cellular therapy drug discovery has substantial clinical development and regulatory risks due to the novel and unprecedented nature of this new category of immune-driven medicines.

As a potential new category of medicines, no TCR-based cellular therapies have been approved to date by the FDA or other regulatory agency. Successful discovery and development of TCR-based cellular therapies by us and our collaborators is highly uncertain and depends on numerous factors, many of which are beyond our and their control. We and our collaborators have made and will continue to make a series of business decisions and take calculated risks to advance our development efforts and pipeline of immune-driven therapeutic product candidates, including those related to TCR-based cellular therapies, delivery technology and manufacturing processes, which may be shown to be incorrect based on further work by us, our collaborators or others. Our cellular therapeutics product candidates that appear promising in the early phases of development may fail to advance, experience delays in the clinic, experience clinical holds or fail to reach the market for many reasons, including:

- discovery efforts identifying potential TCR-based cellular therapies may not be successful;
- nonclinical or preclinical study results may show potential TCR-based cellular therapies to be less effective than desired or to have harmful or problematic side effects;
- clinical trials may fail to meet one or more endpoints, or results may show the TCR-based cellular therapies to be less effective than expected or to have unacceptable side effects or toxicities;
- adverse effects relating to any one of our therapeutic product candidates or adverse effects relating to our TruTCR process may lead to delays in or termination of one or more of our products or services;
- the inability of our translational models to reduce risk or predict outcomes in humans, given that each component of our therapeutic product candidates may have a dependent or independent effect on safety, tolerability and efficacy, and that such effects may, among other things, be species-dependent;
- manufacturing failures or insufficient supply of current good manufacturing practices (“cGMP”) materials for future clinical trials, or higher than expected cost, could delay or set back clinical trials or make TCR-based cellular therapies commercially unattractive;
- our collaborators’ improvements in the manufacturing processes for this new class of potential immune-driven medicines may not be sufficient to satisfy the clinical or commercial demand of our jointly developed TCR-based cellular therapies or regulatory requirements for clinical trials;

- changes that we or our collaborators make to optimize manufacturing, testing or formulating of cGMP materials could impact the safety, tolerability and efficacy of our therapeutic products in development;
- pricing or reimbursement issues or other factors that delay clinical trials or make any TCR-based cellular therapies uneconomical or noncompetitive with other immunotherapies;
- failure to timely advance our or our collaborators' therapeutic products or receive the necessary regulatory clearances, authorizations or approvals or a delay in receiving such clearances, authorizations or approvals due to, among other reasons, slow or failure to complete enrollment in clinical trials, withdrawal by trial participants from trials, failure to achieve trial endpoints, additional time requirements for data analysis, data integrity issues, Biologics License Application or the equivalent application, discussions with the FDA or the European Medicines Agency, a regulatory request for additional nonclinical or clinical data, or safety formulation or manufacturing issues may lead to our inability to obtain sufficient funding; and
- the proprietary rights of others and their competing products and services that may prevent our TCR-based cellular therapies from being commercialized or threaten future commercialization activities.

Risks Relating to our Intellectual Property

We may not be successful in obtaining or maintaining sufficient intellectual property protection for our products, services and technologies and uses thereof, and the scope of the intellectual property protection obtained may not be sufficiently broad.

As is the case with other companies engaged in the life sciences industry, our success depends in large part on our ability to obtain and maintain protection of the intellectual property we may own solely and jointly with others, or license from third parties, particularly patents, in the United States and other countries with respect to our products, services and technologies. We rely on patent protection in addition to trademark, copyright, trade secret and other intellectual property rights protection and contractual restrictions to protect our proprietary technologies, all of which provide limited protection and may not adequately protect our rights or enable us to gain or maintain any competitive advantage. If we fail to protect our intellectual property, third parties may be able to compete more effectively against us. In addition, we may incur substantial litigation costs in our attempts to recover or restrict use of our intellectual property.

To the extent our intellectual property offers inadequate protection, or is found to be invalid or unenforceable, we would be exposed to a greater risk of direct competition. If our intellectual property does not provide adequate barriers to competition, our competitive position could be adversely affected, as could our business.

We apply for or in-license patents covering our products and technologies and uses thereof, as we deem appropriate. However, obtaining and enforcing patents is costly, time-consuming and complex, and we may fail to apply for patents on important products, services and technologies in a timely fashion or at all, or we may fail to apply for patents in potentially relevant jurisdictions. We may not be able to file and prosecute all necessary or desirable patent applications, or maintain, enforce and license any patents that may issue from such 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. We may not have the right to control the preparation, filing and prosecution of patent applications or to maintain the rights to patents licensed from third parties. Consequently, these patents and applications may not be prosecuted and enforced in a manner consistent with the best interests of our business.

As of March 31, 2019, we own or have rights to 343 active patents and patent applications filed in the United States, Europe and elsewhere. Of these, there are 109 pending patent applications and 234 granted patents. Our pending patent applications may not result in issued patents in a timely fashion or at all. Even if patents are granted, they may not provide a basis for intellectual property protection of commercially viable products or services, may not provide us with any competitive advantages, or may be challenged and invalidated by third parties. It is also possible that others will design around our current or future patented technologies.

Some of our patents, licensed patents or patent applications may be challenged in the future, and we may not be successful in defending any such challenges. For example, we may be subject to a third-party pre-issuance submission of prior art to the U.S. Patent and Trademark Office ("USPTO"), or become involved in opposition, derivation, reexamination, *inter partes* review, post-grant review or interference proceedings challenging our patent rights. Any successful third-party challenge to our patents could result in patent claims being narrowed, or patents being invalidated or held unenforceable, in whole or in part, which could lead to increased competition to our business. Conversely, we may have to challenge the patents or patent applications of third parties. The outcome of patent litigation or other proceeding can be uncertain, and any attempt by us to enforce our patent rights against others or to challenge the patent rights of others may not be successful, or, if successful, may take substantial time and result in substantial cost, and may divert our efforts and attention from other aspects of our business. In addition, if the breadth or strength of protection provided by our patents and patent applications is threatened, regardless of the outcome, it could dissuade companies from collaborating with us to license, develop or commercialize current or future products or services. The patent positions of biotechnology companies can be highly uncertain and involve complex legal and factual questions for which important legal principles remain unresolved. Inconsistent policies regarding the eligibility for patent protection and the breadth of patentable claims in such companies' patents has emerged to date in the United States or elsewhere. Courts frequently render opinions in the biotechnology field that may affect the patentability of certain inventions or discoveries, including opinions that may affect the patentability of methods and compositions of matter useful in relation to immunosequencing.

The patent position of companies engaged in the development and commercialization of clinical diagnostic tests, like our clonoSEQ diagnostic test, are particularly uncertain. Various courts, including the U.S. Supreme Court, have rendered decisions that affect the eligibility and scope of patentability of certain inventions or discoveries relating to certain diagnostic tests and related technology. These decisions state, among other things, that a patent claim that recites an abstract idea, natural phenomenon or law of nature (for example, the relationship between particular immune receptors and cancer) may not be patentable. Precisely what constitutes a law of nature is uncertain, and it is possible that certain aspects of our clinical diagnostics would be considered natural laws. The evolving case law in the United States may adversely affect our ability to obtain patents or defend patents we have obtained or have licensed and may facilitate third-party challenges to any owned or licensed patents. The laws of some foreign countries do not protect intellectual property rights to the same extent or for the same subject matter as the laws of the United States, and we may encounter difficulties in protecting and defending such rights in foreign jurisdictions. The legal systems of many other 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 patents in such countries. Proceedings to enforce our patent rights in foreign jurisdictions could result in substantial costs and divert our efforts and attention from other aspects of our business.

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

Filing, prosecuting and defending patents on our products and services in all countries throughout the world would be prohibitively expensive. In addition, the laws of some foreign countries do not

protect intellectual property rights to the same extent as the laws of the United States, and we may encounter difficulties in protecting and defending such rights in foreign jurisdictions. Consequently, we may not be able to prevent third parties from practicing our inventions in all countries outside the United States, or from selling or importing products made using our inventions in and into the United States or other jurisdictions. Competitors may use our technologies in jurisdictions where we have not obtained patent protection to develop their own products and may also export infringing products to territories where we have patent protection, but enforcement is not as strong as that in the United States. These products may compete with our products and our patents or other intellectual property rights may not be effective or sufficient to prevent them from competing.

Many companies have encountered significant problems in protecting and defending intellectual property rights in foreign jurisdictions. The legal systems of many other 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 patents in such countries. Proceedings to enforce our patent rights in foreign jurisdictions could result in substantial cost and divert our efforts and attention from other aspects of our business, could put our patents at risk of being invalidated or interpreted narrowly and our patent applications at risk of not issuing, and could provoke third parties to assert claims against us. We may not prevail in any lawsuits that we initiate and the damages or other remedies awarded, if any, may not be commercially meaningful. Accordingly, our efforts to enforce our intellectual property rights around the world may be inadequate to obtain a significant commercial advantage from the intellectual property that we develop or license.

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

Changes in either the patent laws or in interpretations of patent laws in the United States or other countries or regions may diminish the value of our intellectual property. We cannot predict the breadth of claims that may be allowed or enforced in our patents or in third-party patents. In the United States, prior to March 16, 2013, assuming that other requirements for patentability were satisfied, the first to invent the claimed invention was entitled to the patent, while outside the United States, the first to file a patent application was entitled to the patent. On or after March 16, 2013, under the Leahy-Smith America Invents Act ("America Invents Act"), enacted in September 16, 2011, the United States transitioned to a first inventor to file system in which, assuming that other requirements for patentability are satisfied, the first inventor to file a patent application will be entitled to the patent on an invention regardless of whether a third party was the first to invent the claimed invention. As such, a third party that files a patent application in the USPTO before us could be awarded a patent covering an invention of ours even if we had made the invention before it was made by such third party. This will require us to be cognizant of the time from invention to filing of a patent application. Since patent applications in the United States and most other countries are confidential for a period of time after filing or until issuance, we cannot be certain that we or our licensors were the first to either file any patent application related to our products or services or invent any of the inventions claimed in our or our licensor's patents or patent applications.

The America Invents Act also includes a number of significant changes that affect the way patent applications will be prosecuted and also may affect patent litigation. These include allowing third-party submission of prior art to the USPTO during patent prosecution and additional procedures to attack the validity of a patent by USPTO administered post-grant proceedings, including post-grant review, *inter partes* review and derivation proceedings. Because of a lower evidentiary standard in USPTO proceedings compared to the evidentiary standard in U.S. federal courts necessary to invalidate a patent claim, a third party could potentially provide evidence in a USPTO proceeding sufficient for the USPTO to hold a claim invalid even though the same evidence would be insufficient to invalidate the claim if first presented in a district court action. Accordingly, a third party may attempt to use the

USPTO procedures to invalidate our patent claims that would not have been invalidated if first challenged by the third party as a defendant in a district court action. Therefore, the America Invents 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 owned or in-licensed issued patents, all of which could have a material adverse effect on our business.

Recent U.S. Supreme Court rulings have also narrowed the scope of patent protection available in certain circumstances and weakened the rights of patent owners in certain situations. In addition to increasing uncertainty with regard to our ability to obtain patents in the future, this combination of events has created uncertainty with respect to the value of patents, once obtained. Depending on decisions by the U.S. Congress, the federal courts and the USPTO, the laws and regulations governing patents could change in unpredictable ways that would weaken our ability to obtain new patents or to enforce our existing patents and patents that we might obtain in the future.

Issued patents covering our products and services could be found invalid or unenforceable if challenged.

The issuance of a patent is not conclusive as to its inventorship, scope, validity or enforceability and some of our patents or patent applications, including licensed patents, may be challenged, in courts or patent offices in the United States and abroad, in opposition, derivation, reexamination, *inter partes* review, post-grant review or interference. Additionally, if we and our licensing partners initiate or become involved in legal proceedings against a third party to enforce a patent covering one of our products or technologies, the defendant could counterclaim that the patent covering our product is invalid or unenforceable. In patent litigation in the United States, counterclaims alleging invalidity or unenforceability are commonplace. Grounds for a validity challenge could be an alleged failure to meet any of several statutory requirements, including patent eligible subject matter, lack of novelty, obviousness or non-enablement. 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. In addition, the United States now awards patent priority to the first party to file a patent application, and others may submit patent claims covering our inventions prior to us. The outcome following legal assertions of invalidity and unenforceability is unpredictable. With respect to the validity question, for example, we cannot be certain that there is no invalidating prior art, of which we and the patent examiner were unaware during prosecution. A successful third-party challenge to our patents could result in the unenforceability or invalidity of such patents, which could have a material adverse impact on our business. Furthermore, if the breadth or strength of protection provided by our patents and patent applications is threatened, regardless of the outcome, it could dissuade companies from collaborating with us to license, develop or commercialize current or future products and services.

We may not be aware of all third-party intellectual property rights potentially relating to our immune medicine platform, products and services. Publications of discoveries in the scientific literature often lag behind the actual discoveries, and patent applications in the United States and other jurisdictions are typically not published until approximately 18 months after filing or, in some cases, not until such patent applications issue as patents. We might not have been the first to make the inventions covered by each of our pending patent applications and we might not have been the first to file patent applications for these inventions. To determine the priority of these inventions, we may have to participate in interference proceedings, derivation proceedings or other post-grant proceedings declared by the USPTO. The outcome of such proceedings is uncertain, and other patent applications may have priority over our patent applications. Such proceedings could also result in substantial costs to us and divert our management's attention and resources.

We rely on licenses from third parties in relation to certain products and services and if we lose these licenses then we may be subjected to future litigation.

We are a party to license agreements that grant us rights to use certain intellectual property, including patents and patent applications, typically in certain specified fields of use. Some of those licensed rights could provide us with freedom to operate for aspects of our products and services. We may need to obtain additional licenses from others to advance our research, development and commercialization activities.

Our success may depend in part on the ability of our licensors to obtain, maintain and enforce patent protection for our licensed intellectual property. Our licensors may not successfully prosecute the patent applications we license. Even if patents issue in respect of these patent applications, our licensors may fail to maintain these patents, may determine not to pursue litigation against other companies that are infringing these patents or may pursue such litigation less aggressively than we would. Without protection for the intellectual property we license, other companies might be able to offer substantially identical products for sale, which could adversely affect our competitive business position and harm our business prospects.

Any of the foregoing could have a material adverse effect on our competitive position, business, financial conditions, results of operations and prospects.

Moreover, disputes may also arise between us and our licensors regarding intellectual property subject to a license agreement, including:

- the scope of rights granted under the license agreement and other interpretation-related issues;
- whether, and the extent to which, our products, services, technology and processes infringe on intellectual property of the licensor that is not subject to the licensing agreement;
- our right to sublicense patent and other rights to third parties under collaborative development relationships;
- our diligence obligations under the license agreement and what activities satisfy those diligence obligations;
- the inventorship and ownership of inventions and know-how resulting from the joint creation or use of intellectual property by our licensors and us and our collaborators; and
- the priority of invention of patented technology.

If we do not prevail in such disputes, we may lose any or all of our rights under such license agreements.

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 effect on our business, financial condition, results of operations and prospects. 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 products or services, which could have a material adverse effect on our business, financial conditions, results of operations and prospects.

Absent the license agreements, we may infringe patents subject to those agreements, and if the license agreements are terminated, we may be subject to litigation by the licensor. Litigation could

result in substantial costs to us and distract our management. If we do not prevail, we may be required to pay damages, including treble damages, attorneys' fees, costs and expenses and royalties or be enjoined from selling our products or services, which could adversely affect our ability to offer products or services, our ability to continue operations and our financial condition.

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

In addition to patent protection, we take steps to protect our intellectual property and proprietary technology by entering into agreements, including confidentiality agreements, non-disclosure agreements and intellectual property assignment agreements, with our employees, consultants, collaborators, academic institutions, life sciences research partners and, when needed, our advisers as well as other third parties. However, we cannot be certain that such agreements have been entered into with all relevant parties, and we cannot be certain that our trade secrets and other confidential proprietary information will not be disclosed or that competitors will not otherwise gain access to our trade secrets or independently develop substantially equivalent information and techniques.

For example, any of these parties may breach the agreements and disclose our proprietary information, including our trade secrets, and we may not be able to obtain adequate remedies for such breaches. Such agreements may not be enforceable or may not provide meaningful protection for our trade secrets or other proprietary information in the event of unauthorized use or disclosure or other breaches of the agreements, and we may not be able to prevent such unauthorized disclosure. If we are required to assert our rights against such party, it could result in significant cost and distraction. Monitoring unauthorized disclosure is difficult, and we do not know whether the steps we have taken to prevent such disclosure are, or will be, adequate. If we were to enforce a claim that a third party had illegally obtained and was using our trade secrets, it would be expensive and time-consuming, and the outcome would be unpredictable. In addition, courts outside the United States may be less willing to protect trade secrets.

We also seek to preserve the integrity and confidentiality of our confidential proprietary information by maintaining physical security of our premises and physical and electronic security of our information technology systems. Besides the possibility that these security measures could be breached, such measures may not, for example, in the case of misappropriation of a trade secret by an employee or third party with authorized access, provide adequate protection for our proprietary information. Our security measures may also not prevent an employee or consultant from misappropriating our trade secrets and providing them to a competitor, and recourse we take against such misconduct may not provide an adequate remedy to protect our interests fully. Enforcing a claim that a party illegally disclosed or misappropriated a trade secret can be difficult, expensive and time-consuming, and the outcome is unpredictable. In addition, trade secrets may be independently developed by others in a manner that could prevent legal recourse by us. If any of our confidential or proprietary information, such as our trade secrets, were to be disclosed or misappropriated, or if any such information was independently developed by a competitor, our competitive position could be harmed.

Certain former employees have obtained employment with companies or academic institutions that could be considered competitive with us. This competition may be limited by contractual provisions which may or may not be enforceable by us in certain jurisdictions. In addition, we may not be aware of such competitive employment arrangements until after our trade secrets have been disclosed to potentially competitive companies.

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

We employ, and expect to employ in the future, individuals who were previously employed at universities or other companies, including our competitors or potential competitors. Although we try to ensure that our employees, consultants and independent contractors do not use the proprietary information or know-how of others in their work for us, we may be subject to claims that our employees, consultants or independent contractors have inadvertently or otherwise used or disclosed trade secrets or other proprietary information of their former employers or other third parties, or to claims that we have improperly used or obtained such trade secrets. Litigation 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, which could adversely impact our business. A loss of key research personnel work product could hamper or prevent our ability to commercialize potential products and services, which could harm our business. Even if we are successful in defending against these claims, litigation could result in substantial costs and be a distraction to management and other employees.

We may not be able to protect and enforce our trademarks.

We have not yet registered certain of our trademarks in all of our potential markets, although we have registered Adaptive Biotechnologies, clonoSEQ, immunoSEQ, pairSEQ and TruTCR in the United States, the EU and a number of other countries and are seeking to register additional trademarks, including ADAPTIVE and immunoSEQ Dx. As we apply to register our unregistered trademarks in the United States and other countries, our applications may not be allowed for registration in a timely fashion or at all, and our registered trademarks may not be maintained or enforced. In addition, opposition or cancellation proceedings may be filed against our trademark applications and registrations, and our trademarks may not survive such proceedings. In certain countries outside of the United States, trademark registration is required to enforce trademark rights. If we do not secure registrations for our trademarks, we may encounter more difficulty in enforcing them against third parties than we otherwise would.

We may be subject to claims challenging the inventorship or ownership of our patents and other intellectual property.

We or our licensors may be subject to claims that former employees, collaborators or other third parties have an interest in our owned or in-licensed patents, trade secrets or other intellectual property as an inventor or co-inventor. Ownership disputes may arise, for example, from conflicting obligations of employees, consultants or others who are involved in developing our future products and services. Our Co-Founder, Dr. Harlan Robins, had dual employment with the Fred Hutchinson Cancer Research Center (“Fred Hutch”) and us, and accordingly has had obligations to assign his rights to inventions to either Fred Hutch or us depending on how and where the inventions were conceived, reduced to practice, developed or created. Disputes may arise in the future between Fred Hutch and us regarding ownership of intellectual property generated by Dr. Robins’ work. Fred Hutch may claim to have ownership rights to our intellectual property.

Litigation may be necessary to defend against these and other claims by a third party challenging inventorship of our or our licensors’ ownership of our owned or in-licensed patents, trade secrets or other intellectual property. If we or our licensors fail in defending any such claims, in addition to paying monetary damages, we may lose valuable intellectual property rights, such as exclusive ownership of, or right to use, intellectual property that is important to our product or services. Alternatively, we may need to obtain one or more additional licenses from the third party which will be time-consuming and

expensive and could result in substantial costs and diversion of resources and could have a material adverse effect on our business. Even if we are successful in defending against such claims, litigation could result in substantial costs and be a distraction to management and other employees. Any of the foregoing could have a material adverse effect on our business, financial condition, results of operations and prospects.

If we become involved in patent litigation or other proceedings related to a determination of rights, we could incur substantial costs and expenses, substantial liability for damages or be required to stop our development and commercialization efforts of our products and services.

There is a substantial amount of litigation, both within and outside the United States, involving patent and other intellectual property rights in the life sciences, clinical diagnostics and drug discovery industries, including patent infringement lawsuits, declaratory judgment litigation and adversarial proceedings before the USPTO, including interferences, derivation proceedings, *ex parte* reexaminations, post-grant review and *inter partes* review, as well as corresponding proceedings in foreign courts and foreign patent offices.

We are currently involved in appeals from Opposition Proceedings at the European Patent Office related to two of our patents: EP2364368 and EP2387627. We may, in the future, become involved with litigation or actions at the USPTO or foreign patent offices with various third parties. We expect that the number of such claims may increase as our industry expands, more patents are issued, the number of products or services increases and the level of competition in our industry increases. Any infringement claim, regardless of its validity, could harm our business by, among other things, resulting in time-consuming and costly litigation, diverting management's time and attention from the development of our business, requiring the payment of monetary damages (including treble damages, attorneys' fees, costs and expenses) or royalty payments.

It may be necessary for us to pursue litigation or adversarial proceedings before the patent office in order to enforce our patent and proprietary rights or to determine the scope, coverage and validity of the proprietary rights of others. The outcome of any such litigation might not be favorable to us, and even if we were to prevail, such litigation could result in substantial costs and diversion of resources and could have a material adverse effect on our business, operating results or financial condition.

As we move into new markets and expand our products or services offerings, incumbent participants in such markets may assert their patents and other proprietary rights against us as a means of slowing our entry into such markets or as a means to extract substantial license and royalty payments from us. In addition, future litigation may involve patent holding companies or other adverse patent owners who have no relevant product or service revenue and against whom our own patents may provide little or no deterrence or protection.

Third parties may assert that we are employing their proprietary technology without authorization. Given that clinical diagnostics and drug discovery fields are intense and highly competitive areas, there may be third-party intellectual property rights that others believe could relate to our immune medicine platform, products and services. We have been approached on four occasions with an offer from a third-party patent owner or licensee to license rights to us under patents relating to immune medicine. We have been contacted by Invivoscribe, Inc. regarding U.S. Pat. No. 7,785,783 on March 24, 2012; by Keygene NV regarding U.S. Pat. No. 9,453,256 on October 10, 2016; by MorphoSys AG regarding EP Patent 2243030 and U.S. Pat. No. 9,404,929 on October 10, 2018; and by DName-iT NV regarding EP Patent 2201143 and U.S. Pat. No. 8,318,434 in December 2018. In each instance, we have declined to pursue licenses to the patents. One or more of these or other third-party patent owners or licensees may pursue or threaten to pursue litigation against us to enforce one or more patents. It would be costly and time-consuming to defend such claims.

Because patent applications can take many years to issue, there may be currently pending patent applications which may later result in issued patents that our current or future products, technologies and services may infringe. We cannot be certain that we have identified or addressed all potentially significant third-party patents in advance of an infringement claim being made against us. In addition, similar to what other companies in our industry have experienced, we expect our competitors and others may have patents or may in the future obtain patents and claim that making, having made, using, selling, offering to sell or importing our products or services infringes these patents. Defense of infringement and other claims, regardless of their merit, would involve substantial litigation expense and would be a substantial diversion of management and employee resources from our business. Parties making claims against us may be able to sustain the costs of complex patent litigation more effectively than we can because they have substantially greater resources. Parties making claims against us may be able to obtain injunctive or other relief, which could block our ability to develop, commercialize and sell products or services and could result in the award of substantial damages against us, including treble damages, attorney's fees, costs and expenses if we are found to have willfully infringed. In the event of a successful claim of infringement against us, we may be required to pay damages and ongoing royalties and obtain one or more licenses from third parties, or be prohibited from selling certain products or services. We may not be able to obtain these licenses on acceptable or commercially reasonable terms, if at all, or these licenses may be non-exclusive, which could result in our competitors gaining access to the same intellectual property. In addition, we could encounter delays in product or service introductions while we attempt to develop alternative products or services to avoid infringing third-party patents or proprietary rights. Defense of any lawsuit or failure to obtain any of these licenses could prevent us from commercializing products or services, and the prohibition of sale of any of our products or services could materially affect our business and our ability to gain market acceptance for our products or services.

Furthermore, because of the substantial amount of discovery required in connection with intellectual property litigation, there is a risk that some of our confidential information could be compromised by disclosure during this type of litigation. In addition, during the course of this kind of litigation, there could be public announcements of the results of hearings, motions or other interim proceedings or developments. If securities analysts or investors perceive these results to be negative, it could have a substantial adverse effect on the price of our common stock.

In addition, our agreements with some of our customers, suppliers or other entities with whom we do business require us to defend or indemnify these parties to the extent they become involved in infringement claims, including the types of claims described above. We could also voluntarily agree to defend or indemnify third parties in instances where we are not obligated to do so if we determine it would be important to our business relationships. If we are required or agree to defend or indemnify third parties in connection with any infringement claims, we could incur significant costs and expenses that could adversely affect our business, operating results or financial condition.

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

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

Risks Relating to our Common Stock and the Offering

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

Prior to this offering, there has been no public market for our common stock. It is possible that an active trading market may not develop following the closing of this offering or, if developed, may not be sustained. The lack of an active trading market may impair the value of your shares and your ability to sell your shares at the time you wish to sell them. An inactive trading market may also impair our ability to both raise capital by selling shares of common stock and acquire other complementary products, technologies or businesses by using our shares of common stock as consideration.

Upon the closing of this offering, our common stock will be listed on The Nasdaq Global Select Market. If we fail to satisfy the continued listing standards of The Nasdaq Global Select Market, however, we could be de-listed, which would negatively impact the price of our common stock.

The market price of our common stock is likely to be volatile and fluctuate substantially, and you may be unable to sell your shares at or above the offering price.

The initial public offering price for our shares of common stock will be determined by negotiations between us and representatives of the underwriters and may not be indicative of prices that will prevail in the trading market. In addition, the market price of our common stock is likely to be highly volatile and may fluctuate substantially due to many factors, including:

- the commencement or termination of our collaborations;
- the timing of achievement of specified milestones in the development of our products and services;
- introductions of new or expanded products or services or new pricing policies by us or by our competitors;
- changes in the status of our regulatory clearances, authorizations, approvals or applications, or those jointly developed with our collaborators;
- where required, the results of clinical trials of our future products and services, those jointly developed with our collaborators or those of our competitors;
- the success of competitive products or technologies;
- announcements by us or our competitors of significant acquisitions, collaborators or divestitures;
- changes in governmental regulations and regulatory or legal developments in the United States and other countries;
- developments or disputes concerning patent applications, issued patents or other proprietary rights;
- the recruitment or departure of key personnel;
- actual or anticipated changes in estimates as to financial results, development timelines or recommendations by securities analysts;
- variations in our financial results or those of companies that are perceived to be similar to us;
- changes in the structure of healthcare payment systems;
- market conditions in the life sciences, clinical diagnostics or drug discovery industry;
- general economic, industry and market conditions;

- sales of our securities, including sales by our directors, officers or significant shareholders;
- speculation about our business in the media or the investment community; and
- other factors, including factors unrelated to our operating performance or the operating performance of our competitors.

In recent years, the stock markets generally have experienced extreme price and volume fluctuations that have often been unrelated or disproportionate to the operating performance of listed companies. If the market for stock in our industry or the stock market in general experiences uneven investor confidence, the market price of our common stock could decline for reasons unrelated to our business, operating results or financial condition. The market price of our common stock might also decline in reaction to events that affect other companies within, or outside, our industry even if these events do not directly affect us. If the market price of shares of our common stock after this offering does not ever exceed the initial public offering price, you may not realize any return on your investment in us and may lose some or all of your investment.

In the past, securities class action litigation has often been instituted against companies following periods of volatility in their stock price. This type of litigation, if instituted against us, could result in substantial costs to us and divert our management's attention and resources, which could seriously harm our business, financial condition, results of operations and prospects.

If securities analysts do not publish research or reports about our business, or we are the subject of negative publicity, the price of our stock could decline.

If a trading market for our common stock develops, the trading market will depend, in part, on the research and reports that securities or industry analysts publish about us or our business. We do not control these analysts. As a newly public company, we may be slow to attract research coverage and the analysts who publish information about our common stock may have had relatively little experience with us or our industry, which could affect their ability to accurately forecast our results and could make it more likely that we fail to meet their estimates. In the event securities or industry analysts initiate coverage, if one or more of the analysts who cover us downgrade our stock or publish inaccurate or unfavorable evaluations of our company or our stock, the price of our stock could decline. If one or more of these analysts cease coverage of our company or fail to publish reports covering our company regularly, our stock may lose visibility in the market, which in turn could cause our stock price to decline. In addition, if we are the subject of negative publicity, whether from an analyst, academic, industry group or the general or financial press, our stock price may decline.

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

We are an "emerging growth company," as defined in the JOBS Act. For as long as we continue to be an emerging growth company, we may take advantage of certain exemptions and relief from various reporting requirements that are applicable to other public companies that are not emerging growth companies, including (i) not being required to comply with the auditor attestation requirements of Section 404 of the Sarbanes-Oxley Act of 2002 ("Sarbanes-Oxley Act"), (ii) having the option of delaying the adoption of certain new or revised financial accounting standards, (iii) reduced disclosure obligations regarding executive compensation in this prospectus and our periodic reports and proxy statements and (iv) exemptions from the requirements of holding a nonbinding advisory vote on executive compensation and shareholder approval of any golden parachute payments not previously approved. We may take advantage of these exemptions until such time that we are no longer an emerging growth company. Accordingly, the information contained herein may be different than the information you receive from other public companies in which you hold stock. Further, pursuant to

Section 107 of the JOBS Act, we have elected to take advantage of the extended transition period for complying with new or revised accounting standards until those standards would otherwise apply to private companies. As a result, our operating results and financial statements may not be comparable to the operating results and financial statements of other companies who have adopted the new or revised accounting standards. It is possible that some investors will find our common stock less attractive as a result, which may result in a less active trading market for our common stock and higher volatility in our stock price.

We will remain an emerging growth company until the earliest of (i) the last day of the fiscal year following the fifth anniversary of the closing of this offering, (ii) the last day of the fiscal year in which we have total annual gross revenue of at least $1.07 billion, (iii) the last day of the fiscal year in which we are deemed to be a "large accelerated filer" as defined in Rule 12b-2 under the Exchange Act, which would occur if the market value of our common stock held by non-affiliates exceeded $700.0 million as of the last business day of the second fiscal quarter of such year or (iv) the date on which we have issued more than $1.0 billion in non-convertible debt securities during the prior three-year period.

If our estimates or judgments relating to our critical accounting policies are based on assumptions that change or prove to be incorrect, our operating results could fall below our publicly announced guidance or the expectations of securities analysts and investors, resulting in a decline in the market price of our common stock.

The preparation of financial statements in conformity with accounting principles generally accepted in the United States ("GAAP") requires management to make estimates and assumptions that affect the amounts reported in our financial statements and accompanying notes. We base our estimates on historical experience and on various other assumptions that we believe to be reasonable under the circumstances, the results of which form the basis for making judgments about the carrying values of assets, liabilities, equity, revenue and expenses that are not readily apparent from other sources. As we work toward adopting and implementing the new revenue accounting standard, management will make judgments and assumptions based on our interpretation of the new standard. The new revenue standard is principle-based and interpretation of those principles may vary from company to company based on their unique circumstances. It is possible that interpretation, industry practice and guidance may evolve as we work toward implementing the new standard. If our assumptions change or if actual circumstances differ from our assumptions, our operating results may be adversely affected and could fall below our publicly announced guidance or the expectations of securities analysts and investors, resulting in a decline in the market price of our common stock.

If you purchase our common stock in this offering, you will incur immediate and substantial dilution in the book value of your shares.

Investors purchasing common stock in this offering will pay a price per share that substantially exceeds the pro forma as adjusted net tangible book value per share, which gives effect to the automatic conversion of all of our outstanding shares of convertible preferred stock into common stock, and the issuance of shares of our common stock upon the exercise of an outstanding warrant to purchase our common stock that would otherwise expire. As a result, investors purchasing common stock in this offering will incur immediate dilution of $ per share, based on the initial public offering price of $ per share, and our pro forma as adjusted net tangible book value per share as of December 31, 2018.

This dilution is due to the substantially lower price paid by our investors who purchased our capital stock prior to this offering, including on the exercise of options and warrants, as compared to

the price to the public in this offering. In addition, we have, in the past, issued options and other securities to acquire our common stock at prices significantly below the initial public offering price. If all of these outstanding warrants and options to purchase shares as of December 31, 2018 were exercised, our pro forma as adjusted net tangible book value would be $ per share, representing an immediate increase in pro forma as adjusted net tangible book value of $ per share to our existing shareholders and an immediate dilution of $ per share to new investors participating in this offering. For more information on the dilution you may suffer as a result of investing in this offering, see the "*Dilution*" section of this prospectus.

A significant portion of our total outstanding shares are restricted from immediate resale but may be sold into the market in the near future. The large number of shares eligible for public sale or subject to rights requiring us to register them for public sale could cause the market price of our common stock to drop significantly, even if our business is doing well.

Sales of a substantial number of shares of our common stock in the public market could occur at any time, subject to certain restrictions described below. These sales, or the perception in the market that the holders of a large number of shares intend to sell their shares, could depress the market price of our common stock and could impair our ability to raise capital through the sale of additional equity securities. We are unable to predict the effect that these sales may have on the prevailing market price of our common stock. Based on shares of our common stock outstanding as of December 31, 2018, we will have shares of our common stock outstanding after this offering. This includes the shares that we are selling in this offering, which may be resold in the public market immediately without restriction, unless purchased by our affiliates. Of the remaining shares, substantially all are currently restricted as a result of securities laws, market standoff agreements or 180-day lock-up agreements, but will be able to be sold after the offering as described in the "*Shares Eligible for Future Sale*" section of this prospectus. Subject to certain limitations, based on shares of our common stock outstanding as of December 31, 2018, approximately shares will become eligible for sale beginning 181 days after the date of this prospectus. Moreover, upon the closing of this offering, shareholders owning an aggregate of up to approximately shares of our common stock will have rights, subject to certain conditions, to require us to file registration statements covering their securities or to include their securities in registration statements that we may file for ourselves or other security holders as described in the "*Description of Capital Stock—Registration Rights*" section of this prospectus. We also intend to file one or more registration statements on Form S-8 under the Securities Act of 1933, as amended ("Securities Act") to register our shares of common stock issued or reserved for issuance under our equity incentive plans. Any such Form S-8 registration statements will automatically become effective upon filing with the SEC. Accordingly, shares of common stock registered under such registration statements will be available for sale in the open market, subject to volume limitations applicable to affiliates, vesting restrictions with us, and the market standoff agreements and lock-up agreements described in the "*Underwriting*" section of this prospectus.

Raising additional capital may cause dilution to our existing shareholders, restrict our operations or require us to relinquish rights to our technologies, products or services.

We may seek additional capital through a combination of public and private equity offerings, debt financings, collaborations and licensing arrangements. To the extent that we raise additional capital through the sale of equity or debt securities, your ownership interest will be diluted and the terms may include other preferences that adversely affect your rights as a shareholder. The incurrence of indebtedness, if obtained, would result in increased fixed payment obligations and could involve restrictive covenants, such as limitations on our ability to incur additional debt, limitations on our ability to acquire or license intellectual property rights and other operating restrictions that could adversely impact our ability to conduct our business. If we raise additional funds through collaborations and alliances and licensing arrangements with third parties or through asset sales, we may have to

relinquish valuable rights to our technologies, products or services, or grant licenses on terms unfavorable to us.

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

As of March 31, 2019, our executive officers, directors and five percent or greater shareholders and their respective affiliates, beneficially own, in the aggregate, approximately 63.8% of our outstanding common stock on an as converted basis and, upon the closing of this offering, that same group will beneficially own, in the aggregate, approximately % of our outstanding common stock. As a result, after this offering, these shareholders, if they act together, will be able to control the management and affairs of our company and most matters requiring shareholder approval, including the election of directors, amendments of our organizational documents and approval of any merger, sale of substantially all our assets or other significant corporate transactions. This concentration of ownership may prevent or discourage unsolicited acquisition proposals or offers for our common stock that you or other shareholders may feel are in your or their best interest as one of our shareholders.

We will have broad discretion in the use of the net proceeds to us from this offering and may not use them effectively or may allocate them in ways that you and other shareholders may not approve.

Our management will have broad discretion in the application of the net proceeds from this offering, including for any of the purposes described in the "*Use of Proceeds*" section of this prospectus, and you will not have the opportunity as part of your investment decision to assess whether the net proceeds are being used appropriately. Because of the number and variability of factors that will determine our use of the net proceeds from this offering, their ultimate use may vary substantially from their currently intended use. Our management might not apply our net proceeds in ways that ultimately improve our results of operations or increase the value of your investment or in ways that you and other shareholders approve. The failure by our management to apply these funds effectively could result in financial losses that could have a material adverse impact on our business, cause the price of our common stock to decline and delay the development of our products and services. Pending their use, we plan to invest the net proceeds from this offering in short-term, interest-bearing, investment-grade instruments, certificates of deposit or direct or guaranteed obligations of the U.S. government. These investments may not yield a favorable return to our shareholders.

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. We will be subject to financial reporting and other requirements for which our accounting and other management systems and resources may not be adequately prepared.

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. In addition, the federal securities laws, including the Sarbanes-Oxley Act, the Dodd-Frank Wall Street Reform and Consumer Protection Act of 2010, and rules and regulations subsequently implemented by the SEC and The Nasdaq Global Select Market have imposed various requirements on public companies, including requirements to file annual, quarterly, and event driven reports with respect to their business and financial condition, and to establish and maintain effective disclosure and financial controls and corporate governance practices. These rules and regulations will increase our legal and financial compliance costs, make certain activities more time-consuming and costly, and require our management and other personnel to devote a substantial amount of time to compliance initiatives.

Despite our best efforts, we may not be able to produce reliable financial statements or file such financial statements as part of a periodic report in a timely manner with the SEC or comply with The Nasdaq Global Select Market listing requirements. We also expect that these rules and regulations may make it more difficult and more expensive for us to obtain director and officer liability insurance.

Pursuant to Section 404 of the Sarbanes-Oxley Act, we will be required to furnish a report by our management on our internal control over financial reporting, including an attestation report on internal control over financial reporting issued by our independent registered public accounting firm, beginning with the first full year after the closing of this offering. However, while we remain an emerging growth company, we will not be required to include an attestation report on internal control over financial reporting issued by our independent registered public accounting firm. To achieve compliance with Section 404 of the Sarbanes-Oxley Act, we will be engaged in a process to document and evaluate our internal control over financial reporting, which is both costly and challenging. We will need to continue to dedicate internal resources, potentially engage outside consultants, adopt a detailed work plan to assess and document the adequacy of internal control over financial reporting, continue steps to improve control processes as appropriate, validate through testing that controls are functioning as documented and implement a continuous reporting and improvement process for internal control over financial reporting. Despite our efforts, there is a risk that neither we nor our independent registered public accounting firm will be able to conclude within the prescribed timeframe that our internal control over financial reporting is effective as required by Section 404 of the Sarbanes-Oxley Act. This could result in an adverse reaction in the financial markets due to a loss of confidence in the reliability of our financial statements. We could also become subject to investigations by the SEC or other regulatory authorities, which could require additional financial and management resources.

As a public company, we will also be required to maintain disclosure controls and procedures. Disclosure controls and procedures means our controls and other procedures that are designed to ensure that information required to be disclosed by us in the reports that we file or submit under the Exchange Act is recorded, processed, summarized and reported, within the time periods specified in the rules and forms of the SEC. We do not expect that our disclosure controls and procedures or our internal control over financial reporting will prevent or detect all errors and all fraud. We believe a control system, no matter how well-designed and operated, can provide only reasonable, not absolute, assurance that the control system's objectives will be met. Due to the inherent limitations in all control systems, no evaluation of controls can provide absolute assurance that misstatements due to error or fraud will not occur or that all control issues and instances of fraud, if any, have been detected. The design of any system of controls is based in part on certain assumptions about the likelihood of future events, and any design may not succeed in achieving its stated goals under all potential future conditions. Over time, controls may become inadequate because of changes in conditions or deterioration in the degree of compliance with policies or procedures. Accordingly, because of the inherent limitations in our control system, misstatements due to error or fraud may occur and not be detected.

Provisions in our amended and restated charter documents that will be in effect at the closing of this offering and under Washington law could make an acquisition of our company more difficult and limit attempts by our shareholders to replace or remove our current management.

Our amended and restated articles of incorporation and our amended and restated bylaws, each as will be in effect at the closing of this offering, as well as Washington law contain provisions that may have the effect of deterring takeovers or delaying or preventing a change in control of us or changes in our management that a shareholder might deem to be in his or her best interest. Our amended and restated articles of incorporation and amended and restated bylaws contain provisions that:

- authorize "blank check" preferred stock, which could be issued by our board of directors without shareholder approval and may contain voting, liquidation, dividend and other rights superior to our common stock;

- create a classified board of directors whose members serve staggered three-year terms, with one class being elected each year by our shareholders;
- specify that special meetings of our shareholders can be called only by our board of directors, the Chairperson of our board of directors, our chief executive officer or our president;
- provide that a director may only be removed from the board of directors for cause and then only by the affirmative vote of our shareholders;
- provide that vacancies on our board of directors may be filled only by a majority of directors then in office, even if less than a quorum;
- specify that only our board of directors may change the size of our board of directors;
- establish an advance notice procedure for shareholder proposals to be brought before an annual meeting of our shareholders, including proposed nominations of persons for election to our board of directors;
- specify that no shareholder is permitted to cumulate votes at any election of directors;
- expressly authorize our board of directors to modify, alter or repeal our bylaws; and
- require supermajority votes of the holders of our common stock to amend specified provisions of our amended and restated articles of incorporation and amended and restated bylaws.

These provisions, alone or together, could delay or prevent hostile takeovers and changes in control or changes in our management or our board of directors.

In addition, because we are incorporated in the State of Washington, we are governed by the provisions of Chapter 23B.19 of the Washington Business Corporation Act ("WBCA"), which prohibits certain business combinations between us and certain significant shareholders unless specified conditions are met. These provisions may also have the effect of delaying or preventing a change in control of our company.

Any provision of our amended and restated articles of incorporation or amended and restated bylaws or Washington law that has the effect of delaying or deterring a change in control could limit the opportunity for our shareholders to receive a premium for their shares of our common stock, and could also affect the price that some investors are willing to pay for our common stock.

Our amended and restated articles of incorporation that will be in effect at the closing of this offering will provide that the state courts located in King County, Washington 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 shareholders, which could limit our shareholders' ability to obtain a favorable judicial forum for disputes with us or our directors, officers, or employees.

Our amended and restated articles of incorporation that will be in effect upon the closing of this offering will provide that, unless we consent in writing to the selection of an alternative forum, the state courts located in King County, Washington (or, if the state courts located within King County, Washington do not have jurisdiction, the federal district court for the Western District of Washington) shall be the sole and exclusive forum for commencing and maintaining any proceeding (i) asserting a claim based on a violation of a duty under the laws of the State of Washington by any of our current or former directors, officers or shareholders in such capacity, (ii) commenced or maintained in the right of our corporation, (iii) asserting a claim arising pursuant to any provision of the WBCA, our amended and restated articles of incorporation or our amended and restated bylaws (as either may be amended from time to time) or (iv) asserting a claim concerning our internal affairs that is not included in clauses

(i) through (iii) above, in all cases to the fullest extent permitted by law and subject to the court having personal jurisdiction over the indispensable parties named as defendants. These provisions would not apply to suits brought to enforce a duty or liability created by the Exchange Act, or any other claim for which the federal courts have exclusive jurisdiction.

Our amended and restated articles of incorporation will provide 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 applicable law.

Any person or entity purchasing or otherwise acquiring any interest in any of our securities shall be deemed to have notice of and consented to these provisions. These exclusive-forum provisions may limit a shareholder's ability to bring a claim in a judicial forum of its choosing 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 a court were to find these exclusive-forum provisions in our amended and restated articles of incorporation to be inapplicable or unenforceable in an action, we may incur additional costs associated with resolving the dispute in other jurisdictions, which could harm our results of operations. 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 under Delaware law. It is unclear whether the Delaware Supreme Court will review and ultimately overturn this decision, and whether Washington courts would reach a similar conclusion under Washington law. In addition, the provision may be unenforceable under federal law if it is deemed to bind a person acquiring any security to waive compliance with any provision of the Securities Act or of SEC rules and regulations. Even if we are successful in defending against these claims, litigation could result in substantial costs and be a distraction to management and other employees.

Claims for indemnification by our directors and officers may reduce our available funds to satisfy successful third-party claims against us and may reduce the amount of money available to us.

Our amended and restated articles of incorporation that will be in effect at the closing of this offering provide that we will indemnify our directors and officers to the fullest extent permitted by Washington law.

In addition, as permitted by Section 23B.08.510 through Section 23B.08.570 of the WBCA, our amended and restated articles of incorporation and our indemnification agreements that we have entered into with our directors and officers provide that:

- We will indemnify our directors and officers for serving us in those capacities or for serving other business enterprises at our request, to the fullest extent permitted by Washington law. Washington law provides that a corporation may indemnify such person if such person acted in good faith and in a manner such person reasonably believed to be in or not opposed to our best interests and, with respect to any criminal proceeding, had no reasonable cause to believe such person's conduct was unlawful;
- We may, in our discretion, indemnify employees and agents in those circumstances where indemnification is permitted by applicable law;
- We are required to advance expenses, as incurred, to our directors and officers in connection with defending a proceeding, except that such directors or officers shall undertake to repay such advances if it is ultimately determined that such person is not entitled to indemnification;

- The rights conferred in our amended and restated articles of incorporation are not exclusive, and we are authorized to enter into indemnification agreements with our directors, officers, employees and agents and to obtain insurance to indemnify such persons; and
- We may not retroactively amend our amended and restated articles of incorporation provisions to reduce our indemnification obligations to directors, officers, employees and agents.

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 currently intend to retain all available funds and any future earnings to support operations and to finance the growth and development of our business, and do not anticipate paying any cash dividends on our common stock for the foreseeable future. In addition, the terms of any future debt agreements may preclude us from paying dividends. As a result, capital appreciation, if any, of our common stock will be your sole source of gain for the foreseeable future.

SPECIAL NOTE REGARDING FORWARD-LOOKING STATEMENTS

This prospectus contains forward-looking statements that are based on management's beliefs and assumptions and on information currently available to management. Some of the statements in the "*Prospectus Summary*," "*Risk Factors*," "*Management's Discussion and Analysis of Financial Condition and Results of Operations*" and "*Business*" sections of this prospectus and elsewhere in this prospectus contain forward-looking statements. In some cases, you can identify forward-looking statements by the following words: "may," "will," "could," "would," "should," "expect," "intend," "plan," "anticipate," "believe," "estimate," "predict," "project," "potential," "continue," "ongoing" or the negative of these terms or other comparable terminology, although not all forward-looking statements contain these words.

These statements involve risks, uncertainties and other factors that may cause actual results, levels of activity, performance or achievements to be materially different from the information expressed or implied by these forward-looking statements. Although we believe we have a reasonable basis for each forward-looking statement contained in this prospectus, we caution you that these statements are based on a combination of facts and factors currently known by us and our projections of the future, about which we cannot be certain. Forward-looking statements in this prospectus include, but are not limited to, statements about:

- the success of our significant investments in our continued research and development of new products and services;
- the success of developing, commercializing and achieving commercial market acceptance of clonoSEQ, immunoSEQ Dx, our TCR-Antigen Map, TCR-based cellular therapies and additional products and services beyond our current portfolio;
- the potential for our identified research priorities to advance our proprietary immune medicine platform or our future products and services;
- the success, cost and timing of our research development activities, preclinical and clinical studies and, in certain instances, clinical trials and clinical validations;
- the potential benefits of collaborations, our ability to enter into collaborations or arrangements, and our ability to attract collaborators with development, manufacturing, regulatory and commercialization expertise;
- the ability and willingness of our collaborators to continue development, manufacturing, distribution and commercialization activities relating to our jointly developed products and services;
- our ability to identify research priorities and apply a risk-mitigated strategy to efficiently discover and develop products and services;
- our ability to obtain and maintain regulatory approval of our products and services;
- our ability, and that of our collaborators, to commercialize our products and services;
- our ability to generate revenue and obtain funding for our operations, including funding necessary to complete further development of our current and future products and services, and if successful, commercialization;
- the size and growth potential of the markets for our products and services, and our ability to serve those markets, either alone or in combination with others;
- the rate and degree of market acceptance of our products and services;
- our financial performance;

- the pricing and reimbursement of our products and services following approval where required;
- our expectations regarding our ability to obtain and maintain intellectual property protection for our immune medicine platform, products, services and related technologies and the direction of such protection;
- regulatory developments in the United States and foreign countries;
- the success of competing products or services that are or may become available;
- developments relating to our competitors and our industry;
- our ability to attract and retain key scientific or management personnel;
- the impact of laws and regulations;
- our estimates regarding expenses, future revenue, capital requirements and needs for additional financing; and
- our use of the proceeds from this offering.

In addition, you should refer to the "*Risk Factors*" section of this prospectus for a discussion of other important factors that may cause actual results to differ materially from those expressed or implied by the forward-looking statements. As a result of these factors, we cannot assure you that the forward-looking statements in this prospectus will prove to be accurate. Furthermore, if the forward-looking statements prove to be inaccurate, the inaccuracy may be material. 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. The forward-looking statements in this prospectus represent our views as of the date of this prospectus. We anticipate that subsequent events and developments will cause our views to change. However, while we may elect to update these forward-looking statements at some point in the future, we have no current intention of doing so except to the extent required by applicable law. You should, therefore, not rely on these forward-looking statements as representing our views as of any date subsequent to the date of this prospectus.

MARKET AND INDUSTRY DATA

This prospectus contains estimates, projections and other information concerning our industry and our business, as well as data regarding market size, estimates and forecasts prepared by our management. Information that is based on estimates, forecasts, projections, market research or similar methodologies is inherently subject to uncertainties and actual events or circumstances may differ materially from events and circumstances that are assumed in this information. Unless otherwise expressly stated, we obtained this industry, business, market and other data from reports, research surveys, studies and similar data prepared by market research firms and other third parties, industry, medical and general publications, government data and similar sources. In some cases, we do not expressly refer to the sources from which these data are derived. In that regard, when we refer to one or more sources of this type of data in any paragraph, you should assume that other data of this type appearing in the same paragraph is derived from the same sources, unless otherwise expressly stated or the context otherwise requires.

USE OF PROCEEDS

We estimate that the net proceeds from this offering will be approximately $ million, or $ million if the underwriters exercise in full their option to purchase additional shares of our common stock, assuming an initial public offering price of $ per share, the midpoint of the price range set forth on the cover page of this prospectus, after deducting the estimated underwriting discounts and commissions and estimated offering expenses.

Each $1.00 increase (decrease) in the assumed initial public offering price of $ per share of common stock, the midpoint of the price range set forth on the cover page of this prospectus, would increase (decrease) the net proceeds to us by approximately $ million, assuming that the number of shares offered by us, as set forth on the cover page of this prospectus, remains the same, and after deducting the estimated underwriting discounts and commissions. We may also increase or decrease the number of shares we are offering. Each increase (decrease) of 1,000,000 shares in the number of shares of common stock offered by us would increase (decrease) the net proceeds to us by approximately $ million, assuming that the assumed initial public offering price remains the same, and after deducting the estimated underwriting discounts and commissions.

The principal purposes of this offering are to increase our financial flexibility, obtain additional capital to support our operations, create a public market for our common stock and to facilitate our potential future access to the public equity markets. We expect to use the net proceeds from this offering as follows:

- $ million to $ million to fund commercial and marketing activities associated with our clinical products and services;
- $ million to $ million to fund continued research and development for our drug discovery initiatives; and
- $ million to $ million to fund ongoing investments in our TCR-Antigen Map related activities.

We expect to use the remainder, if any, to scale our laboratory operations with our anticipated growth, for working capital and for other general corporate purposes.

We currently believe the net proceeds from this offering will allow us to develop clonoSEQ for CLL and NHL through FDA authorization and reimbursement, immunoSEQ Dx for a selected indication into clinical validation, and one of our TCR-based cell therapies through IND submission. We believe our cash flows from operations and our existing cash, cash equivalents and marketable securities, together with the net proceeds from this offering, will be sufficient to fund our operating expenses and capital expenditure requirements through at least the 24 months following the date of this prospectus.

The estimated use of proceeds is preliminary and subject to change. We cannot specify with certainty all of the particular uses for the net proceeds to be received upon the closing of this offering. Due to uncertainties inherent in the development process, it is difficult to estimate the exact amounts of the net proceeds that will be used for any particular purpose. We may use our existing cash, cash equivalents, marketable securities and the future payments, if any, generated from any future collaboration agreements to fund our operations, either of which may alter the amount of net proceeds used for a particular purpose. In addition, the amount, allocation and timing of our actual expenditures will depend upon numerous factors, including the results of our research and development efforts, the timing and success of our Genentech and Microsoft collaborations and the timing of regulatory submissions. Accordingly, we will have broad discretion in using these proceeds.

Pending their use, we plan to invest the net proceeds from this offering in short-term, interest-bearing, investment-grade instruments, certificates of deposit or direct or guaranteed obligations of the U.S. government.

DIVIDEND POLICY

We currently intend to retain all available funds and any future earnings to fund the growth and development of our business. We do not intend to pay cash dividends to our shareholders in the foreseeable future. Any future determination to declare dividends will be made at the discretion of our board of directors and will depend on our financial condition, operating results, capital requirements, general business conditions and other factors that our board of directors may deem relevant. Our future ability to pay cash dividends on our common stock may also be limited by the terms of any future debt securities, preferred stock or credit facility.

CAPITALIZATION

The following table sets forth our capitalization as of December 31, 2018:

- on an actual basis;
- on a pro forma basis to reflect: (i) the conversion of all outstanding shares of our convertible preferred stock into an aggregate of 92,790,094 shares of common stock upon the closing of this offering; (ii) the issuance of 20,000 shares of common stock upon the exercise of an outstanding warrant to purchase our common stock immediately prior to the closing of this offering that would otherwise expire; (iii) the conversion of an outstanding warrant to purchase our convertible preferred stock into a warrant to purchase an aggregate of 56,875 shares of our common stock upon the closing of this offering; and (iv) the filing and effectiveness of our amended and restated articles of incorporation upon the closing of this offering; and
- on a pro forma as adjusted basis to give further effect to the issuance and sale of shares of common stock in this offering at an assumed initial public offering price of $ per share of common stock, the midpoint of the price range set forth on the cover page of this prospectus, and after deducting the estimated underwriting discounts and commissions and estimated offering expenses.

The pro forma as adjusted information below is illustrative only and our capitalization following the closing of this offering will be adjusted based on the actual initial public offering price and other terms of this offering determined at pricing. You should read this information together with our financial statements and related notes appearing elsewhere in this prospectus and the information set forth in the "*Use of Proceeds*," "*Selected Financial Data*" and "*Management's Discussion and Analysis of Financial Condition and Results of Operations*" sections of this prospectus.

	As of December 31, 2018		
	Actual	Pro Forma	Pro Forma As Adjusted[1]
	(in thousands, except for share and per share amounts)		
Cash, cash equivalents and marketable securities	$ 165,018	$ 165,027	$
Convertible preferred stock warrant liability	$ 336	$ —	$
Convertible preferred stock, $0.0001 par value per share; 93,762,517 shares authorized, 92,790,094 issued and outstanding, actual; no shares authorized, issued or outstanding, pro forma and pro forma as adjusted	560,858	—	
Shareholders' (deficit) equity:			
Preferred stock, $0.0001 par value per share; no shares authorized, issued or outstanding, actual; shares authorized, no shares issued or outstanding, pro forma and pro forma as adjusted	—	—	
Common stock, $0.0001 par value per share; 131,000,000 shares authorized, 12,841,536 shares issued and outstanding, actual; authorized, pro forma and pro forma as adjusted, 105,651,630 issued and outstanding, pro forma; shares issued and outstanding, pro forma as adjusted	1	11	
Additional paid-in capital	37,902	599,095	
Accumulated other comprehensive loss	(107)	(107)	
Accumulated deficit	(295,908)	(295,908)	
Total shareholders' (deficit) equity	(258,112)	303,091	
Total capitalization	$ 303,082	$ 303,091	$

(1) Each $1.00 increase (decrease) in the assumed initial public offering price of $ per share of common stock, the midpoint of the price range set forth on the cover page of this prospectus, would increase (decrease) our pro forma as adjusted cash, cash equivalents and marketable securities by approximately $ million, and our pro forma as adjusted amount of additional paid-in capital, total shareholders' (deficit) equity and total capitalization by approximately $ million, assuming that the number of common stock offered by us, as set forth on the cover page of this prospectus, remains the same, and after deducting the estimated underwriting discounts and commissions. We may also increase or decrease the number of shares we are offering. Each increase (decrease) of 1,000,000 shares in the number of shares of common stock offered by us would increase (decrease) our pro forma as adjusted cash, cash equivalents and marketable securities, additional paid-in capital, total shareholders' (deficit) equity and total capitalization by approximately $ million, assuming that the assumed initial price to the public remains the same, and after deducting the estimated underwriting discounts and commissions. The pro forma as adjusted information discussed above is illustrative only and will be adjusted based on the actual public offering price and other terms of this offering determined at pricing.

If the underwriters exercise their option to purchase additional shares in full, pro forma as adjusted cash, cash equivalents and marketable securities, additional paid-in capital, total shareholders' (deficit) equity, total capitalization and shares of common stock outstanding as of December 31, 2018 would be $, $, $, $ and shares, respectively.

The total number of shares of our common stock reflected in our actual, pro forma and pro forma as adjusted information set forth in the table above excludes:

- 56,875 shares of common stock issuable upon the exercise of a warrant to purchase shares of convertible preferred stock outstanding as of December 31, 2018, with an exercise price of $2.64 per share;
- 35,032 shares of common stock issuable upon the exercise of a warrant to purchase shares of common stock outstanding as of December 31, 2018, with an exercise price of $0.33 per share;
- 264,677 shares of common stock issuable upon the exercise of stock options to purchase shares of convertible preferred stock outstanding as of December 31, 2018 under our Sequenta Plan with a weighted-average exercise price of $0.44 per share;
- 14,893,253 shares of common stock issuable upon the exercise of stock options outstanding as of December 31, 2018 under our 2009 Plan with a weighted-average exercise price of $4.59 per share, and 3,093,831 shares of common stock issuable upon the exercise of stock options issued after December 31, 2018, under our 2009 Plan, with a weighted-average exercise price of $7.43 per share;
- shares of common stock that will become available for future issuance under the 2019 Plan (which includes all shares reserved for issuance under our 2009 Plan) upon the effectiveness of the registration statement of which this prospectus forms a part; and
- shares of common stock that will become available for future issuance under our ESPP upon the effectiveness of the registration statement of which this prospectus forms a part.

DILUTION

If you invest in our common stock in this offering, your ownership interest will be immediately diluted to the extent of the difference between the initial public offering price per share and the pro forma as adjusted net tangible book value per share of our common stock immediately after this offering.

Our historical net tangible book value as of December 31, 2018 was a deficit of $390.7 million, or a deficit of $30.43 per share of our common stock. Our historical net tangible book value is the amount of our total tangible assets less our total liabilities. Historical net tangible book value per share represents historical net tangible book value divided by the 12,841,536 shares of our common stock outstanding as of December 31, 2018.

Our pro forma net tangible book value as of December 31, 2018 was $170.5 million, or $1.61 per share of our common stock. Pro forma net tangible book value per share represents historical net tangible book value divided by the number of shares of our common stock outstanding as of December 31, 2018, after giving effect to: (i) the conversion of all outstanding shares of our convertible preferred stock into an aggregate of 92,790,094 shares of common stock upon the closing of this offering; (ii) the issuance of 20,000 shares of common stock upon the exercise of an outstanding warrant to purchase our common stock immediately prior to the closing of this offering that would otherwise expire; and (iii) the conversion of an outstanding warrant to purchase our convertible preferred stock into a warrant to purchase an aggregate of 56,875 shares of our common stock upon the closing of this offering.

After giving further effect to the sale by us of shares of common stock in this offering at an assumed initial public price of $ per share, the midpoint of the estimated price range set forth on the cover page of this prospectus, and after deducting the estimated underwriting discounts and commissions and estimated offering expenses, our pro forma as adjusted net tangible book value as of December 31, 2018 would have been approximately $, or $ per share. This amount represents an immediate increase in pro forma as adjusted net tangible book value of $ per share to our existing shareholders and an immediate dilution of $ per share to new investors participating in this offering.

We determine dilution per share to investors participating in this offering by subtracting pro forma as adjusted net tangible book value per share after this offering from the assumed initial public offering price per share paid by investors participating in this offering. The following table illustrates this dilution:

Assumed initial public offering price per share		$
Historical net tangible book deficit per share as of December 31, 2018	$ (30.43)	
Pro forma increase in net tangible book value per share	32.04	
Pro forma net tangible book value per share as of December 31, 2018	1.61	
Increase in pro forma net tangible book value per share attributable to new investors participating in this offering		
Pro forma as adjusted net tangible book value per share after this offering		
Dilution per share to new investors participating in this offering		$

Each $1.00 increase (decrease) in the assumed initial public offering price of $ per share, the midpoint of the price range set forth on the cover page of this prospectus, would increase (decrease) the pro forma as adjusted net tangible book value by $ per share and increase (decrease) the dilution per share to new investors by $ per share, assuming the number of

shares of common stock offered by us, as set forth on the cover page of this prospectus, remains the same, and after deducting the estimated underwriting discounts and commissions.

Similarly, each increase (decrease) of 1,000,000 shares in the number of common stock we are offering would increase (decrease) our pro forma as adjusted net tangible book value by approximately $ million, or $ per share, and decrease (increase) the dilution per share to new investors participating in this offering by $ per share, assuming that the assumed initial public offering price of $, the midpoint of the estimated price range set forth on the cover page of this prospectus, remains the same, and after deducting the estimated underwriting discounts and commissions.

The pro forma as adjusted information discussed above is illustrative only and will change based on the actual initial public offering price, number of shares and other terms of this offering determined at pricing.

If the underwriters exercise their option to purchase additional shares in this offering in full at the assumed initial public offering price of $ per share, the midpoint of the price range set forth on the cover page of this prospectus, and assuming the number of shares of common stock offered by us, as set forth on the cover page of this prospectus, remains the same, and after deducting estimated underwriting discounts and commissions and estimated offering expenses, the pro forma as adjusted net tangible book value would be approximately $ per share, and the dilution in pro forma net tangible book value per share to investors in this offering would be approximately $ per share.

The table below summarizes, as of December 31, 2018, on a pro forma as adjusted basis, the number of shares of common stock purchased from us, the total consideration and the average price per share (i) paid to us by our existing shareholders and (ii) to be paid by new investors participating in this offering at an assumed initial public offering price of $ per share, the midpoint of the price range set forth on the cover page of this prospectus, before deducting estimated underwriting discounts and commissions and estimated offering expenses.

	Shares Purchased		Total Consideration		Average Price Per Share
	Number	Percent	Amount	Percent	
Existing shareholders		%	$	%	$
Investors in this offering					
Total		100.0%		100.0%	

In addition, if the underwriters exercise their option to purchase additional shares in full, the number of shares held by existing shareholders will be reduced to % of the total number of shares of common stock to be outstanding upon the closing of this offering, and the number of shares of common stock held by new investors participating in this offering will be further increased to , or % of the total number of shares of common stock to be outstanding upon the closing of this offering.

Each $1.00 increase (decrease) in the assumed initial public offering price of $ per share, the midpoint of the estimated price range set forth on the cover page of this prospectus, would increase (decrease) total consideration paid by new investors by $ million, assuming the number of shares of common stock we are offering, as set forth on the cover page of this prospectus, remains the same, after deducting the estimated underwriting discounts and commissions. Each increase (decrease) of 1,000,000 in the number of shares of common stock offered by us would increase (decrease) total consideration paid by new investors by $ million, assuming that the assumed initial public offering price of $, the midpoint of the estimated price range set forth on the cover page of this prospectus, remains the same, and after deducting the estimated underwriting discounts and commissions.

The above discussion and tables are based on shares of common stock issued and outstanding as of December 31, 2018 and (i) includes the conversion of all outstanding shares of our convertible preferred stock into an aggregate of 92,790,094 shares of our common stock upon the closing of this offering and the issuance of 20,000 shares of common stock upon exercise of an outstanding common stock warrant immediately prior to the closing of this offering and (ii) excludes:

- 56,875 shares of common stock issuable upon the exercise of a warrant to purchase shares of convertible preferred stock outstanding as of December 31, 2018, with an exercise price of $2.64 per share;
- 35,032 shares of common stock issuable upon the exercise of a warrant to purchase shares of common stock outstanding as of December 31, 2018, with an exercise price of $0.33 per share;
- 264,677 shares of common stock issuable upon the exercise of stock options to purchase shares of convertible preferred stock outstanding as of December 31, 2018 under our Sequenta Plan with a weighted-average exercise price of $0.44 per share;
- 14,893,253 shares of common stock issuable upon the exercise of stock options outstanding as of December 31, 2018 under our 2009 Plan with a weighted-average exercise price of $4.59 per share, and 3,093,831 shares of common stock issuable upon the exercise of stock options issued after December 31, 2018, under our 2009 Plan, with a weighted-average exercise price of $7.43 per share;
- shares of common stock that will become available for future issuance under the 2019 Plan (which includes all shares reserved for issuance under our 2009 Plan) upon the effectiveness of the registration statement of which this prospectus forms a part; and
- shares of common stock that will become available for future issuance under our ESPP upon the effectiveness of the registration statement of which this prospectus forms a part.

To the extent that outstanding stock options or warrants are exercised, new stock options or warrants are issued or we issue additional shares of common stock in the future, there will be further dilution to new investors. If all of these outstanding warrants and options to purchase shares as of December 31, 2018 were exercised, our pro forma as adjusted net tangible book value would be $ per share, representing an immediate increase in pro forma as adjusted net tangible book value of $ per share to our existing shareholders and an immediate dilution of $ per share to new investors participating in this offering.

In addition, we may choose to raise additional capital because of market conditions or strategic considerations, even if we believe we have sufficient funds for our current or future operating plans. If we raise additional capital through the sale of equity or convertible debt securities, the issuance of these securities could result in further dilution to our shareholders.

SELECTED FINANCIAL DATA

The selected financial data set forth below should be read together with our financial statements and the related notes to those statements, as well as the "*Management's Discussion and Analysis of Financial Condition and Results of Operations*" section of this prospectus. The statements of operations data for the years ended December 31, 2017 and 2018 and the balance sheet data as of December 31, 2017 and 2018 have been derived from our audited financial statements included elsewhere in this prospectus. Our historical results are not necessarily indicative of results that may be expected in the future.

	Year Ended December 31,	
	2017	2018
	(in thousands, except share and per share data)	
Statements of Operations Data:		
Revenue:		
Sequencing revenue	$ 22,759	$ 32,978
Development revenue	15,689	22,685
Total revenue	38,448	55,663
Operating expenses:		
Cost of revenue	15,680	19,668
Research and development	31,995	39,157
Sales and marketing	16,765	24,486
General and administrative	15,949	20,409
Amortization of intangible assets	1,694	1,699
Restructuring	840	—
Total operating expenses	82,923	105,419
Loss from operations	(44,475)	(49,756)
Interest and other income, net	1,644	3,309
Net loss	$ (42,831)	$ (46,447)
Fair value adjustment to Series E-1 convertible preferred stock options	135	102
Net loss attributable to common shareholders	$ (42,696)	$ (46,345)
Net loss per share attributable to common shareholders, basic and diluted	$ (3.50)	$ (3.67)
Weighted-average shares used in computing net loss per share attributable to common shareholders, basic and diluted	12,196,998	12,629,778
Unaudited pro forma net loss per share attributable to common shareholders, basic and diluted[1]		$ (0.44)
Unaudited weighted-average shares used in computing pro forma net loss per share attributable to common shareholders, basic and diluted[1]		105,470,520

(1) See Note 17 to our financial statements appearing at the end of this prospectus for details on the calculation of basic and diluted net loss per share and the calculation of basic and diluted pro forma net loss per share.

	As of December 31,	
	2017	2018
	(in thousands)	
Balance Sheet Data:		
Cash, cash equivalents and marketable securities	$ 201,055	$ 165,018
Working capital[1]	184,244	157,918
Total assets	362,489	332,688
Total liabilities	25,772	29,942
Convertible preferred stock	561,333	560,858
Total shareholders' (deficit) equity	(224,616)	(258,112)

(1) We define working capital as current assets less current liabilities.

MANAGEMENT'S DISCUSSION AND ANALYSIS OF FINANCIAL CONDITION AND RESULTS OF OPERATIONS

You should read the following discussion and analysis of our financial condition and results of operations together with our consolidated financial statements and related notes and other financial information appearing elsewhere in this prospectus. Some of the information contained in this discussion and analysis or set forth elsewhere in this prospectus, including information with respect to our plans and strategy for our business and related financing, includes forward-looking statements that involve risks and uncertainties. As a result of many factors, including those factors set forth in the "Risk Factors" section of this prospectus, our actual results could differ materially from the results described in or implied by the forward-looking statements contained in the following discussion and analysis.

Overview

We are advancing the field of immune-driven medicine by harnessing the inherent biology of the adaptive immune system to transform the diagnosis and treatment of disease. Our immune medicine platform applies our proprietary technologies to read the diverse genetic code of a patient's immune system and understand precisely how it detects and treats disease in that patient. We capture these insights in our dynamic clinical immunomics database, which is underpinned by computational biology and machine learning, and use them to develop and commercialize clinical products and services that we are tailoring to each individual patient. We have two commercial products and services and a robust pipeline of clinical products and services that we are designing to diagnose, monitor and enable the treatment of diseases such as cancer, autoimmune conditions and infectious diseases.

Our immune medicine platform is the foundation for our expanding suite of products and services. The cornerstone of our platform and core immunosequencing product, immunoSEQ, serves as our underlying research and development engine and generates revenue from academic and biopharmaceutical customers. Our first clinical diagnostic product, clonoSEQ, is the first test authorized by the FDA for the detection and monitoring of MRD in patients with MM and ALL and is being validated for patients with other blood cancers. Leveraging our collaboration with Microsoft to create the TCR-Antigen Map, we are also developing a diagnostic product, immunoSEQ Dx, that may enable early detection of many diseases from a single blood test. Our therapeutic product candidates, being developed under our collaboration agreement with Genentech, leverage our platform to identify specific immune cells to develop into cellular therapies in oncology.

Since our inception, we have devoted a majority of our resources to research and development activities to develop our immune medicine platform, which enables the delivery of our products and services for life sciences research, clinical diagnostics and drug discovery customers.

For our life science research customers, we provide two categories of products and services using immunoSEQ, our core sequencing and immunomics tracking technology. First, we provide immunosequencing services, the revenue from which we record as sequencing revenue. Second, we provide certain research customers professional support, for which we may receive payments upon those customers achieving specified milestones. We record these support activities as development revenue.

For our clinical diagnostics customers, we sell our clonoSEQ diagnostic tests, which include our immunosequencing services and are thus recorded as sequencing revenue. In the future we intend to sell other diagnostics products and services, which we also expect to record as sequencing revenue.

For our current drug discovery collaborator, Genentech, we screen, identify and characterize TCRs in support of our collaboration. We plan to record revenue from this collaboration as development revenue.

Historically, we have sold immunoSEQ as a fee-for-service offering to academic centers and biopharmaceutical customers and further deepened those relationships over time by supporting their development initiatives. These research offerings have comprised the vast majority of our revenue to date, although our business is pursuing broader opportunities. As we continue to expand the use of our clonoSEQ diagnostic tests, develop and commercialize immunoSEQ Dx, and develop and commercialize therapeutic product candidates with our drug discovery collaborator, we expect our mix of revenue to shift to clinical products and services, which we believe will become our largest sources of revenue.

We are actively pursuing opportunities to deepen our relationships with current customers and initiate relationships with new customers. We have an experienced, specialty salesforce that is targeting department heads, laboratory directors, principal investigators, core facility directors, clinicians, payors and research scientists and pathologists at leading academic institutions, biopharmaceutical companies, research institutions and contract research organizations. We plan to continue to expand our life sciences research and clinical diagnostic revenue sources beyond the more than 2,000 academic researchers, 125 biopharmaceutical companies and 480 clinical trials that have used our technology for research purposes to date. As MRD assessment becomes standard practice for patient management across a range of blood cancers, we believe it will be essential for clinicians and patients to have access to a highly accurate, sensitive and standardized MRD assessment tool. We are focused on establishing collaborative relationships with payors, developing health economic evidence and building billing and patient access infrastructure to expand reimbursement coverage for our clinical diagnostics.

We generated revenue of $38.4 million in 2017 and $55.7 million in 2018, and we incurred net losses of $42.8 million in 2017 and $46.4 million in 2018. We have funded our operations to date principally from the sale of convertible preferred stock, and to a lesser extent sequencing and development revenue. As of December 31, 2018, we had cash, cash equivalents and marketable securities of $165.0 million. In December 2018, we entered into a collaboration agreement with Genentech pursuant to which we received a $300.0 million initial upfront payment in February 2019, may be eligible to receive approximately $1.8 billion over time, including payments upon achievement of specified development, regulatory and commercial milestones and may receive additional royalties on sales of products commercialized under that agreement.

Components of Results of Operations

Revenue

We derive our revenue from two sources: (i) sequencing revenue and (ii) development revenue.

Sequencing revenue. Sequencing revenue reflects the amounts generated from providing sequencing services through immunoSEQ to research customers and from providing testing services through clonoSEQ to clinical and research customers.

For our research customers, which include biopharmaceutical customers and academic institutions, delivery of the sequencing results may include some level of professional support and analysis. Terms with biopharmaceutical customers generally include non-refundable upfront payments, which we record as deferred revenue. For all customers, we recognize revenue as we deliver sequencing results. From time to time, we offer discounts in order to gain rights and access to certain

datasets. Revenue is recognized net of these discounts and costs associated with these services are reflected in cost of revenue.

For our clinical customers, we derive revenue from providing our clonoSEQ test report to ordering physicians. We bill commercial payors and medical institutions as we deliver test results to ordering physicians. Amounts paid for clonoSEQ diagnostic tests by commercial payors and medical institutions vary based on respective reimbursement rates and patient responsibilities, which may vary from our targeted list price. To date, the majority of our clonoSEQ diagnostic test revenue has been received from medical institutions. We recognize clinical revenue by evaluating customer payment history and estimating the amount of revenue that is collectible. As of December 31, 2018, we did not have reimbursement available to us through any government payors for clonoSEQ. In January 2019, clonoSEQ received Medicare coverage aligned with the FDA label and NCCN guidelines for longitudinal monitoring in MM and ALL.

Development revenue. Development revenue primarily represents regulatory or development support services, other than sequencing revenue, that we provide to biopharmaceutical customers who seek access to our platform to support their therapeutic development activities. Additionally, we generate development revenue from the achievement of regulatory milestones. We enter into collaboration and similar agreements with these customers. When these agreements include sequencing activities, we separately classify those activities as sequencing revenue. These agreements may also include substantial non-refundable upfront payments which we recognize as development revenue over time as we perform the respective services.

We expect revenue to increase over the long term, particularly as the mix of revenue migrates to clinical diagnostics and drug discovery. The pace by which this mix migrates will be determined by the level of customer adoption and frequency of use of our products and services. However, our revenue may fluctuate from period to period due to the uncertain nature of delivery of our product and services and milestone achievement.

Cost of Revenue

Cost of revenue includes the cost of materials, personnel-related expenses (comprised of salaries, benefits and share-based compensation), shipping and handling, equipment and allocated facility costs associated with processing samples and professional support for our sequencing revenue. Allocated facility costs include depreciation of laboratory equipment, allocated facility occupancy and information technology costs. Costs associated with processing samples are recorded as expense, regardless of the timing of revenue recognition.

We expect cost of revenue to increase in absolute dollars as we grow our sequencing volume but the cost per sample to decrease over the long term due to the efficiencies we may gain as sequencing volume increases from improved utilization of our laboratory capacity, automation and other value engineering initiatives.

Research and Development Expenses

Research and development expenses comprise laboratory materials costs, personnel-related expenses, allocated facility costs, information technology and contract service expenses. Research and development activities support further development and refinement of existing assays and products, discovery of new technologies and investments into our immune medicine platform. We also include in research and development expenses the costs associated with software development activities to support laboratory scaling and workflow, as well as development of applications to support

future commercial opportunities. We are currently conducting research and development activities for several products and services, and we typically use our laboratory materials, personnel, facilities, information technology and other development resources across multiple development programs. Additionally, certain of these research and development activities benefit more than one of our product opportunities. We do not track research and development expenses by specific product candidates.

A component of our research and development activities is supporting clinical and analytical validations to obtain regulatory approval for future clinical products and services. Some of these activities have generated and may in the future generate development revenue.

We expect our research and development expenses to continue to increase in absolute dollars as we innovate and expand the application of our platform. However, we expect research and development expenses to decrease as a percentage of revenue in the long term, and they may fluctuate as a percentage of revenue from period to period due to the timing and extent of our efforts needed to develop and commercialize new products and services.

Sales and Marketing Expenses

Sales and marketing expenses consist primarily of personnel-related expenses for commercial sales, account management, marketing, reimbursement, medical education and business development personnel that support commercialization of our platform products. In addition, these expenses include external costs such as advertising expenses, customer education and promotional expenses, market analysis expenses, conference fees, travel expenses and allocated facility costs.

We expect our sales and marketing expenses to increase in absolute dollars as we expand our commercial sales, marketing and business development teams, and increase marketing activities to drive awareness and adoption of our products and services. However, we expect sales and marketing expenses to decrease as a percentage of revenue in the long term, though they may fluctuate as a percentage of revenue from period to period due to the timing and magnitude of these expenses.

General and Administrative Expenses

General and administrative expenses consist primarily of personnel-related expenses, including share-based compensation, salaries and benefits for our personnel in executive, legal, finance and accounting, human resources and other administrative functions, including third-party billing services. In addition, these expenses include external legal costs, accounting and tax service expenses, consulting fees and allocated facilities costs.

We expect our general and administrative expenses to continue to increase in absolute dollars as we increase headcount and incur costs associated with operating as a public company, including expenses related to legal, accounting, regulatory, maintaining compliance with exchange listing and requirements of the SEC, director and officer insurance premiums and investor relations. Though expected to increase in absolute dollars, we expect these expenses to decrease as a percentage of revenue in the long term.

Comparison of the Years Ended December 31, 2017 and 2018

	Year Ended December 31,	
	2017	2018
	(in thousands)	
Revenue:		
Sequencing revenue	$ 22,759	$ 32,978
Development revenue	15,689	22,685
Total revenue	38,448	55,663
Operating expenses:		
Cost of revenue	15,680	19,668
Research and development	31,995	39,157
Sales and marketing	16,765	24,486
General and administrative	15,949	20,409
Amortization of intangible assets	1,694	1,699
Restructuring	840	—
Total operating expenses	82,923	105,419
Loss from operations	(44,475)	(49,756)
Interest and other income, net	1,644	3,309
Net loss	$(42,831)	$ (46,447)
Fair value adjustment to Series E-1 convertible preferred stock options	135	102
Net loss attributable to common shareholders	$(42,696)	$ (46,345)

Revenue

	Year Ended December 31,		Change		Percent of Revenue	
(in thousands, except percentages)	2017	2018	$	%	2017	2018
Revenue:						
Sequencing revenue	$22,759	$32,978	$10,219	45%	59%	59%
Development revenue	15,689	22,685	6,996	45	41	41
Total revenue	$38,448	$55,663	$17,215	45	100%	100%

Total revenue was $55.7 million for the year ended December 31, 2018 compared to $38.4 million for the year ended December 31, 2017, an increase of $17.2 million, or 45%.

Sequencing revenue increased to $33.0 million for the year ended December 31, 2018, representing an increase of $10.2 million, or 45%. The increase in sequencing revenue was primarily attributable to a change in our sequencing revenue mix to higher priced products and services, particularly from biopharmaceutical customers utilizing clonoSEQ for research purposes. In 2018, we recognized $3.4 million in revenue related to cancelled customer projects that were previously deferred.

Research sequencing volume increased by 4% to 30,200 sequences delivered in 2018 from 29,106 sequences delivered in 2017. Additionally, clinical revenue also increased primarily due to more tests delivered to medical institutions with higher reimbursement rates, as well as increased volumes. Clinical sequencing volume increased by 32% to 6,867 clinical tests in 2018 from 5,220 clinical tests in 2017.

Development revenue increased to $22.7 million for the year ended December 31, 2018, representing an increase of $7.0 million, or 45%. The increase was primarily attributable to the achievement of regulatory milestones of $10.0 million related to our biopharmaceutical MRD development projects utilizing clonoSEQ, offset by a $3.0 million decrease relating to support services for FDA submissions of clonoSEQ that occurred in 2017.

Cost of Revenue

	Year Ended December 31,		Change		Percent of Revenue	
(In thousands, except percentages)	2017	2018	$	%	2017	2018
Cost of revenue	$15,680	$19,668	$3,988	25%	41%	35%

Cost of revenue was $19.7 million for the year ended December 31, 2018, compared to $15.7 million for the year ended December 31, 2017, representing an increase of $4.0 million, or 25%. The increase in cost of revenue was primarily attributable to an increase of $2.7 million in the cost of processing our samples as a result of expanding our production laboratory overhead and increased sample volumes. In addition, materials costs increased by $1.1 million, reflecting increases in samples processed year over year and a change in our mix of revenue to our higher-cost clonoSEQ tests.

Research and Development

	Year Ended December 31,		Change		Percent of Revenue	
(in thousands, except percentages)	2017	2018	$	%	2017	2018
Research and development	$31,995	$39,157	$7,162	22%	83%	70%

Research and development expenses were $39.2 million for the year ended December 31, 2018 compared to $32.0 million for the year ended December 31, 2017, representing an increase of $7.2 million, or 22%. The increase was primarily attributable to $4.5 million in additional cost of materials and production laboratory overhead to support the expansion of our platform, including for immunoSEQ Dx and our drug discovery efforts. This change also resulted from increases in personnel related costs of $0.9 million (including $0.5 million in share-based compensation), in software development expenses of $0.8 million (including cloud service costs), in rent costs of $0.5 million primarily related to the expansion of our South San Francisco, California facilities, and in depreciation cost of $0.3 million primarily related to additional investments in research and development equipment.

Sales and Marketing

	Year Ended December 31,		Change		Percent of Revenue	
(in thousands, except percentages)	2017	2018	$	%	2017	2018
Sales and marketing	$16,765	$24,486	$7,721	46%	44%	44%

Sales and marketing expenses were $24.5 million for the year ended December 31, 2018 compared to $16.8 million for the year ended December 31, 2017, representing an increase of $7.7 million, or 46%. The increase was primarily attributable to $4.8 million in additional personnel-related costs (including a $1.5 million increase in share-based compensation) due to increased headcount mainly for expanding our clonoSEQ commercial and research business development teams, $1.8 million in marketing and medical education investments to support our clonoSEQ and corporate branding initiatives, $0.5 million in travel expenses and $0.4 million in consulting fees.

General and Administrative

(in thousands, except percentages)	Year Ended December 31, 2017	2018	Change $	%	Percent of Revenue 2017	2018
General and administrative	$15,949	$20,409	$4,460	28%	41%	37%

General and administrative expenses were $20.4 million for the year ended December 31, 2018 compared to $16.0 million for the year ended December 31, 2017, representing an increase of $4.5 million, or 28%. The increase was primarily attributable to $3.3 million in additional personnel-related costs (including an increase in share-based compensation of $1.9 million) driven primarily by growth in salaries and related headcount. Legal and other professional support fees contributed $0.7 million of the increase.

Interest and Other Income, Net

(in thousands, except percentages)	Year Ended December 31, 2017	2018	Change $	%
Interest and other income, net	$1,644	$3,309	$1,665	101%

Interest income was $3.3 million for the year ended December 31, 2018 compared to $1.6 million for the year ended December 31, 2017, representing an increase of $1.7 million, or 101%. The increase was primarily attributable to an increase in marketable securities during the year ended December 31, 2018 as a result of the cash received from our Series F-1 convertible preferred stock financing and rising interest rates.

Liquidity and Capital Resources

We have incurred losses and negative cash flows from operations since our inception, and as of December 31, 2018, we had an accumulated deficit of $295.9 million.

We have funded our operations to date principally from the sale of convertible preferred stock, and to a lesser extent sequencing and development revenue. As of December 31, 2018, we had cash, cash equivalents and marketable securities of $165.0 million. In December 2018, we entered into a collaboration agreement with Genentech pursuant to which we received a $300.0 million initial upfront payment in February 2019, may receive approximately $1.8 billion over time, including payments upon achievement of specified development, regulatory and commercial milestones, and may receive additional royalties on sales of products commercialized under that agreement. In the first quarter of 2019, we expect to have cash flows from operations as a result of the $300.0 million upfront payment.

We believe our cash flows from operations and our existing cash, cash equivalents and marketable securities, together with the net proceeds from this offering, will be sufficient to fund our operating expenses and capital expenditure requirements through at least the 12 months following the date of this prospectus. We may consider raising additional capital to expand our business, to pursue strategic investments, to take advantage of financing opportunities or for other reasons.

We plan to utilize the existing cash, cash equivalents and marketable securities on hand primarily to fund our commercial and marketing activities associated with our clinical products and services, continued research and development initiatives for our pipeline candidates and drug discovery initiatives, ongoing investments into our immune medicine platform and scaling of our laboratory operations with our anticipated growth. Cash in excess of immediate requirements is invested in

accordance with our investment policy, primarily with a view to liquidity and capital preservation. Currently, our funds are held in money market funds and marketable securities consisting of U.S. government debt securities, U.S. government agency bonds, commercial paper and corporate bonds.

As revenue from sales of immunoSEQ and clonoSEQ is expected to grow, we expect our accounts receivable and inventory balances to increase. Any increase in accounts receivable and inventory may not be completely offset by increases in accounts payable and accrued expenses, which could result in greater working capital requirements. Moreover, following the closing of this offering, we expect to incur additional costs associated with operating as a public company, including expenses related to legal, accounting, regulatory, exchange listing and SEC compliance matters.

If our available cash, cash equivalents and marketable securities balances, net proceeds from this offering and anticipated cash flow from operations are insufficient to satisfy our liquidity requirements, we may seek to sell additional equity or convertible debt securities, enter into a credit facility or another form of third-party funding or seek other debt financing. The sale of equity and convertible debt securities may result in dilution to our shareholders and, in the case of preferred equity securities or convertible debt, those securities could provide for rights, preferences or privileges senior to those of our common stock. The terms of debt securities issued or borrowings pursuant to a credit agreement could impose significant restrictions on our operations. Additional capital may not be available on reasonable terms, or at all.

Cash Flows

The following table summarizes our cash flows for the years presented (in thousands):

	Year Ended December 31,	
	2017	2018
Cash (used in) provided by operating activities	($34,858)	($32,259)
Cash provided by investing activities	36,432	736
Cash provided by financing activities	50,034	1,248

Operating Activities

Cash used in operating activities during the year ended December 31, 2018 was $32.3 million, which was primarily attributable to a net loss of $46.4 million, offset by non-cash share-based compensation of $11.1 million and non-cash depreciation and amortization of $4.8 million, and a net change in our operating assets and liabilities of $1.7 million. The net change in our operating assets and liabilities reflects an increase in inventory of $3.0 million to support growth in our laboratory, an increase in accounts payable and accrued liabilities of $2.2 million due to increased headcount, a decrease of $0.6 million in deferred revenue due to increased development revenue and a decrease $0.5 million in deferred rent due to increases in cash rental payments.

Cash used in operating activities during the year ended December 31, 2017 was $34.9 million, which was primarily attributable to a net loss of $42.8 million, offset by noncash share-based compensation of $7.0 million, non-cash depreciation and amortization of $6.1 million, and a net change in our operating assets and liabilities of $5.5 million. The net change in our operating assets and liabilities reflects an increase in inventory of $2.7 million to support growth in laboratory, a $2.5 million increase in deferred revenue due to MRD biopharmaceutical agreements entered into in 2017, an increase in accounts receivable of $2.4 million due to increased sequencing revenue, a decrease in accounts payable and accrued liabilities of $1.5 million primarily due to the payment of severance amounts for restructuring activities initiated in 2016 and reductions in deferred rent of $1.1 million due to increased cash rent payments.

Investing Activities

Cash provided by investing activities during the year ended December 31, 2018 was $0.7 million, which was primarily attributable to maturities of marketable securities of $153.5 million, partially offset by purchases of marketable securities of $146.5 million and purchases of property and equipment of $6.3 million.

Cash provided by investing activities during the year ended December 31, 2017 was $36.4 million, which was primarily attributable to maturities of marketable securities of $163.9 million, partially offset by purchases of marketable securities of $125.2 million and purchases of property and equipment of $2.4 million.

Financing Activities

Cash provided by financing activities during the year ended December 31, 2018 was $1.2 million, which was primarily attributable to proceeds from the exercise of stock options.

Cash provided by financing activities during the year ended December 31, 2017 was $50.0 million, which was primarily attributable to proceeds from issuance of Series F-1 convertible preferred stock of $49.8 million, net of issuance costs, and proceeds of $0.2 million from the exercise of stock options.

Contractual Obligations and Commitments

The following table summarizes our contractual obligations as of December 31, 2018, which represents contractually committed future obligations (in thousands):

		Expected Payments by Period			
	Total	2019	2020-2021	2022-2023	More than 5 Years
Operating lease obligations(1)	$ 19,924	$ 3,561	$ 7,736	$ 6,312	$ 2,315
Purchase commitments(2)	12,764	1,962	3,791	4,290	2,721
Total	$ 32,688	$ 5,523	$ 11,527	$ 10,602	$ 5,036

(1) We lease office and laboratory space in Seattle, Washington and South San Francisco, California. Please see Note 10 of our financial statements for additional information pertaining to operating lease commitments.

(2) Purchase commitments include commitments for cloud data storage through our collaboration with Microsoft, commitments to support clinical trials utilizing clonoSEQ, software and service license commitments, and minimum commitments for one laboratory material supplier.

Net Operating Loss Carryforwards

Utilization of our NOL carryforwards and credits may be subject to a substantial annual limitation due to the ownership change limitations provided by Section 382 of the Code (“Section 382”) and similar state provisions. The annual limitation may result in the expiration of NOL carryforwards and credits before utilization. If there should be an ownership change, our ability to utilize our NOL carryforwards and credits could be limited. We have completed a Section 382 analysis and there are no permanent limitations on the utilization of approximately $186.9 million of our federal NOLs as of December 31, 2018. Approximately $38.5 million of federal NOLs were excluded from this study and maybe subject to limitation. Based on the available objective evidence, management determined that it was more likely than not that the net deferred tax assets would not be realizable as of December 31, 2018 and 2017. Accordingly, management applied a full valuation allowance against net deferred tax assets as of December 31, 2018 and 2017.

In December 2017, the TCJA became law. The TCJA decreases the U.S. corporate federal income tax rate from 35% to 21% effective January 1, 2018. The reduction in the tax rate resulted in a $25.0 million reduction in net deferred tax assets. There was no impact on recorded deferred tax balances as the remeasurement of net deferred tax assets was offset by a change in valuation allowance for the same amount. Under the TCJA, federal NOLs incurred in 2018 and in future years may be carried forward indefinitely, but the deductibility of such federal NOLs is limited.

Off-Balance Sheet Arrangements

As of December 31, 2018 and December 31, 2017, we have not had any off-balance sheet arrangements as defined in the rules and regulations of the SEC.

Quantitative and Qualitative Disclosures about Market Risk

Interest Rate Risk

We are exposed to market risk for changes in interest rates related primarily to our cash and cash equivalents, and marketable securities. As of December 31, 2018, we had cash and cash equivalents of $55.0 million held primarily in cash deposits and money market funds. Our marketable securities are held in U.S. government debt securities, U.S. government agency bonds, commercial paper and corporate bonds. As of December 31, 2018, we had short-term marketable securities of $110.0 million. Our primary exposure to market risk is interest income sensitivity, which is affected by changes in the general level of the interest rates in the United States. As of December 31, 2018, a hypothetical 100 basis point increase in interest rates would have resulted in an approximate $0.3 million decline of the fair value of our available-for-sale securities. This estimate is based on a sensitivity model that measures market value changes when changes in interest rates occur.

Critical Accounting Policies and Estimates

We have prepared our financial statements in accordance with GAAP. Our preparation of these financial statements requires us to make estimates, assumptions and judgments that affect the reported amounts of assets, liabilities and related disclosures at the date of the financial statements, as well as revenue and expense recorded during the reporting periods. We evaluate our estimates and judgments on an ongoing basis. We base our estimates on historical experience and or other relevant assumptions that we believe to be reasonable under the circumstances. Estimates are used in several areas, including, but not limited to, estimates of progress to date for certain performance obligations and transaction price for certain contracts with customers, share-based compensation, including the fair value of common stock, and the provision for income taxes, including related reserves, among others. These estimates generally involve complex issues and require judgments, involve the analysis of historical results and prediction of future trends, can require extended periods of time to resolve and are subject to change from period to period. Actual results may differ materially from management's estimates.

While our significant accounting policies are described in more detail in Note 2 to our audited financial statements included elsewhere in this prospectus, we believe the following accounting policies to be critical to the judgments and estimates used in the preparation of our financial statements.

Revenue Recognition

Our development and sequencing revenue arrangements may include upfront payments for the performance of services in the future, which have both fixed and variable consideration. Non-refundable upfront fees and funding for related development services are generally considered fixed consideration, while milestone payments are identified as variable consideration.

In determining the appropriate amount of revenue to recognize as we fulfill our obligations under these agreements, we perform the following steps to determine the amount of revenue to be recognized: (i) identification of contract or contracts; (ii) determination of whether the promised goods or services are performance obligations, including whether they are distinct in the context of the contract; (iii) measurement of the transaction price, including the constraint on variable consideration; (iv) allocation of the transaction price to the performance obligations based on estimated selling prices; and (v) recognition of revenue when (or as) we satisfy each performance obligation.

A performance obligation is a promise in a contract to transfer a distinct good or service to the customer and is the unit of account in Accounting Standard Codification ("ASC") Topic 606. Our performance obligations include sequencing services and services associated with regulatory submission and approval processes. Significant management judgment is applied to determine (1) the measurement of the transaction price, including the constraint on variable consideration, (2) the allocation of the transaction price to the performance obligations and (3) the appropriate input or output based method to recognize revenue and the extent of progress to date.

We include the unconstrained amount of estimated variable consideration in the transaction price. The amount included in the transaction price is constrained to the amount for which it is probable that a significant reversal of cumulative revenue recognized will not occur. At the end of each subsequent reporting period, we re-evaluate the estimated variable consideration included in the transaction price and any related constraint and, if necessary, adjust our estimate of the overall transaction price.

To determine the allocation of the transaction price to the performance obligations, we apply the adjusted market assessment approach. Using this approach, we evaluate the market in which we sell the services and estimate the price that a customer in that market would be willing to pay for those services.

To select the measure of progress, we consider the expectations of the performance period which may be based on customer dependent estimates of samples or internal estimates of the performance period based on both the customer and our expected development timeframes. We regularly review our expectations of the extent of progress, including if any variable consideration is no longer constrained, and if any changes in estimates are made recognize revenue using the cumulative catch-up method.

Share-Based Compensation

We measure share-based compensation expense for stock options granted to our employees and directors on the date of grant and recognize the corresponding compensation expense of those awards over the requisite service period, which is generally the vesting period of the respective award.

We estimate the fair value of stock options granted to our employees and directors on the grant date, and the resulting share-based compensation expense, using the Black-Scholes option-pricing model. The Black-Scholes option-pricing model requires the use of assumptions regarding a number of variables that are complex, subjective and generally require significant judgment to determine. The assumptions used to calculate the fair value of our stock options were:

Fair value of common stock

The fair value of the common stock issuable upon exercise of the stock options was determined by our board of directors, with input from management and independent third-party valuations, as discussed in "*—Common Stock Valuations*" below.

Expected term

Our expected term represents the period that our stock options are expected to be outstanding and is determined using a simplified method (based on the midpoint between the vesting date and the end of the contractual term), as we do not have sufficient historical data to use any other method to estimate expected term.

Expected volatility

As there has been no public market for our common stock to date, and as a result we do not have any trading history of our common stock, expected volatility is estimated based on the average volatility for comparable publicly traded peer group companies in the same industry over a period equal to the expected term of the stock option grants. The comparable companies are 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 the stock option grants.

Expected dividend yield

We have no plans to pay dividends on our common stock. Therefore, we use an expected dividend yield of zero.

Black-Scholes assumptions

The weighted-average assumptions used in our Black-Scholes option-pricing model were as follows for our employee stock option grants for the periods presented:

	Year Ended December 31,	
	2017	2018
Grant date fair value	$4.00	$4.15
Expected term (in years)	6.12	6.14
Risk-free interest rate	2.0%	2.7%
Expected volatility	70.2%	68.1%
Expected dividend yield	—	—

As of January 1, 2018, we adopted Accounting Standards Update 2016-09, *Compensation—Stock Compensation* (Topic 718) and elected to account for forfeitures as they occur rather than estimate expected forfeitures over the vesting period of the respective grant.

We use judgment in evaluating the assumptions related to our share-based compensation on a prospective basis. As we continue to accumulate additional data related to our common stock, we may have refinements to our estimates, which could materially impact our future share-based compensation expense. At December 31, 2018, unrecognized share-based compensation expense related to unvested stock options was $18.3 million that is expected to be recognized over a remaining weighted average period of 2.72 years.

Common Stock Valuations

As there has been no public market for our common stock to date, the estimated fair value of the common stock issuable upon exercise of our stock options was determined by our board of directors,

with input from management, considering our most recently available third-party valuations of common stock and our board of directors' assessment of additional objective and subjective factors that it believed were relevant, and factors that may have changed from the date of the most recent valuation through the date of the grant, which intended all options granted to be exercisable at a price per share not less than the fair value per share of our common stock issuable upon exercise those options on the date of grant. We believe our board of directors has the relevant experience and expertise to determine the fair value of our common stock. Prior to our initial public offering, given the absence of a public trading market for our common stock, the valuations of our common stock were determined in accordance with the guidelines outlined in the American Institute of Certified Public Accountants Practice Aid, *Valuation of Privately-Held-Company Equity Securities Issued as Compensation*. The assumptions we use in the valuation model are based on future expectations combined with management judgment. In the absence of a public trading market, our board of directors with input from management exercised significant judgment and considered numerous objective and subjective factors to determine the fair value of our common stock as of the date of each option grant, including the following factors:

- independent valuations performed at periodic intervals by an independent third-party valuation firm;
- the prices, rights, preferences and privileges of our convertible preferred stock relative to the common stock;
- our operating and financial performance and forecast and capital resources;
- current business conditions;
- the hiring of key personnel;
- our stage of commercialization;
- the status of research and development efforts;
- the likelihood of achieving a liquidity event for the shares of common stock issuable upon exercise of these stock options, such as an initial public offering or sale of our company, given prevailing market conditions;
- any adjustment necessary to recognize a lack of marketability for our common stock;
- trends and developments in our industry;
- the market performance of comparable publicly traded technology companies; and
- the U.S. and global economic and capital market conditions.

In valuing our common stock, we utilized a hybrid methodology that includes a probability-weighted expected return method ("PWERM") and an option pricing method ("OPM"), which is a highly complex and subjective valuation methodology. Under a PWERM, the fair market value of the common stock is estimated based upon an analysis of future values for the enterprise assuming various future outcomes. Within one of those potential outcomes, we utilized the OPM. The OPM treats the rights of the of the holders of convertible preferred stock and common stock as equivalent to that of call options on any value of the enterprise above certain break points of value based upon the liquidation preferences of the holders of preferred stock, as well as their rights to participation and conversion. Based on the timing and nature of an assumed liquidity event in each scenario, a discount for lack of marketability either was or was not applied to each scenario as appropriate. We then probability-weighted the value of each expected outcome to arrive at an estimate of fair value per share of common stock.

For valuations after the closing of this offering, our board of directors plans to determine the fair value of each share of common stock based on the closing price of our common stock on the date of grant or other relevant determination date, as reported on The Nasdaq Global Select Market.

Goodwill

Goodwill represents the excess of the purchase price over the net amount of identifiable assets acquired and liabilities assumed in a business combination measured at fair value. We assess goodwill for impairment annually on October 1 and upon any occurrence of triggering events or substantive changes in circumstances that could indicate a potential impairment.

We evaluate goodwill for impairment by first assessing qualitative factors to determine whether it is more likely than not that the fair value of our reporting unit is less than its carrying amount. We evaluate certain qualitative factors such as macroeconomic conditions, the market and industry in which we operate, cost factors, overall financial performance, and other relevant entity specific events to determine if there are any negative trends or events that could indicate impairment. Key assumptions in this analysis include anticipated demand for our products and services including industry and regulatory changes, future revenue growth and cash, cash equivalents, and marketable securities on-hand. These assumptions are determined based on our historical performance and management's forecasted results. Management's estimates of forecasted results are based upon assumptions believed to be reasonable, but which are inherently uncertain and unpredictable and, as a result, actual results may differ from estimates. If we determine that it is more likely than not that the fair value of our reporting unit is less than its carrying amount, or if we choose to bypass the qualitative assessment, we perform a quantitative goodwill impairment test. Goodwill impairment exists when the estimated fair value of our one reporting unit is less than its carrying value. If impairment exists, the carrying value of the goodwill is reduced to fair value through an impairment charge recorded in our statements of operations. To date we have not recognized any impairment of goodwill.

JOBS Act Accounting Election

We are an "emerging growth company" within the meaning of the JOBS Act. The JOBS Act allows an emerging growth company to delay the adoption of new or revised accounting standards that have different effective dates for public and private companies until those standards apply to private companies. We have elected to use this extended transition period and, as a result, our financial statements may not be comparable to companies that comply with public company effective dates. We also intend to rely on other exemptions provided by the JOBS Act, including not being required to comply with the auditor attestation requirements of Section 404(b) of the Sarbanes-Oxley Act.

We will remain an emerging growth company until the earliest of (1) the last day of the fiscal year following the fifth anniversary of the closing of this offering, (2) the last day of the fiscal year in which we have total annual gross revenue of at least $1.07 billion, (3) the last day of the fiscal year in which we are deemed to be a "large accelerated filer" as defined in Rule 12b-2 under the Exchange Act, which would occur if the market value of our common stock held by non-affiliates exceeded $700.0 million as of the last business day of the second fiscal quarter of such year or (4) the date on which we have issued more than $1.0 billion in non-convertible debt securities during the prior three-year period.

Recent Accounting Pronouncements

See Note 2 to our audited financial statements included elsewhere in this prospectus for more information.

BUSINESS

Overview

We are advancing the field of immune-driven medicine by harnessing the inherent biology of the adaptive immune system to transform the diagnosis and treatment of disease. We believe the adaptive immune system is nature's most finely tuned diagnostic and therapeutic for most diseases, but the inability to decode it has prevented the medical community from fully leveraging its capabilities. Our immune medicine platform applies our proprietary technologies to read the diverse genetic code of a patient's immune system and understand precisely how it detects and treats disease in that patient. We capture these insights in our dynamic clinical immunomics database, which is underpinned by computational biology and machine learning, and use them to develop and commercialize clinical products and services that we are tailoring to each individual patient. We have two commercial products and services and a robust pipeline of clinical products and services that we are designing to diagnose, monitor and enable the treatment of diseases such as cancer, autoimmune conditions and infectious diseases. Since our inception in 2009, we have characterized over 20 billion immune receptors, established partnerships and commercial relationships with over 125 biopharmaceutical companies and launched two product lines. Our goal is to understand the adaptive immune system and translate it into new products with unprecedented scale, precision and speed.

Our immune medicine platform is the foundation for our expanding suite of products and services. The cornerstone of our platform and core immunosequencing product, immunoSEQ, serves as our underlying research and development engine and generates revenue from academic and biopharmaceutical customers. Our first clinical diagnostic product, clonoSEQ, is the first test authorized by the FDA for the detection and monitoring of MRD in patients with MM and ALL and is being validated for patients with other blood cancers. Leveraging our collaboration with Microsoft to create the TCR-Antigen Map, we are also developing a diagnostic product, immunoSEQ Dx, that may enable early detection of many diseases from a single blood test. Our therapeutic product candidates, being developed under our collaboration agreement with Genentech, leverage our platform to identify specific immune cells to develop into cellular therapies in oncology. We believe this approach has the potential to be applicable to patients across a wide range of cancers.

Immune-driven medicine is one of the largest global addressable markets in healthcare. We estimate the potential market opportunity for our portfolio to be $48.7 billion, including $1.0 billion for research products, $16.3 billion for clinical diagnostics and $31.4 billion for cellular therapy in oncology. We believe we are uniquely positioned to develop and commercialize a pipeline of immune-driven diagnostic and therapeutic products across multiple disease states by leveraging the cumulative learning from our immune medicine platform.

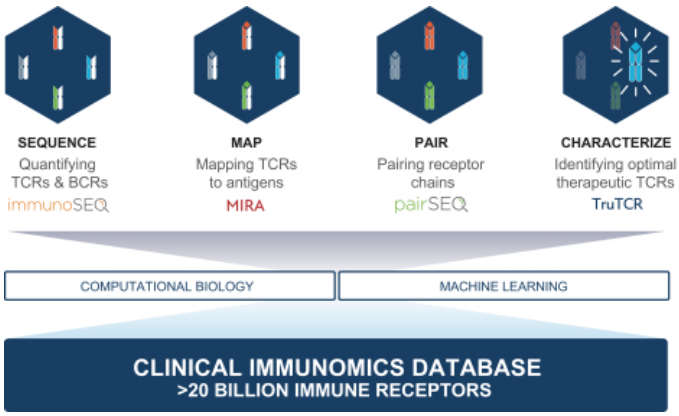
Our Immune Medicine Platform

The adaptive immune system is comprised of specialized cells, called T cells and B cells, which hold the instructions for diagnosing and treating most diseases. These instructions enable these cells to identify, bind and destroy pathogens or human cells presenting foreign antigens using receptors on their cell surface. Unlike all other genes in the human genome, the genetic sequences of TCRs and BCRs rearrange over time creating massive genetic diversity. The resulting diversity of the adaptive immune repertoire, which consists of over 100 million different genes in a healthy adult compared to approximately 30,000 genes in the static human genome, gives the immune system the ability to detect and respond to millions of different antigens associated with human disease.

Our immune medicine platform combines a suite of proprietary technologies, bioinformatics, software and machine learning to generate clinical immunomics data to decode the adaptive immune

system. It extracts and interprets insights from the adaptive immune system with the scale, precision and speed required to enable the design of clinical products tailored to the specific genetics of each patient's immune system.

Our Immune Medicine Platform



Our immune medicine platform performs the following key functions related to immune receptors:

- *Sequence.* immunoSEQ sequences single chains of "Y-shaped" TCRs or BCRs using NGS, enabling us to understand the quantity and diversity of T and B cells in a biological sample. This provides deep insights into individual and collective immune responses at a scale that is thousands of times greater than was previously possible.
- *Map.* MIRA (Multiplexed Identification of T cell Receptor Antigen Specificity) maps millions of TCRs to thousands of clinically relevant antigens. Combined with immunoSEQ, MIRA elucidates what potential diseases a patient's immune system has been exposed to or is actively fighting.
- *Pair.* pairSEQ builds on immunoSEQ by using a combinatorial strategy to accurately pair both chains of Y-shaped immune cell receptors at high-throughput, which is challenging to do at scale using other methods because the two chains of the Y-shaped receptors are located on different chromosomes. The ability to accurately pair both chains of the receptors in a sample enables us to reconstruct receptors for therapeutic purposes.
- *Characterize.* TruTCR characterizes binding, cytotoxicity and safety properties of antigen-specific, paired TCRs to identify a subset that is therapeutic-grade, enabling the discovery and development of optimal clinical candidates to be engineered into TCR-mediated cellular therapies.

The massive amount of data generated by our immune medicine platform is stored in our dynamic clinical immunomics database of over 30 billion immune receptors, of which we have data rights to over 20 billion. We believe the application of machine learning, supported by our collaboration with Microsoft, has the potential to exponentially accelerate our ability to derive novel insights from this database and use them to inform our robust product development efforts.

Our Current Products and Pipeline

Our current portfolio includes commercial products and services in life sciences research and clinical diagnostics, and we are developing products and services in both clinical diagnostics and drug discovery. Our commercial research product, immunoSEQ, primarily serves as our underlying research and development engine to develop and validate our clinical pipeline. We plan to continue to invest in our immune medicine platform to develop additional clinical products, which we prioritize based on clinical actionability, unmet medical need and commercial viability.

Life Sciences Research

Our immunoSEQ research service and kit are used to answer translational research questions and discover new prognostic and diagnostic signals. Our technology has been used for research purposes by over 2,000 academic researchers and more than 125 biopharmaceutical companies and incorporated into over 480 clinical trials since our inception in 2009. We intend to initiate development of a next generation, sample-type agnostic RUO kit, which we expect to enable global distribution of our research product. We are working to analytically validate the improved version of immunoSEQ so that all research data generated using immunoSEQ can be used for clinical validation of potential diagnostic applications.

Clinical Diagnostics

Our clonoSEQ diagnostic test detects and monitors the remaining number of cancer cells that are present in a patient's body during and after treatment, known as MRD. clonoSEQ was granted marketing authorization from the FDA, under the *de novo* process, in September 2018 for patients with MM and ALL to monitor their MRD from bone marrow samples. In January 2019, clonoSEQ received Medicare coverage aligned with the FDA label and NCCN guidelines for longitudinal monitoring in MM and ALL. clonoSEQ is also available for use in other lymphoid cancers as an LDT. clonoSEQ testing has been ordered by clinicians in nearly 300 healthcare systems and institutions, including 27 of the 28 NCCN centers in the United States, and used by more than 30 biopharmaceutical companies in over 120 clinical trials. We continue to invest in the commercial success of clonoSEQ by establishing a specialized sales organization and infrastructure in the United States and by exploring partnerships with diagnostic companies in other parts of the world. We believe clonoSEQ has broad applicability and we intend to file to expand the clonoSEQ FDA label to multiple additional indications, starting with CLL in 2019, followed by NHL to further expand its usage. Importantly, we are also generating data for submission to validate the use of clonoSEQ to monitor MRD from blood samples, which is less invasive than bone marrow samples, and may facilitate more frequent monitoring and broader physician adoption.

Leveraging Microsoft's machine learning capabilities to create the TCR-Antigen Map, we are developing a diagnostic product, immunoSEQ Dx, that may enable early detection of many diseases from a single blood test. Initially, we are validating early detection testing for a set of discrete diseases for which there is a significant unmet medical need for better diagnostic testing and early intervention, and where antigen specificity is well-known. These include certain prevalent cancer types and autoimmune disorders. In 2019, we plan to confirm the first indications to bring to the FDA for review while continuing signal validation in several additional indications. We believe we are uniquely positioned to rapidly identify signals for early detection across many disease states simultaneously because our immune medicine platform works with retrospective sample sets and uses machine learning and computational statistics to continuously improve our detection and accuracy without requiring large cohorts of prospective patients.

Drug Discovery

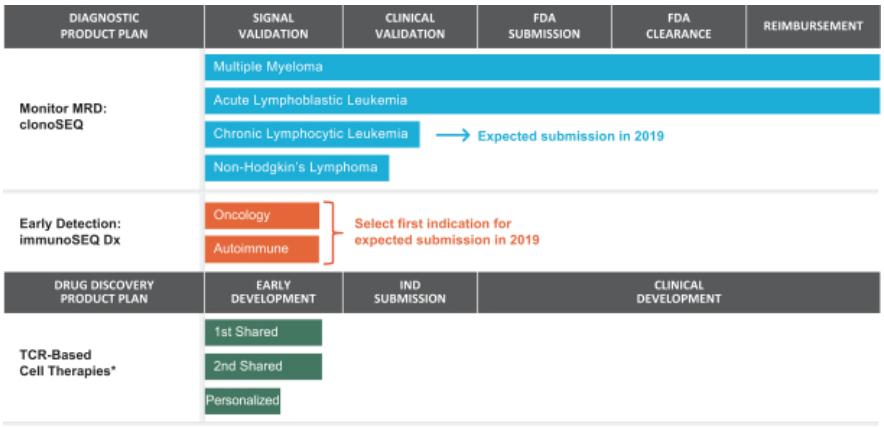
Our TruTCR process characterizes TCRs against shared antigens for use in the development of therapeutics. In December 2018, we entered into an exclusive collaboration with Genentech to

leverage this capability for the development of cellular therapies in oncology. We are pursuing two product development pathways for novel T cell immunotherapies in which Genentech intends to use TCRs screened by our immune medicine platform to engineer and manufacture cellular medicines:

- *Shared Products.* The shared products will use "off-the-shelf" TCRs identified against cancer antigens shared among patients.
- *Personalized Product.* The personalized product will use patient-specific TCRs identified by real-time screening of TCRs against cancer antigens in each patient.

In parallel, we plan to evaluate an investment in facilities for the screening of patient-specific TCRs to shorten the time from patient blood draw to infusion of the Personalized Product. We believe this investment would position us to potentially pursue additional opportunities outside of this collaboration, including cellular therapy in other disease states and cancer vaccines.

Our Clinical Pipeline



* Product candidates in development as part of our worldwide collaboration and license agreement with Genentech. The "1st Shared" and "2nd Shared" product candidates refer to the two lead product candidates that will use "off-the-shelf" TCRs identified against cancer antigens shared among patients.

Our Market

Immune-driven medicine is one of the largest global addressable markets in healthcare. We estimate our total potential addressable market to be $48.7 billion based on our current products and pipeline. We believe this market will grow over time as clinicians increasingly appreciate the importance of the immune system in the diagnosis and treatment of disease and as our pipeline of products and services continues to expand.

Life Sciences Research

We estimate the life sciences research opportunity for immunosequencing is approximately $1.0 billion globally, comprised of $150.0 million from academic researchers and $850.0 million from biopharmaceutical companies. We base this market sizing on the number of current academic researchers and biopharmaceutical clinical trials across oncology, autoimmune disorders and

infectious diseases that could benefit from immunosequencing. We anticipate this market will grow as immunosequencing continues to demonstrate clinical relevance, and we believe our penetration will deepen as we expand our customer base and move from earlier to later stage clinical trials with our existing collaborators.

Clinical Diagnostics

The current market opportunity for our clinical diagnostics portfolio is estimated to be $16.3 billion and is comprised of MRD monitoring in lymphoid malignancies and early detection in two representative indications we are currently assessing. The market opportunity for MRD monitoring is based on the more than 4.6 million newly diagnosed and surviving patients worldwide with lymphoid malignancies in which the cancerous cell is a T cell or B cell, such as MM, ALL, CLL and NHL. Taking into account geographic distinctions in pricing and testing frequency, we estimate the annual addressable market to be $1.2 billion and $3.3 billion in the United States and outside the United States, respectively. We base this market sizing on the population of both incident and prevalent patients in each disease state, the number of tests per line of therapy, the number of lines of therapy, and an estimated average selling price. We anticipate this market to continue to grow as approved therapeutics extend the lives of patients and testing can be conducted from blood samples, increasing the frequency of testing.

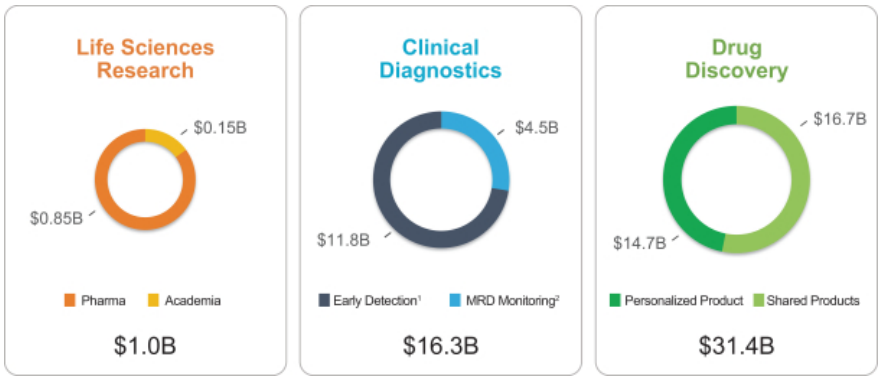
To determine the early detection opportunity for immunoSEQ Dx, while our initial indications have not yet been confirmed, we are targeting an addressable market based on two representative indications where we have developed preliminary data, celiac disease and ovarian cancer. Based on people at high risk for these representative diseases, we estimate a potential contribution of $11.8 billion to our annual addressable market. To assess the opportunity in ovarian cancer, we focus on high-risk women who are BRCA-mutation positive or who have been diagnosed or treated for breast cancer. To assess the opportunity in celiac disease, we focus on people who have undiagnosed gastrointestinal symptoms or who are first-degree relatives of people with a confirmed celiac diagnosis. In the future, if our TCR-Antigen Map enables us to read the immune system from a simple blood test, then this could potentially transform the diagnosis and treatment of disease and present one of the largest opportunities in healthcare.

Drug Discovery

The market opportunity for our Shared Products and Personalized Product being developed in collaboration with Genentech is estimated to be $31.4 billion based on over 100,000 metastatic patients with select tumor types who have at least one of the antigens that may be prioritized in the collaboration. While the Personalized Product is expected to be applicable to a broad range of tumor types, it is currently earlier in development than the Shared Products, leading to a larger expected addressable market for the Shared Products in the near term.

Because our immune medicine platform enables the high-throughput discovery of clinical-grade TCRs against any type of antigen by querying hundreds to thousands of TCRs from healthy donor or patient blood, we believe we are uniquely positioned to bring the promise of cellular therapy to a broad range of cancer patients. If proven, we intend to explore expanding the market opportunity for our TCR screening approach to the development of cellular therapies in autoimmune diseases as well.

Our Addressable Market: $48.7B



1. Early detection includes ovarian cancer testing for high-risk women who are BRCA-mutation positive or who have been diagnosed or treated for breast cancer, and celiac disease testing for people who have undiagnosed gastrointestinal symptoms or who are first-degree relatives of people with a confirmed celiac diagnosis.
2. MRD monitoring in ALL, MM, CLL, and NHL globally. Assumes 2-4 MRD tests per treatment cycle depending on indication and geography.

Our Competitive Strengths

We aim to harness the inherent biology of the adaptive immune system to develop clinical products and services that improve human health by leveraging our core competitive strengths.

- *Our immune medicine platform is uniquely capable of supporting clinical products.* We have developed a platform that is capable of reading and translating the massive genetic diversity of the adaptive immune system and its selective response to disease. Specifically, our platform *sequences* immune receptors and *maps* them to antigens for diagnostic applications, *pairs* receptor chains and *characterizes* antigen-specific, paired receptors to identify optimal clinical targets for therapeutic use. We are the only company that can perform all of these functions—and we do so at an unprecedented scale to develop novel clinical diagnostic and therapeutic products.
- *Our clinical immunomics database provides a robust product development engine.* Our dynamic clinical immunomics database of over 20 billion immune receptors, now being annotated with antigens using machine learning, drives our ability to rapidly discover and develop potential diagnostic and therapeutic applications. Our aim is to translate the natural capabilities of the immune system into the clinic by capturing the millions of diverse unique receptors present in a patient's blood.
- *Clinical applicability spans diagnostic and therapeutic product potential.* Our ability to accumulate, synthesize and process billions of immunomic datapoints to generate multiple clinical diagnostic and therapeutic applications across disease areas provides optionality to our commercial pipeline. Each of our products also has broad applicability, enabling robust product lifecycle extensions.
- *Regulatory and reimbursement expertise will help inform future clinical product development.* Having successfully obtained FDA marketing authorization and Medicare coverage for clonoSEQ, we believe we have developed valuable core capabilities that will facilitate future

product development through to regulatory approval and reimbursement. We believe this capability will inform future development of other clinical products, including our early detection tests.

- *Transformational collaborations with industry leaders validate our platform.* Our collaborations with industry-defining leaders such as Genentech and Microsoft validate our unique approach to advancing the promise of immune-driven medicine. We will continue to seek opportunities to optimize our ever-growing clinical immunomics database to drive product development and commercial success and facilitate efficient use of capital.
- *Strong intellectual property protects our immune medicine platform and its applications.* We have filed 375 patent applications, 234 of which have issued as of March 31, 2019, covering improvements in sequencing methods and new ways to leverage adaptive immune receptors for life sciences research, clinical diagnostic and drug discovery applications.

Our Strategy

Our focus is to leverage our immune medicine platform and competitive strengths to develop transformative clinical solutions accessible to patients around the world.

- *Advance the promise of immune-driven medicine.* We facilitate the development of the immune medicine field by providing a platform to encourage generation of immunomics data to facilitate a deeper understanding of, and biological discovery from, the adaptive immune system. We leverage the unique capability of our platform to translate a patient's immune system with the scale, precision and speed required to enable the development of personalized products, including clinical diagnostic tests for disease monitoring and early detection, as well as immune-based therapeutics.
- *Rapidly identify and advance new products, leveraging foundational technology.* Integrate proven chemistry into our clinical products in development, avoiding the need to re-engineer new products for every clinical application. We do this by serially identifying new applications of immunoSEQ Dx for early detection of disease using retrospective datasets without requiring live cells from large cohorts of patients, and by characterizing TCRs for therapeutic use. As our platform expands into new indications across cancer, autoimmune conditions and infectious diseases, we believe we will benefit from economies of scale and drive margin improvement over time.
- *Entrench our products and services in clinical drug development with biopharmaceutical collaborators.* Position our platform as the gold standard for the validation of potential immune-driven clinical discoveries in late-stage clinical trials. Since inception, our products and services have been used by more than 125 biopharmaceutical companies and incorporated into over 480 clinical trials, and clonoSEQ has proven to be the MRD test of choice for select registrational trials. To deepen our established position as a partner of choice, we provide end-to-end support, including hypothesis-driven trial design, extensive data analyses, parallel regulatory support, compliant data transfers and novel target screening. These synergistic relationships advance the development and adoption of our own clinical products and also inform drug development for our partners.
- *Drive the commercial adoption of distributed, reimbursed and regulated clinical products.* Expand distribution and drive usage of our products and services, including the development of clinical IVD kits. Leverage the commercial infrastructure built for clonoSEQ to submit clinical data for regulatory clearance of our products and services, engage in payor conversations and provide robust billing and patient access infrastructure for multiple clinical applications.
- *Maintain an entrepreneurial, scientifically rigorous, data-driven and inclusive corporate culture.* Fuel the promise and potential that our platform offers to help patients better manage their

disease by translating insights from our world-class team, which includes 79 people with medical or doctoral degrees with expertise in biology, chemistry, bioinformatics, software, drug discovery, development and commercialization, into clinical products and services. We plan to continue to expand our team to advance the promise of immune-driven medicine.

A Primer: The Adaptive Immune System

Over millions of years, the adaptive immune system has evolved an elegant solution to keeping people healthy. It recognizes and responds to most antigens, whether they come from outside the body, such as a virus, or inside the body, such as mutations that drive cancer.

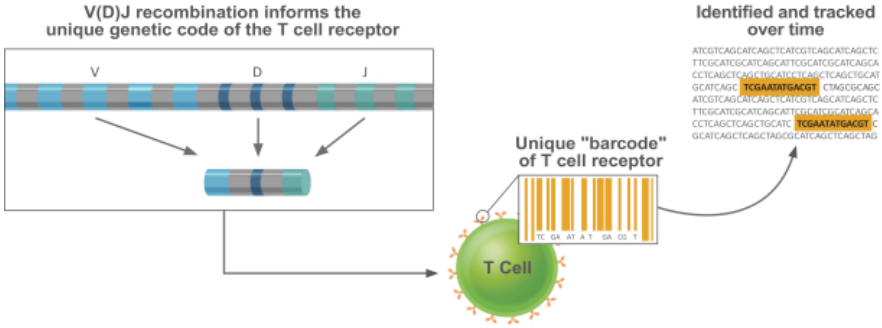
The innate and adaptive immune systems both play a role in human immunity, but only the adaptive immune system provides a specific response to signals of disease, or antigens. These disease specific antigens are primarily fragments of proteins that are recognized as foreign, such as proteins from a virus. However, antigens can be recognized as foreign even if they are not from a pathogen. In cancer cells, antigens are generated from neoantigens, which are derived from mutations specific only to the cancer, or tumor associated antigens ("TAAs"), which are from aberrantly expressed normal proteins. For autoimmune disorders, the immune system mistakenly recognizes normal protein fragments as foreign antigens and attacks otherwise healthy tissue.

The Adaptive Immune Response

The key cells of the adaptive immune system that enable our body to mount responses against antigens are called T cells and B cells. T cells can destroy target cells directly, and B cells secrete antibodies, activating other parts of the immune system to destroy targets.

Each T and B cell has a unique Y-shaped receptor, which can recognize one or a small number of the millions of antigens to which our bodies are continuously exposed. When an adaptive immune response is initiated against a particular disease, the T cells and B cells encoding the disease-specific targeting receptors rapidly multiply through clonal expansion, allowing for a powerful immune response. Some of these expanded cells directly attack the disease, and others form long-term memory to allow rapid recognition of the same antigens in the future and protect against reinfection.

Unlike all other genes in the human genome, the genetic sequences of TCRs and BCRs rearrange over time through a complex biological process resulting in massive diversity. The diversity of these receptors is made possible by a unique reshuffling of their genetic code known as V(D)J recombination (V=Variable, D=Diversity, J=Joining). This recombination process only occurs in T cells and B cells, and it results in each cell clone having a unique receptor-associated deoxyribonucleic acid ("DNA") sequence. This unique DNA sequence acts like a barcode that can be used to identify and track an individual receptor over time, as shown in the figure below:



The adaptive immune response requires millions of these unique receptors to be widely distributed and present in the blood at all times in order to have the ability to rapidly respond to many different diseases simultaneously. Even after a specific TCR binds to an antigen and clonally expands, the frequency of these expanded T cell clones containing the TCR remains relatively low in relation to the estimated trillions of other T cells that are circulating. We have demonstrated this by sequencing thousands of healthy individuals for control cohorts for our research and development efforts. We now know that disease-specific TCRs that are clonally expanded in a patient's blood are present, on average, at less than 1 cell out of 100,000 cells. Despite their relatively low abundance, disease-specific TCRs can mount a systemic, persistent response to most perturbations because of the highly specialized properties of the immune response summarized in the table below:

PROPERTY	DESCRIPTION
High sensitivity	The adaptive immune system identifies even a very small amount of antigen in the body.
High specificity	TCRs and BCRs specifically bind to this antigen or pieces of this antigen presented on cells, respectively, but normally avoid binding to features on healthy cells.
Natural amplification	Upon binding, the disease-specific T cells and B cells expand, or multiply exponentially. So, even when the amount of antigen is small, the number of disease-specific T cells can become quite large and more easily measurable.
Systemic expansion	These expanded T cells and B cells then circulate throughout the body to identify and protect the body systemically, making them readily accessible in blood and other tissues.
Persistence	A fraction of these disease-specific T cells, and the B cells that they direct, move into long-term memory and can be found in the blood decades after the disease is cleared.

In order to fully leverage these inherent properties of the immune system to develop clinical products, this enormous diversity and scale must be taken into consideration to be able to reliably and repeatedly measure the relative frequency of each disease-specific T cell in the blood. For example, cancer-specific TCRs circulating in the blood of a cancer patient are only present at 1 out of 100,000 cells. Auto-reactive T cells specific to any given autoimmune disorder circulating in the blood are only present at 1 out of 1,000,000 cells. Accordingly, the ability to detect disease-specific T cells requires a technology that can quantitatively probe a minimum of hundreds of thousands to millions of blood cells from each sample.

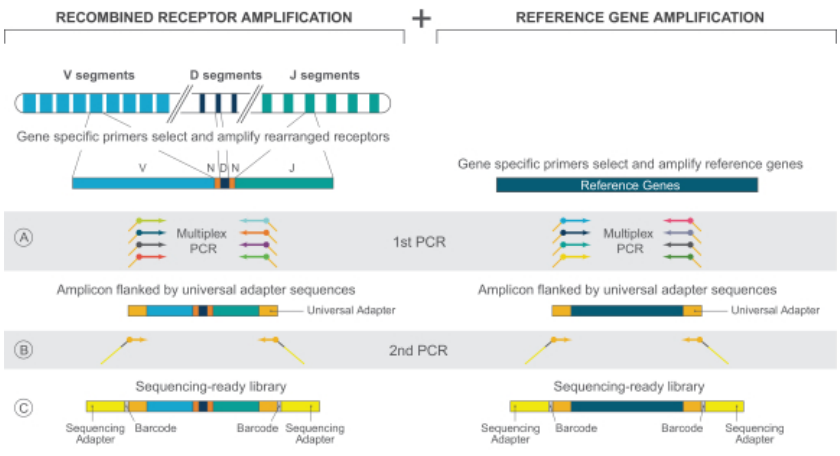
Our Immune Medicine Platform

We built a platform that can reveal and translate these properties of the adaptive immune system with the scale, precision and speed required to enable the development of personalized products, including disease monitoring, clinical diagnostic tests for early detection and immune-based therapeutics. Our immune medicine platform combines a suite of proprietary technologies, bioinformatics, software and machine learning to generate clinical immunomics data to decode the adaptive immune system and transform the diagnosis and treatment of disease.

The massive amount of data generated by our immune medicine platform is stored in our dynamic clinical immunomics database of over 30 billion immune receptors, of which we have data rights for over 20 billion. We believe the application of machine learning with Microsoft has the potential to exponentially accelerate the growth of novel insights from this database, which we expect will further inform our product development efforts.

Sequence with immunoSEQ

immunoSEQ sequences single chains of Y-shaped TCRs and BCRs using NGS. NGS generally describes several modern sequencing technologies that enable more efficient DNA and ribonucleic acid (“RNA”) sequencing than prior technologies. The key innovation in the development of immunoSEQ, pioneered by Dr. Harlan Robins and a team of leading immunologists at Fred Hutch, was a novel approach utilizing a two-step multiplex polymerase chain reaction (“PCR”) amplification process, hybridization and sequencing of rearranged TCRs to determine the sequences in millions of rearranged TCR genes, as shown in the figure below. We apply a similar approach for BCR sequencing. All of the data generated by immunoSEQ is uploaded to our clinical immunomics database and accessed through our proprietary cloud-based visualization and analytic tool called the immunoSEQ Analyzer.



Note: V, D, and J gene segments are recombined on the human TCRB locus. A) Multiplex PCR to capture the highly variable reference gene (autosomal loci). B) PCR to add barcodes and adapter sequences for high-throughput sequencing. C) Sequencing-ready libraries.

One of the biggest challenges of any multiplex PCR technique is controlling for PCR amplification bias, which is critical for accuracy. We solved for this problem by creating a synthetic immune repertoire that mimics rearranged immune receptor loci for all V and J genes. By identifying specific primers that are either under or over amplified, titrating the primer concentrations and computationally adjusting residual bias, we optimize quantitation. The accuracy and reproducibility of our bias control methodology was demonstrated in our lab and independently in a multi-center, lab-to-lab concordance study using our immunoSEQ RUO kit. The ability to generate an unbiased TCR or BCR sequencing read-out is paramount for any clinical product and will be required for the utility and reliability of clinical kits.

immunoSEQ enables us to observe the majority of receptors involved in a real human immune response, providing deep insights into a complex biological system that was previously challenging to understand.

Map with MIRA

Our proprietary MIRA technology enables the identification of TCRs specific to thousands of antigens simultaneously. The MIRA technology leverages a multiplexed, combinatorial approach to mapping TCRs to antigens in four steps:

1. Identify and query antigens of interest which can include neoantigens, tumor-associated, viral, infectious, autoimmune or other antigens.
2. Pool the antigens of interest and incubate them with immune cells from multiple donors whereby antigen specificities are determined based on the antigen pool design.
3. Sort T cells by marker of interest.
4. Match T cell clones to specific antigens based on the presence of specific sequences in designated pools.

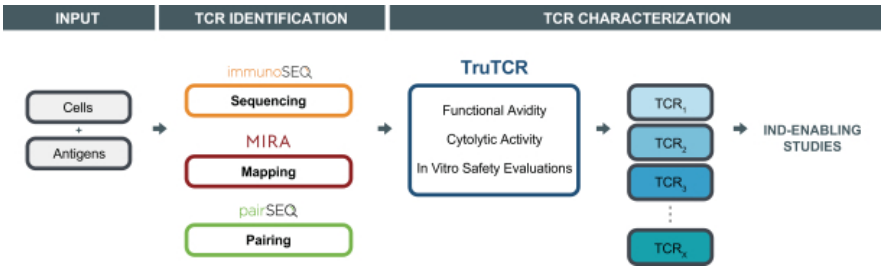
Combined with immunoSEQ, MIRA elucidates what diseases a patient's immune system has been exposed to or is actively fighting at a scale that is one thousand times more sensitive than standard immunological techniques such as ELISPOT, or enzyme-linked immunospot.

Pair with pairSEQ

Our proprietary pairSEQ technology builds on immunosequencing by using a combinatorial strategy to accurately pair the two chains of Y-shaped immune cell receptors at higher throughput than can be achieved with single cell sequencing. Pairing is difficult because the two chains of the Y-shaped receptor are located on different chromosomes, which get separated when DNA is extracted from a cell for sequencing. By pairing TCRs, we rapidly detect thousands of complete chain sequences to develop new TCR-mediated cellular therapies. Additionally, this technology may be used for downstream target discovery for novel therapies. pairSEQ has also been developed for BCRs which may enable improvements to current methods of antibody development and engineering.

Characterize with TruTCR

TruTCR characterizes binding, cytotoxicity and safety properties of antigen-specific, paired TCRs to identify a select subset that are therapeutic-grade, enabling the development of optimal clinical candidates to be engineered into TCR-mediated cellular therapies. Our comprehensive TCR characterization process utilizes advanced cellular immunology to measure TCRs against a variety of metrics to determine the optimal clinical candidates. Antigen-specific, paired TCRs undergo evaluation for avidity, cytokine release, cytotoxicity and safety. Those TCRs that pass the first safety filter are then evaluated for TCR reactivity against T cell lines and primary cells. To date, we have identified and characterized to different stages more than 1,200 unique antigen-specific TCRs against 600 different clinically relevant targets, constituting our pipeline of possible clinical candidates. TCR characterization using TruTCR is summarized in the figure below.



In collaboration with Genentech, we plan to apply a similar process to screen, identify and characterize in real-time what we believe are the most promising patient-specific TCRs targeting the patient's specific cancer antigens, advancing the next generation of cellular therapy in oncology.

Clinical Immunomics Database

We are developing a large, dynamic clinical immunomics database, which currently contains over 30 billion immune receptors, of which we have data rights for over 20 billion. We use our proprietary software and core competency in computational biology to structure and store data and to create tools for rapid analysis and easy visualization. All immunosequencing data is processed and uploaded to a secure cloud-based database.

The record of diseases a person has encountered, both past and present, is recorded in their TCR repertoire. This comprehensive disease information is contained in the immunosequencing data that we generate from each sample, which we believe will be revealed over time by our TCR-Antigen Map. We plan to map, both directly and through machine learning, an estimated 10^{15} TCRs to thousands of clinically relevant antigens, which we believe will allow us to annotate this immunosequencing data with information about disease states, increasing the value of the data over time.

We leverage our database to fuel our pipeline of immune-driven medicine products. With data rights for over 20 billion immune receptors, our platform enables us to work with retrospective samples which serve as training sets to which our Microsoft collaborators apply machine learning and computational statistics to improve the accuracy of certain of our clinical products and services.

Platform Validated by Peer-Reviewed Publications

From inception, one of our core principles has been to focus on ensuring our immune medicine platform is recognized and validated, distinguishing ourselves significantly from others in the industry. Our immune medicine platform has been used for research that has been published in over 360 peer-reviewed publications to date. These publications further validate our immune-driven applications in life sciences research, clinical diagnostics and drug discovery. In 2018 alone, our platform was leveraged to support 73 new publications, 44 of which were in high impact journals such as The New England Journal of Medicine, Nature and Cell.

Our Products and Services

Our current portfolio includes commercial products and services in life sciences research and clinical diagnostics, and we are developing products and services in both clinical diagnostics and drug discovery. Our commercial research product, immunoSEQ, primarily serves as our underlying research and development engine to develop and validate our clinical pipeline. The technologies underlying our current research and diagnostic products, immunoSEQ and clonoSEQ, respectively, leverage the sequencing and tracking capabilities of our immune medicine platform and comprise our sequencing revenue. Our pipeline of clinical diagnostics for early detection and our TCRs for drug discovery are informed by the mapping function of our platform, which we are optimizing with Microsoft's machine learning capabilities. The selection of TCRs for drug discovery also leverages the pairing and characterization components of our platform. We plan to rapidly scale our drug discovery efforts in 2019 to expedite the path to the clinic for the cellular therapy product candidates we are developing in collaboration with Genentech, which generates most of our development revenue. We plan to continue to invest in our platform to develop additional clinical applications, which we prioritize based on rigorous data requirements for clinically actionability, unmet medical need and commercial viability.

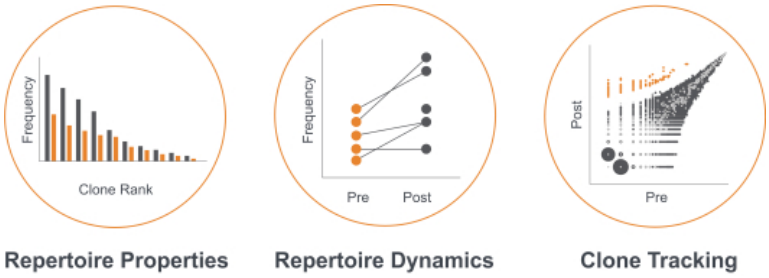
Life Sciences Research

immunoSEQ for Research Use Only

Our immunoSEQ technology, which we offer to customers as a service and a kit, is the core of our immune medicine platform. immunoSEQ utilizes multiplex, bias-controlled PCR to accurately and quantitatively sequence millions of immune receptors at high-throughput directly from DNA. We believe immunoSEQ is positioned to become the global standard for immunosequencing due to the quality and reliability of our data and the analytics and data visualization tools that are easily accessible to customers in the immunoSEQ Analyzer, whether sequenced as a service or a kit.

Since inception, immunoSEQ has been used for research purposes by over 2,000 academic researchers and more than 125 biopharmaceutical companies and incorporated into over 480 clinical

trials to answer translational research questions relating to the adaptive immune system, monitor response to therapies and discover new prognostic and diagnostic signals. These research questions are answered by using the data generated by immunoSEQ and uploaded to the immunoSEQ Analyzer to study different properties and dynamics of all of the sequences in an immune repertoire, such as frequency or abundance, and by tracking specific sequences over time in clinical trials. Graphical representations of the Analyzer output are shown in the figure below:



immunoSEQ provides a growing revenue stream. However, we also use immunoSEQ as the foundational technology for our clinical diagnostic and therapeutic products. To fuel innovation, we also provide immunoSEQ to select research and development collaborators who gain access to immunoSEQ and significant computational and analytical support, co-share and co-publish the data with us, and contribute to the validation of potential clinical diagnostic discoveries. For example, we work closely with our collaborators to conduct translational research to explore the use of immunosequencing to predict responders to novel immunotherapies such as checkpoint inhibitors.

Our immunoSEQ Analyzer is housed on a secure cloud-based database and is the visualization gateway to our clinical immunomics database that currently has billions of TCR and BCR sequences which are often annotated and accompanied by samples with associated metadata. We offer computational services to assist our customers in realizing the power of their data and to compare their data to other publicly available datasets in our clinical immunomics database. We contribute some of our own research and development sequences into the publicly available datasets and customers are offered the option to make their data public using one of our tools on our immunoSEQ Analyzer, called immuneACCESS, through which researchers can expedite and streamline the peer-review process by sharing their data with reviewers prior to manuscript submission. The ongoing analysis of immune receptor data from an expanding database tagged with clinical metadata, when possible, has led to approximately 360 peer-reviewed publications referencing immunoSEQ and potential clinical signals to explore.

In 2018, we launched an improved version of immunoSEQ to our research customers and we expect to incorporate these chemistry changes into a new RUO kit. Importantly, we expect this service and kit offering to become the technology upon which we clinically validate the early detection diagnostics we are developing using our TCR-Antigen Map. These changes will further enhance the quantitation of the data and allow for any sample type to be used, including stored cancer tumor tissue sections, which is more readily available globally amongst researchers in the field of cancer immunotherapy.

Strategy to Become a Standard for Immunosequencing

To become the global standard for immunosequencing, we are focused on several key commercial initiatives:

- *Offer a clinical-grade research product.* We are working to analytically validate the improved version of immunoSEQ so that all research data generated using immunoSEQ can be used for clinical validation of potential diagnostic applications.
- *Deepen relationships with existing customers.* By delivering reliable and meaningful results, we aim to move from earlier to later stage clinical trials and from a focus in oncology to other disease states, with the potential for conversion from fee-for-service to diagnostic and translational collaborations.
- *Create ubiquity through broad global reach.* We are actively seeking distribution partners to drive availability and adoption of our improved immunoSEQ RUO kit by researchers who want to perform immunosequencing in their local labs.
- *Develop accreditation program for high-complexity labs to run immunoSEQ.* In addition to growing our prospecting and collaboration efforts with our biopharmaceutical customers, we are also considering enabling select high-complexity labs to run the sequencing portion of our RUO product in an effort to broaden the inclusion of immunosequencing in non-registrational clinical trials.

Clinical Diagnostics

We aim to be a global leader in immune-driven diagnostics for early detection, prognosis and monitoring of disease, which represents an estimated $16.3 billion market opportunity for our early products and services. To achieve this long-term goal, we are focused on leveraging the sequencing and mapping functions of our immune medicine platform to develop diagnostic tests that meet regulatory standards, are widely reimbursed and are accessible to patients all around the world.

Monitoring MRD with clonoSEQ

Our first diagnostic product, clonoSEQ, is an FDA-authorized test for the detection and NGS-based monitoring of MRD in bone marrow samples in patients with MM and ALL. In these blood cancers and others, such as CLL and NHL, the malignant cell is derived from a T cell or B cell. MRD refers to the presence and number of these malignant T or B cells that may remain in a patient's body during and following treatment. Because our technology quantifies the frequency of every T cell or B cell in a sample, we can monitor MRD accurately at a sensitivity of 1 out of 1,000,000 cells, given sufficient sample input. By taking a baseline measurement prior to starting therapy and then tracking the number of cells at several time points following therapy initiation, hematologists can improve their ability to detect relapse early, help predict patient outcomes and monitor response to therapy.

NCCN Guidelines recommend using a validated test to measure MRD to define the burden of disease and assess response to therapy in MM and ALL after each treatment stage. NGS-based MRD testing has been added to these guidelines and we plan to seek expansion of the recommendations to include additional time points in each disease state and to incorporate clonoSEQ specific data.

MRD monitoring is becoming increasingly important in the hematologic oncology field because highly effective new therapies are extending survival. This has created a need for more sensitive tools to monitor the disease status of patients over longer periods of time and has introduced the potential for MRD to be included as a surrogate or primary endpoint in registrational clinical trials. We believe we are uniquely positioned to benefit from these industry dynamics with both our clinical and biopharmaceutical customers.

clonoSEQ testing has been ordered by clinicians in nearly 300 healthcare systems and institutions, including 27 of the 28 NCCN centers in the United States. We believe increased adoption of clonoSEQ will now be possible due to the recent Medicare coverage decision in January 2019 to assess MRD at multiple time points throughout therapy in MM and ALL. Due to our FDA marketing authorization, we believe clonoSEQ will remain the preferred commercial test among biopharmaceutical companies using MRD in their registrational trials. In addition, clonoSEQ is being used by more than 30 biopharmaceutical companies in over 120 clinical trials. To continue demonstrating clinical utility across disease settings and lines of therapy, clonoSEQ is also being used in 40 ongoing prospective investigator-led clinical trials, and our MRD data have been included in over 38 peer-reviewed publications.

clonoSEQ is also currently available as an LDT for use across lymphoid malignancies and sample types, including those which are not yet authorized by the FDA. We intend to file for regulatory clearance in additional indications and sample types, with at least one planned submission for CLL in 2019.

The Technology

clonoSEQ is our FDA-authorized, NGS-based MRD technology that is designed to sequence all rearranged receptor sequences in a tumor in parallel to ensure accurate, sensitive and robust MRD monitoring.

A summary of the steps for FDA-authorized usage is as follows:

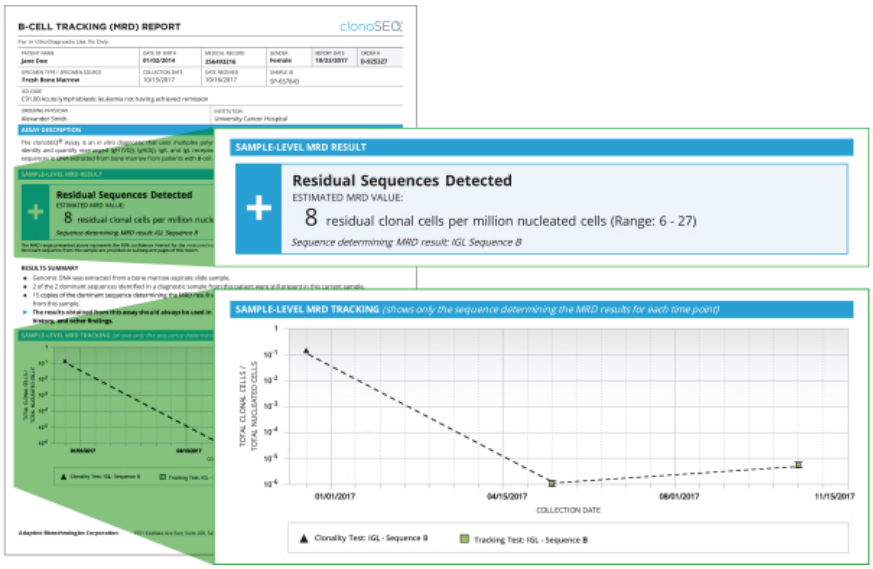
1. gDNA is extracted from bone marrow.
2. Extracted DNA quality is assessed, and rearranged immune receptors are amplified using a multiplex PCR.
3. Reaction-specific index barcode sequences for sample identification are added to the amplified receptor sequences by PCR.
4. Sequencing libraries are prepared from barcoded amplified DNA which are then sequenced by synthesis using NGS.
5. Raw sequence data are uploaded from the sequencing instrument to our analysis pipeline.
6. Sequence data is analyzed in a multi-step process, where a sample's sequence data is first identified using the sample index sequences and the data is then processed using a proprietary algorithm with in-line controls to remove amplification bias.
7. Following completion of these data processing steps, a report is issued.

Clinical Report Forms

Patient test results can be accessed by the ordering physician within seven days for fresh specimens, or 14 days for stored specimens, of receiving the sample in our lab in Seattle, Washington via our secure ordering portal and can be incorporated into the patient's medical record. There are two clonoSEQ report forms:

- A Clonality or ID Report that identifies and quantifies DNA sequences specific to "dominant" clone sequences consistent with the presence of a lymphoid malignancy. This is the report that is issued upon initial testing.

- A Tracking MRD Report which is provided at multiple points in time when the patient is re-tested and the previously identified dominant clone sequences are detected and quantified to determine the sample MRD level which can be compared to the MRD level at previous time points.



Adaptive Assist: Patient support program

Adaptive Assist is our patient support program to facilitate access to clonoSEQ testing services for patients who could benefit from the clinical insights provided by NGS-based MRD testing. Patients can call to discuss their individual circumstances with one of our dedicated patient support representatives in order to better understand their coverage prior to clonoSEQ testing and to navigate the insurance process, including appeals for denied claims. We also offer financial assistance for qualified uninsured and under-insured patients who cannot afford their patient financial responsibility for clonoSEQ.

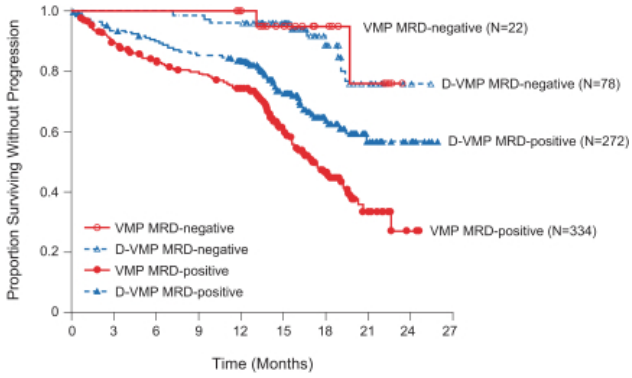
Clinical Validation in FDA Filing for MM and ALL

Our clonoSEQ test has been shown to help better predict patient outcomes and add insight to the evaluation of disease response to therapy because we have clinically validated clonoSEQ's ability to detect MRD at a sensitivity greater than the current recommended clinical standard for all lymphoid malignancies. clonoSEQ has demonstrated sensitivity of 1 out of 1,000,000 cells (10^{-6}), given sufficient sample input, which is a deeper resolution than the current accepted standard of 1 out of 100,000 cells (10^{-5}) or 1 out of 10,000 cells (10^{-4}) for MM and ALL, respectively. Based on these results, as further illustrated below, we believe clinical standards for MRD sensitivity may be increased to 10^{-6} to better predict patient outcomes.

Clinical validation in MM was demonstrated in two studies. The first study, a 720 patient, randomized phase III trial conducted at the Dana Farber Cancer Institute (DFCI 10-106), evaluated the ability to predict progression-free survival ("PFS") and disease-free survival in patients who achieved complete response ("CR") and the ability to predict PFS in all evaluable patients. This study demonstrates that MRD negativity for patients in CR significantly predicts PFS.

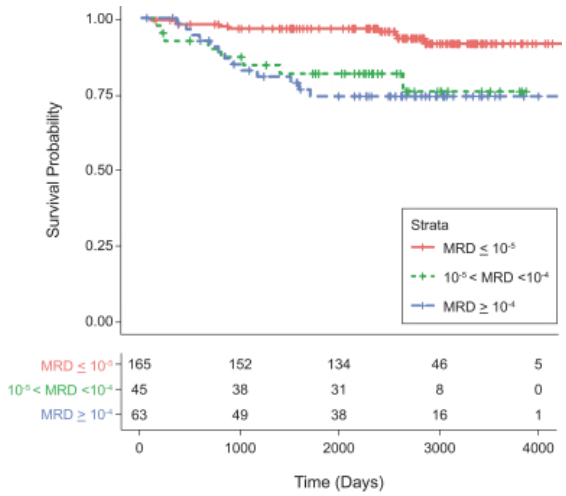
The second study, a 706 patient, randomized phase III trial sponsored by Janssen Biotech, Inc. ("ALCYONE"), evaluated Darzalex in patients with newly diagnosed MM who were transplant ineligible and served as the basis of the approval of Darzalex in combination with Bortezomib, Melphalan and Prednisone ("VMP") in this patient population. This study provides evidence that our clonoSEQ diagnostic test is predictive of PFS, regardless of treatment received. Patients who were MRD negative at less than or equal to 10^{-5} had longer PFS and the group with persistent MRD negativity had the longest PFS overall.

Patients who were MRD negative by the clonoSEQ Assay had longer PFS compared to MRD positive patients regardless of treatment.



Clinical validation in ALL was demonstrated in two Children's Oncology Group studies, AALL0232 (high risk) and AALL0331 (standard risk) by evaluating the ability of clonoSEQ to predict event-free survival ("EFS") at a primary cutoff of 10^{-4} and across a continuous MRD measure. Results demonstrate that patients with the lowest levels of MRD have better outcomes than patients with higher disease burden regardless of risk stratification.

Patients with lower levels of MRD (less than 1/100,000 cells), using the increased sensitivity of clonoSEQ, have a higher probability of EFS.



Strategy to Achieve Market Leadership

We aim to drive adoption and achieve market leadership for MRD monitoring with clonoSEQ for all lymphoid malignancies. To do so, we are executing against the following strategic initiatives:

- *Expand reimbursement with public and private payors.* We are working with payors to develop appropriate coverage policies, generate healthcare economic information and provide robust billing and patient access infrastructure. Following our established Medicare coverage for clonoSEQ in its current FDA-authorized indications, we expect to seek broader coverage in line with our planned FDA label expansions. We continue to invest in health economic research and real-world evidence to demonstrate the benefits of including MRD testing across indications.
- *Entrench clonoSEQ in biopharmaceutical clinical trials.* As the industry pursues the inclusion of MRD as a potential surrogate or primary endpoint in clinical trials for lymphoid malignancies, having a standardized and highly accurate and sensitive option for MRD testing to guide clinical decisions in late stage trials, including registrational trials, is valuable. Our goal is to position clonoSEQ for use by our biopharmaceutical collaborators as the MRD test of choice for these clinical trials.
- *Validate clonoSEQ in additional indications for use.* With the end goal of clonoSEQ becoming a universal MRD test for all lymphoid malignancies, we have developed a robust lifecycle development plan to generate sufficient clinical evidence to support the extension of the FDA label beyond ALL and MM. We are accumulating clinical data in CLL, and we have plans to submit these data to the FDA in 2019.
- *Validate clonoSEQ in blood to offer a minimally invasive alternative.* We expect to also submit data to the FDA in 2019 to add blood as a validated sample type to our FDA label, which would enable more frequent monitoring of patients over longer periods of time. Testing with blood is less invasive and less expensive as compared to MRD testing from bone marrow samples, and it may only be possible because of the deep sensitivity of our clonoSEQ diagnostic test.

- *Invest in an experienced, specialty salesforce.* We are building a sales organization to target key customer segments, including academic centers, integrated health networks and community clinicians, in a tiered manner based on patient volume. In 2019, we are focused on Tier 1 and Tier 2 accounts, which we estimate to drive 75% of the market potential. As coverage expands and usage builds, we have designed multiple field sizing scenarios to drive uptake in Tier 3 and Tier 4 accounts.
- *Develop a decentralized testing solution.* We are developing a clonoSEQ IVD kit which we intend to sell to trained high complexity molecular labs to service the MRD opportunity in regions where local testing is needed or required. Between now and the launch of the clinical IVD kit, we plan to scale up our investment in physician education to establish the need for a fully standardized MRD solution.
- *Expand internationally.* To enter European markets, we plan to transfer our technology to select centers to conduct investigational studies that are essential for reimbursement submissions. We have already completed one successful technology transfer in Toulouse, France in 2017 and expect to continue expanding this program to select sites in 2019. We also plan to seek a CE mark for clonoSEQ in 2019 to enhance our reimbursement efforts in Europe. We expect these market development activities to prepare us to launch the clonoSEQ IVD kit in markets outside the United States over the next three to five years.

Early Detection with immunoSEQ Dx

By learning to read the antigen specificity of a patient's immune system, we are developing the immunoSEQ Dx diagnostic test for early detection across a broad range of diseases, including certain prevalent cancer types and autoimmune disorders. We believe the adaptive immune system presents an ideal model for diagnostic tools for early detection of disease. Treatment is typically most effective early in the course of a disease, when there is a minimal amount of disease-specific antigen present. TCRs recognize this very small amount of antigen before it is detectable by conventional methods and then they expand exponentially. Given this large response in proportion to the amount of antigen present, we believe we will be able to see this signal of disease much sooner than is possible with other methods of early disease detection.

We are leveraging our existing immunoSEQ technology to develop immunoSEQ Dx for the early detection of many diseases simultaneously. This is possible because our platform works with retrospective sample sets and uses machine learning and computational statistics to continuously improve accuracy without requiring large cohorts of prospective patients. Before pursuing broad population screening tests, however, we are initially developing immunoSEQ Dx for the early detection of specific disease states that meet the following criteria:

- Clinically relevant antigens are known and understood.
- High unmet medical need for diagnosis.
- Potential to improve patient outcomes with early intervention.
- Availability of sample sets with patient outcomes.

We have initially chosen to pursue a small subset of indications that meet these criteria which together represent an estimated $11.8 billion of the addressable market we describe for our diagnostic opportunities. Our goal is to generate a confirmatory clinical signal for one or more of these indications in 2019 and to run analytical validation studies for the technology in parallel. We plan to repeat this process for additional disease states as we expand our knowledge about the antigen specificity of millions of TCRs in our clinical immunomics database. Using these clinical signals and validation studies, we then plan to pursue FDA approval of immunoSEQ Dx in one or more of these initial

indications as an IVD conducted in our CLIA certified, CAP-accredited, ISO 13485-certified laboratory. We believe the same blood test will ultimately be able to be used to detect multiple diseases simultaneously.

The TCR-Antigen Map

In order to detect disease from a blood sample, the TCRs sequenced by immunoSEQ must be annotated with their disease-specific antigens by cross-referencing our TCR-Antigen Map in the cloud. We are building our TCR-Antigen Map as part of our strategic collaboration with Microsoft established in December 2017. Together we are using immunosequencing, proprietary computational modeling and machine learning to map TCR sequences to the antigens they bind. Using these data, we aim to translate the natural diagnostic capability of the immune system into the clinic.

Proof of Concept

For proof of concept of the ability of our technology to detect infectious disease exposure in patients, our researchers profiled the T cell repertoire of more than 660 subjects with known cytomegalovirus ("CMV") status and identified a set of TCRs across that population that are specific for CMV. This set of CMV-specific TCRs was then tested as a method for CMV diagnosis in a new cohort of 120 people. Using this TCR set, we were able to confirm CMV infection in up to 93% of blood samples evaluated. These data represent a significant step forward for the potential use of TCR sequences to detect exposure to pathogens or other diseases with distinct T cell profiles.

By combining the power of our clinical immunomics database with a machine learning technique known as pseudo-labeling, we are rapidly scaling the identification and validation of antigen-specific TCRs for diagnostic applications. For example, we have already iteratively scaled the identification of additional CMV-specific TCRs to improve the diagnostic accuracy in our proof of concept study to 98% with a minimal false positive rate. We believe this approach has the potential to significantly reduce the time and number of individuals, and ultimately the cost, required to accurately validate our clinical diagnostics across different diseases.

Strategic Plan to Evolve Early Detection of Disease

To achieve our goal of developing a diagnostic test for early detection across a broad range of diseases, we are pursuing the following strategic steps:

- Apply machine learning to high-throughput mapping to generate the TCR-Antigen Map.
- Demonstrate proof of concept for early detection using mapped TCRs in select indications.
- Launch one TCR sequencing technology, immunoSEQ Dx, for initial indications.
- Broaden utility to a wide range of diseases without requiring large prospective trials.

Drug Discovery

Our aim is to develop immune-mediated therapies in oncology and other disease areas by using the full functionality of our immune medicine platform, including TruTCR for TCR characterization. We are currently working to leverage our TCR discovery capabilities to enable commercialization of novel therapies by collaborators. In the future, we may explore expanding our end-to-end capabilities for the development of cellular therapies and vaccines.

TCR Discovery for Cellular Therapy

We have developed a high-throughput TCR screening process that allows for the discovery of antigen-specific TCRs that occur in low frequencies in healthy individuals. We believe this provides a

set of naturally-occurring TCRs with a more favorable safety profile in comparison to engineered TCRs. We then further characterize these naturally-occurring TCRs for binding avidity and cytotoxic potency. To date, we have identified and characterized to different stages more than 1,200 unique antigen-specific, paired TCRs against 600 different clinically relevant targets, constituting our pipeline of possible clinical candidates. We complete a data package for each characterized TCR that we believe meets the thresholds for therapeutic evaluation. These thresholds are divided into a series of seven key steps covering antigen specificity, functional avidity, cytolysis and safety assessment. A package is considered complete when the TCR meets the rigorous criteria for all seven steps and the data are compiled to support an investigational new drug ("IND") package. As a proof of concept, we compared our fully characterized TCR against WT-1, a TAA often overexpressed in various cancers, to a benchmark WT-1 TCR. A gold standard for testing TCR efficacy is killing of cells that naturally express the target antigen at low levels. Using a cancer cell line that is known to express low levels of WT-1, our candidate WT-1 TCR was over four times more effective at killing cancer cells than the benchmark TCR. The complete data package for our lead WT-1 TCR candidate demonstrates improved avidity, cytolysis and a promising safety profile.

Our high-throughput screening technologies enable us to discover TCRs against any type of antigen which opens up the potential to develop novel TCR-mediated cellular therapies for any type of cancer. As compared to cellular therapies that target T cell surface antigens that are not specific to cancer, we believe our approach to TCR cellular therapies may mitigate the risk of off-target side effects. Therefore, we believe our approach may be applicable to the vast majority of solid tumors, even those where the tissue of origin is vital to survival such as lung or renal.

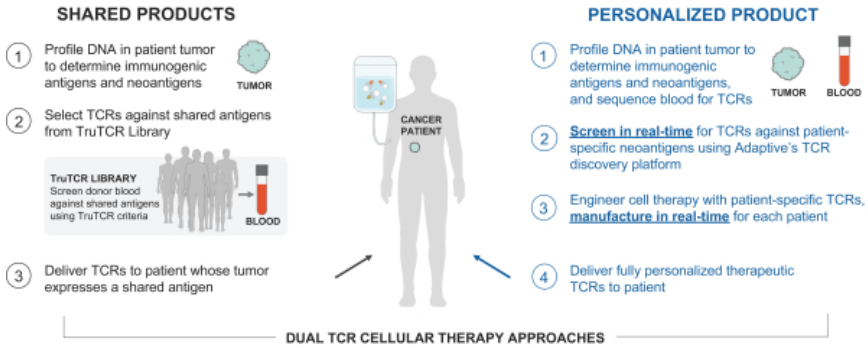
In December 2018, Genentech selected our platform to develop, manufacture and commercialize novel neoantigen directed T cell therapies for the treatment of a broad range of cancers. Our ultimate goal is to harness the vast majority of therapeutically relevant, patient-specific TCRs against neoantigens and advance the next generation of cellular therapies in oncology. We believe our TCR discovery capabilities may also facilitate the development of cellular therapies in disease areas beyond cancer, which we can commercialize outside of the Genentech collaboration.

In addition to cellular therapy applications, we believe our TCR screening capabilities can guide the design and development of next-generation vaccines by characterizing the immunogenicity of hundreds of antigens at a time. Our platform can also be used to then monitor early signs of antigen-specific immune response in patients treated with novel vaccines.

Strategic Collaboration with Genentech

Through our worldwide collaboration and license agreement with Genentech, we plan to develop, manufacture and commercialize novel neoantigen directed T cell therapies for the treatment of a broad range of cancers to advance the next generation of cellular therapies in oncology. We are pursuing two product development pathways for novel T cell immunotherapies in which Genentech intends to use TCRs screened by our immune medicine platform to engineer and manufacture cellular medicines:

- *Shared Products.* The Shared Products will use "off-the-shelf" TCRs identified against cancer antigens shared among patients.
- *Personalized Product.* The Personalized Product will use patient-specific TCRs identified by real-time screening of TCRs against cancer antigens in each patient.



Under the terms of the agreement, we received a $300.0 million initial upfront payment in February 2019, and we are eligible to receive approximately $1.8 billion in aggregate milestone payments upon achievement of specified development, regulatory and commercial milestones. Additionally, we may receive royalties on sales of products commercialized under that agreement. Genentech will be responsible for clinical, regulatory and commercialization efforts. We will be responsible for the screening and identification of TCRs that can most effectively recognize and directly target specific cancer antigens, including neoantigens.

In parallel, we plan to evaluate an investment in facilities for the screening of patient-specific TCRs to shorten the time from patient blood draw to infusion of the Personalized Product. We believe this investment would position us to potentially pursue additional opportunities outside of this collaboration, including developing and commercializing cancer vaccines and cellular therapies in other disease states.

Our People and Culture

Our employees, internally referred to as "Adapters," are passionate about immune-driven medicine, empowered by scientific discipline and fueled by our foresight and curiosity about the adaptive immune system.

As of March 31, 2019, we had 346 full-time employees of which 154 had advanced degrees, including 79 who hold medical or doctoral degrees. None of our employees are subject to a collective bargaining agreement and we have not experienced any work stoppages. We believe relations with our employees are good.

Our talented employees drive our mission and share core values that both stem from and define our culture, which plays an invaluable role in our execution at all levels in our organization. Our core values are used in candidate screening and in employee evaluations to help reinforce their importance in our organization:

- *Make it happen.* Individual ownership and accountability keep us moving forward.
- *Innovate fearlessly.* Push against boundaries and think boldly to achieve world-changing results.
- *Debate openly.* Value discussions inspired by different points of view.

- *Work together.* Demonstrate you care about the success of others. The same goes for our partners and customers—together we can achieve more.
- *Follow True North.* Show up with integrity and do the right thing.
- *Have fun.* Fun makes everything better.

We believe our employees are highly engaged, and we were recognized by the Puget Sound Business Journal as one of Washington State's Best Places to Work in 2018.

Strategic Collaborations and Other Agreements

Genentech Agreement

In December 2018, we entered into the Genentech Agreement to develop, manufacture and commercialize novel neoantigen directed T cell therapies for the treatment of a broad range of cancers. Pursuant to the Genentech Agreement, we are responsible for the screening and identification of TCRs that can most effectively recognize and directly target specific neoantigens, while Genentech is responsible for clinical, regulatory and commercialization efforts. During the term of the Genentech Agreement, we have agreed to certain defined exclusivity obligations or restrictions with respect to the development and commercialization of certain cell therapies.

In February 2019, we received a $300.0 million upfront payment from Genentech. We are also eligible to receive more than $1.8 billion over time, including payments of up to $75.0 million upon the achievement of specified regulatory milestones, up to $300.0 million upon the achievement of specified development milestones, and up to $1.4 billion upon the achievement of specified commercial milestones. Genentech will also pay us tiered royalties at a rate ranging from the mid-single digits to the mid-teens on aggregate worldwide net sales of the Shared Products and the Personalized Product arising from the strategic collaboration, subject to certain reductions, with aggregate minimum floors.

The Genentech Agreement will continue until the expiration of all royalty payments, but may be terminated by mutual agreement, upon an uncured material breach by either party, upon insolvency of either party, or by Genentech for convenience upon prior written notice.

Microsoft Agreement

In December 2017, we entered into the Microsoft Agreement to map TCR sequences to the antigens they bind with the goal of developing diagnostic tests for early detection of many diseases from a single blood test.

Pursuant to the Microsoft Agreement, Microsoft applies machine learning and computational statistics to our clinical immunomics data in order to produce predictive models that allow us to map TCR sequences to the antigens they bind. Under the Microsoft Agreement, we retain all rights to these predictive models and the data underlying our TCR-Antigen Map, including the right to commercialize clinical products using our TCR-Antigen Map. We and Microsoft have granted each other certain licenses to one another's intellectual property rights and have agreed to certain defined exclusivity obligations with respect to collaborations and projects that are substantially similar to the Microsoft Agreement.

During the term of the Microsoft Agreement, we have agreed to exclusively use Microsoft's Azure cloud services at standard volume pricing with a minimum Azure consumption requirement. We have also agreed to host each diagnostic product developed as a direct result of the Microsoft Agreement on Azure throughout the term of the Microsoft Agreement and for a period of five years thereafter. In addition, we have agreed to exclusively use Microsoft's immunomics artificial intelligence services for TCR-antigen mapping in connection with all of our technology, products and services developed as a direct result of our collaboration with Microsoft throughout the term of the Microsoft Agreement.

The Microsoft Agreement has a seven-year term and may be terminated by mutual agreement or by either party upon an uncured material breach. Concurrently with entry into the Microsoft Agreement, Microsoft purchased shares of our Series F-1 convertible preferred stock.

Processing and Manufacturing

We process both clinical and research use samples in our laboratory in Seattle, Washington. Our Seattle laboratory is CLIA certified, CAP-accredited and ISO 13485-certified. After we intake samples sent to us from healthcare providers or research and biopharmaceutical customers, we extract DNA from the sample if required, amplify it and otherwise prepare it for our sequencing and data analysis. Throughout our processes, we apply a rigorous quality management system, which is designed to comply with the QSR and the requirements of CLIA, CAP and other applicable state licensing and accreditation requirements.

In order to process samples submitted to us using immunoSEQ or clonoSEQ, we utilize a combination of proprietary primer mixes and commercial materials, including a multiplex PCR master mix, enzymes, high throughput multi-cycle sequencing reagents and other materials, which we obtain and assemble as needed from various third-party vendors on customary terms. A number of our processing steps utilize automated equipment to help ensure consistency and efficiency. Sequencing is performed using the Illumina NextSeq System, which we have appropriately qualified for the intended uses of our products and services. We also work with a third-party vendor to manufacture our immunoSEQ RUO kit using our proprietary primer mix and other materials.

For our TCR-Antigen Map and drug discovery initiatives, we conduct our current operations at our laboratories in Seattle, Washington and South San Francisco, California. These laboratories have cell sorting, tissue culture and other processing equipment.

We use a limited number of suppliers, or in some cases single suppliers, for our laboratory equipment and materials. We manage this concentration risk by targeting levels of surplus stock that, we believe, would allow us to locate alternative suppliers if needed. However, if one of our suppliers fails to perform adequately or fulfill our needs, we may be required to incur significant costs and devote significant efforts to find new suppliers and may face delays in processing samples or developing and commercializing our products and services. In particular, we have purchased the Illumina NextSeq System, and Illumina also supplies us with reagents that have been designed for use solely with this sequencer. While we acquire these reagents from Illumina on customary terms, if we had to replace the reagents we use we may also need to acquire and qualify a replacement sequencer, validate the reagents and potentially revalidate aspects of our existing assays.

Distribution

We processed our first immunoSEQ samples in 2011 and issued our first clonoSEQ report in 2013. Since then, we have focused on expanding our customer base. We sell our products and services primarily through our own internal sales force. Our sales and marketing efforts are targeted at department heads, laboratory directors, principal investigators, core facility directors, clinicians, payors and research scientists and pathologists at leading academic institutions, biopharmaceutical companies, research institutions and contract research organizations. We seek to increase awareness of our products and services among our target customers through direct sales calls, trade shows, seminars, academic conferences, web presence and other forms of internet marketing. Our drug discovery efforts are focused on large biopharmaceutical companies.

We intend to launch an improved RUO kit that can be used with various sample types, which we expect to enable global distribution of our research product. We plan to utilize a third-party global

distributor. We may not be able to engage a distributor in a timely manner or on commercially reasonable terms.

Intellectual Property

We have an extensive global portfolio of intellectual property rights to protect our immune medicine platform, the products and services that draw on it and our reputation in the industry.

As of March 31, 2019, we owned or controlled 343 active patents and patent applications whose claims are intended to cover what we do, what we plan to do and what others might do to compete with us. From our earliest patent filings in 2009, our portfolio has been tailored to reflect our efforts to harness the adaptive immune system for research, diagnostic and therapeutic applications. Our patent claims extend to not only adaptive immune receptor molecules, but also to uniquely powerful techniques for sequencing immune cell receptors, determining clonality and immune competency, diagnosing disease, predicting responses to immunotherapy and identifying new drug candidates. Our patent protections generally expire in years ranging from 2029 to 2038.

Critical know-how we develop is protected by a trade secrecy program to ensure against inappropriate disclosure or use. Encompassed in our know-how is our proprietary database of coding sequences, antigen reactivities and safety profiles for immune receptors, which is vast and growing. Even with collaborators, access to our immune medicine platform technology is limited and tightly controlled through contracts and careful communication. We own our immune medicine platform, including improvements we or collaborators make to it, and retain rights in data resulting from its use.

We also pursue trademark registration for our product and service names and promotional slogans in our existing and projected markets.

Intellectual Property Portfolio by the Numbers

As of March 31, 2019, our intellectual property portfolio consisted of the following:

- 375 patent applications filed worldwide directly or in conjunction with a co-owner or licensor since 2009;
- 109 pending patent applications;
- 234 issued patents across our immune medicine platform;
- 24 patent families directed to methods and tools useful in our immune medicine platform for non-target specific immunosequencing and research, including immunoSEQ;
- 10 patent families directed to methods and tools useful in diagnosis, prognosis and disease monitoring, including clonoSEQ and the TCR-Antigen Map;
- 12 patent families directed to methods and tools useful in drug discovery, including TruTCR, MIRA and pairSEQ; and
- 19 trademarks registered and pending registration worldwide.

Patent Portfolio

We have developed an expansive patent portfolio in commercially important markets with claims to critical aspects of our technology, beginning with our first patent applications exclusively licensed from Fred Hutch in 2009. Our ongoing patent strategy is to generate a return on our patenting investments, which values substantive quality over volume to build a defensible moat around technology we use as well as what others might develop to design around our position.

We prioritize pursuing patent claims with a reasonable likelihood of being granted. Where patentability for a particular invention is questionable, we often choose to protect it as a trade secret instead. In some instances, however, we may seek to push the patentability envelope when the state of the applicable patent laws are in flux, such as patent eligibility for naturally occurring molecules, including TCRs, in the United States.

Methods of Measuring Adaptive Immunity

In 2009, a U.S. provisional patent application was filed to pursue protection for immunosequencing by our Co-Founder, Dr. Harlan Robins. The invention broadly relates to methods for assessing the adaptive immune system status of individuals. Rearranged V and J segment genes of TCRs or BCRs are targeted as biomarkers for assessing the status of the immune system at one or more points in time. Granted claims extend to the use of particular sets of amplification primers, while pending claims are being pursued to capture additional assessment techniques. Licensed exclusively to us by Fred Hutch, the application has since spawned 31 additional patent applications, from which 12 patents have been granted as of March 31, 2019, including U.S. Patent No. 9,809,813.

Optimizing Nucleic Acid Amplification Reactions

Amplification of nucleic acids can result in over- or under-representation of the amplified molecules, misrepresenting the number present in the source material, such as a blood sample. Dr. Robins invented a method to correct for such bias, thereby improving the precision of PCR-based quantification of TCR and BCR coding sequences in a sample. The claimed approach utilizes synthetic templates, reflecting nucleic acid sequences for rearranged V and J receptor segments in the sampled cells. Twenty-eight related patent applications have since been filed, from which 16 patents have been granted as of March 31, 2019, including U.S. Patent Nos. 9,371,558 and 10,214,770.

Diagnosing and Monitoring Disease

In connection with our Sequenta Acquisition in 2015, we purchased Sequenta's extensive patent portfolio. The portfolio includes 124 patent applications which disclose and claim methods to identify and quantify T cell-based immune responses to antigen exposure using NGS. TCR and BCR DNA, RNA or cell-free DNA from samples, including blood and bone marrow, are used to detect, prognose and monitor disease, including autoimmune disease, infection and cancer. One hundred one patents have been granted in the portfolio as of March 31, 2019, including U.S. Patent Nos. 8,628,927 and 8,236,503.

Our diagnostic methods also apply to the detection of MRD, the target of our clonoSEQ diagnostic test for assessing how disease burden changes in response to treatment or during remission. Nine patents have been granted from additional applications filed by us, including U.S. Patent No. 9,824,179.

TCR-Antigen Map

In connection with our Microsoft collaboration, we are developing a diagnostic product to detect cancer and other diseases at their earliest stage by learning the signals and responses of the activated immune receptors in a patient's blood. Pre-collaboration, we filed 10 related patent applications for methods to produce antigen-exposed enriched T cell populations and identify their antigen specificities by comparison to a pre-exposure population of cells or by use of an algorithm. We expect to file additional patent applications relating to TCRs and algorithmic-based methods to characterize antigen specificities as our work proceeds with Microsoft.

MIRA

We developed and are pursuing patent protection for bioinformatic-based methods to determine the antigen specificity of TCRs by exposing T cells to a panel of multiple antigens. Antigen exposure can be performed by incubation or presentation; for example, it can be performed via recombinant expression in another cell. These methods may also be used to pair the two TCR chains as well as to identify high avidity TCRs. Eight related patent applications have been filed, from which two patents have been granted as of March 31, 2019, including U.S. Patent No. 10,066,265.

pairSEQ

In nature, TCRs and BCRs exist as a heterodimer of paired chains, each of which is encoded on a different chromosome. Immunosequencing reveals the nucleotide structure of each individual chain, but not which chains match as cognate pairs. We developed and are pursuing patent protection for multiple bioinformatic-based approaches to pairing the two chains of TCRs and BCRs, including one deployed in our pairSEQ technique. Our methods also allow for identification of receptor chain pairs which are specific to particular antigen targets. Fifty-four related patent applications have been filed, from which 21 patents have been granted as of March 31, 2019, including U.S. Patent No. 10,077,478.

Assessing Responsiveness to Immunotherapy

Leveraging our immunosequencing technologies, we developed methods for predicting responses to immunotherapy, vaccines and infection. To those ends, rearranged TCR or BCR sequences are quantified and their levels or frequencies compared at different points in time. Twenty-three related patent applications have been filed, from which 15 patents have been granted as of March 31, 2019, including U.S. Patent No. 10,221,461.

In-Licensed and Acquired Intellectual Property Rights

While we have developed the majority of our immune medicine platform, products and services, we occasionally license or acquire third-party owned inventions to bolster the strength of our patent estate and ensure freedom to operate.

Early work by Dr. Robins with Fred Hutch led to discoveries around immunosequencing methods and tools covered by 128 patents and patent applications in the United States and abroad which we exclusively licensed. Our rights are for all fields of use worldwide and are sublicensable. To the extent any licensed granted patent rights extend to products or services sold by us, we pay Fred Hutch a royalty rate of 0.75% of net sales on licensed products.

Through our Sequenta Acquisition, we also obtained an exclusive paid-up license, with rights to sublicense, to patents filed in the United States, Europe, Australia and China owned by iRepertoire, Inc. The license is for worldwide use in diagnosis, prognosis, treatment and monitoring of any proliferative disorder for which rearranged nucleic acids capable of encoding an immune receptor, whether productive or unproductive, or functional or nonfunctional, of a cell, excluding tumor infiltrating lymphocytes, of the proliferative disorder can be used as markers for the disorder, including, but not limited to, lymphoid and myeloid proliferative disorders, such as ALL, CLL, acute myeloid leukemia, chronic myelogenous leukemia, Hodgkin's and Non-Hodgkin's lymphomas, plasma cell neoplasms, such as MM, monoclonal gammopathy of undetermined significance, monoclonal B cell lymphocytosis and myelodysplastic syndromes.

In addition to the patent estate acquired from Sequenta, we also acquired ownership of immunosequencing-related patent portfolios from Imdaptive, Inc. and ImmunID S.A.S.

Trademarks

We own various trademarks, applications and unregistered trademarks in the United States and other commercially important markets, including our company name, product and service names and other trade or service marks. Our trademark portfolio is designed to protect the brands for our products and services, both current and in the pipeline.

Trade Secrecy Program

We have a trade secrecy program to prevent disclosure of our trade secrets to others, except under stringent conditions of confidentiality when disclosure is critical to our business. Our trade secrets include the composition of certain reagents, assay protocols and immunosequencing-related data, such as immune receptor sequences. We protect trade secrets and know-how by establishing confidentiality agreements and invention assignment agreements with our employees, consultants, scientific advisors, contractors and collaborators. These agreements provide that all confidential information developed or made known during the course of an individual or entities' relationship with us must be kept confidential during and after the relationship. These agreements also provide that all inventions resulting from work performed for us or relating to our business and conceived or completed during the period of employment or assignment, as applicable, shall be our exclusive property. In addition, we take other appropriate precautions, such as physical and technological security measures, to guard against misappropriation of our proprietary information by third parties.

Although we take steps to protect our proprietary information and trade secrets, including through contractual means with our employees and consultants, third parties may independently develop substantially equivalent proprietary information and techniques or otherwise gain access to our trade secrets or disclose our technology. Accordingly, we may not be able to meaningfully protect our trade secrets. For more information regarding the risks related to our intellectual property, see "*Risk Factors—Risks Related to Our Intellectual Property*."

Competition

The biotechnology and pharmaceutical industries, including the fields of life sciences research, clinical diagnostics and drug discovery, are characterized by rapidly advancing technologies, intense competition and a strong emphasis on intellectual property. Given the breadth and promise of immune medicine, we face substantial competition from many different sources, including life sciences tools, diagnostics, pharmaceutical and biotechnology companies, academic research institutions and governmental agencies and public and private research institutions across various components of our platform and product and service offerings. Due to the significant interest and growth in immune-driven medicine more broadly, we expect the intensity of the competition to increase. However, we believe our scale, precision and speed, and the resulting clinical applicability, distinguish us from our competitors. In life sciences research, immunoSEQ faces competition from a number of companies, including Thermo Fisher Scientific Inc., ArcherDX, Inc., 10X Genomics, Inc., Invivoscribe, Inc., iRepertoire, Inc., QIAGEN N.V., Takara Bio Inc., Fluidigm Corporation and Dolomite Bio (a brand of Blacktrace Holdings Ltd).

In clinical diagnostics, clonoSEQ faces competition primarily from institutions performing flow cytometry in-house, particularly outside of the United States. Competitors with diagnostic technology platforms include Invivoscribe, Inc., ArcherDX, Inc. and Becton, Dickinson and Company. We may also face competition from companies developing early cancer detection testing products for indications that do not currently compete with clonoSEQ, including GRAIL, Inc. Guardant Health, Inc. Exact Sciences Corporation and Natera, Inc.

In drug discovery, clinical trials in the field of immune-driven medicine are being pursued by a number of industry and academic players. Direct competitors with a pipeline of preclinical and clinical TCR-based cellular therapy candidates include GlaxoSmithKline plc, Adaptimmune Therapeutics plc, Kite Pharma, Inc./Gilead Sciences, Inc., Juno Therapeutics, Inc./Celgene Corporation, bluebird bio, Inc., Immatics Biotechnologies GmbH, Neon Therapeutics, Inc. and several others.

Immune medicine is being pursued by several biotechnology companies as well as by large-cap biopharmaceutical companies. Many of our current or potential competitors, either alone or with their collaboration partners, have significantly greater financial resources and expertise in research and development, manufacturing, regulatory approval and compliance, and sales and distribution than we do. Mergers and acquisitions involving life sciences research, clinical diagnostics or drug discovery companies in the immune medicine space may result in even more resources being concentrated among a smaller number of our competitors. Smaller or early-stage companies may also prove to be significant competitors, particularly through collaborative arrangements with large and established companies. These competitors also compete with us in recruiting and retaining qualified scientific and management personnel and in acquiring technologies complementary to, or necessary for, our programs.

Our commercial opportunity could be reduced or eliminated if our competitors develop and commercialize research or diagnostic products or services that are more accurate, more convenient to use or more cost-effective than our products or services. Competitor therapeutic products could also prove more safe, more effective, more convenient to administer or more cost-effective than any therapeutic products we may develop with our collaborators. Our competitors also may obtain FDA or other regulatory approval for their products more rapidly than we may obtain approval for ours, which could result in our competitors establishing a strong market position before we are able to enter the relevant market.

Government Regulation

Life Sciences Research Use Only Technologies

Our core research product, immunoSEQ, is an RUO tool in the United States that provides data to third parties such as biopharmaceutical companies that are themselves engaged in the research and development of potential diagnostic and therapeutic products and services for which they may later pursue investigation and clearance, authorization or approval from regulatory authorities, such as the FDA.

RUO products belong to a separate regulatory classification under a long-standing FDA regulation. From an FDA perspective, products that are intended for research use only and are labeled as RUO are not regulated by the FDA as *in vitro* diagnostic devices and are therefore not subject to the regulatory requirements discussed below for clinical diagnostic products. Thus, RUO products may be used or distributed for research use without first obtaining FDA clearance, authorization or approval. The products must bear the statement: “For Research Use Only. Not for Use in Diagnostic Procedures.” RUO products cannot make any claims related to safety, effectiveness or diagnostic utility, and they cannot be intended for human clinical diagnostic use. Accordingly, a product labeled RUO but intended or promoted for clinical diagnostic use may be viewed by the FDA as adulterated and misbranded under the FDCA and subject to FDA enforcement action. The FDA will consider the totality of the circumstances surrounding distribution and use of an RUO product, including how the product is marketed and to whom, when determining its intended use. If the FDA disagrees with a company’s RUO status for its product, the company may be subject to FDA enforcement activities, including, without limitation, requiring the company to seek clearance, authorization or approval for the products.

Clinical Diagnostics in the United States

Our first diagnostic product, clonoSEQ, was granted marketing authorization by the FDA for the detection and monitoring of MRD in bone marrow samples in patients with MM and ALL under the *de novo* process, which classified clonoSEQ and future DNA-based tests to measure MRD in hematological malignancies as Class II devices, as explained further below.

In the United States, medical devices are subject to extensive regulation by the FDA under the FDCA and its implementing regulations, and other federal and state statutes and regulations. The FDA regulates the design, development, preclinical, analytical and clinical testing, manufacture, safety, effectiveness, clearance, authorization or approval, record-keeping, packaging, labeling, storage, adverse event reporting, advertising, promotion, marketing, sales, distribution and import and export of medical devices. IVDs are a type of medical device and include reagents and instruments used in the diagnosis or detection of diseases, conditions or infections, including, without limitation, the presence of certain chemicals, genetic information or other biomarkers. Predictive, prognostic and screening tests can also be IVDs.

Devices must undergo premarket review by and receive clearance, authorization or approval from the FDA prior to commercialization, unless the device is of a type exempted from such review by statute, regulation or pursuant to the FDA's exercise of enforcement discretion. For example, the FDA, to date, has generally exercised enforcement discretion over most LDTs, which are tests that are designed, manufactured, validated and used within a single laboratory, subject to certain other limitations such as the LDT not being offered directly to consumers.

Pursuant to the FDCA, medical devices are subject to varying degrees of regulatory control and are classified in one of three classes depending on the controls the FDA determines necessary to reasonably ensure their safety and effectiveness. Class I devices are deemed to be low risk. Class II devices are deemed to be moderate risk. Class III devices are generally the highest risk devices and are subject to the highest level of regulatory control to provide reasonable assurance of the devices' safety and effectiveness.

Class I devices are those for which reasonable assurance of safety and effectiveness can be provided by adherence to the FDA's "general controls" for medical devices. General controls apply to all classes of devices and include FDA's QSR, labeling requirements, premarket review, establishment registration and device listing, the MDR regulation, which requires that manufacturers report to the FDA if their device may have caused or contributed to a death or serious injury or malfunctioned in a way that would likely cause or contribute to a death or serious injury if it were to recur, and the Reports of Corrections and Removals regulation, which requires manufacturers to report recalls and field actions to the FDA if initiated to reduce a risk to health posed by the device or to remedy a violation of the FDCA. Most Class I devices are exempt from premarket regulation; however, some Class I devices require premarket clearance by the FDA through the 510(k) premarket notification process described below.

Class II devices are subject to the FDA's general controls, and any other "special controls," such as performance standards, post-market surveillance and the FDA guidelines, deemed necessary by the FDA to provide reasonable assurance of the devices' safety and effectiveness. Premarket review and clearance by the FDA for Class II devices are accomplished through the 510(k) premarket notification pathway, although some Class II devices are exempt from the 510(k) requirements. Premarket notifications are subject to user fees, unless a specific exemption applies. To obtain 510(k) clearance, a manufacturer must submit a premarket notification demonstrating that the proposed device is "substantially equivalent" to a legally marketed predicate device, which is usually a previously 510(k)-cleared device. In determining substantial equivalence, the FDA assesses whether the

proposed device has the same intended use as the predicate device, and the same technological characteristics as the predicate device, or, if the proposed device has different technological characteristics, that the information submitted in the premarket notification demonstrates the proposed device is as safe and effective as and does not raise different questions of safety and effectiveness than the predicate device. Premarket notifications typically include bench, analytical, and preclinical data, and sometimes include clinical data. The 510(k) pathway usually takes from three to nine months from the time of submission to the FDA, but it can take longer, particularly for a novel type of product. If the FDA determines that a device is substantially equivalent to a predicate device, the subject device may be marketed. However, if the FDA makes a not substantially equivalent determination, then the device would be regulated as a Class III device, discussed below. If a manufacturer obtains a 510(k) clearance for its device and then makes a modification that could significantly affect the device's safety or effectiveness or constitutes a major change or modification in the intended use of the device, a new clearance, authorization or approval may be required.

Class III devices are deemed by the FDA to pose the greatest risk, such as those for which reasonable assurance of the device's safety and effectiveness cannot be assured solely by the general controls and special controls described above and that are life-sustaining or life-supporting. Some pre-amendment Class III devices, for which the FDA has not yet required a PMA, require the FDA's clearance of a premarket notification in order to be marketed. However, most Class III devices are required to undergo the PMA process in which the manufacturer must demonstrate reasonable assurance of the safety and effectiveness of the device for its proposed intended use to the FDA's satisfaction. The PMA pathway is costly, lengthy and uncertain. A PMA application must provide valid scientific evidence, typically extensive preclinical, analytical and clinical trial data and information about the device and its components regarding, among other things, device design, manufacturing and labeling. PMA applications, and supplemental PMA applications, are subject to significantly higher user fees than are 510(k) premarket notifications. Some PMA applications are exempt from a user fee, for example a small business' first PMA. As part of its PMA review process, the FDA will typically inspect the manufacturer's facilities for compliance with QSR requirements, which impose elaborate testing, control, documentation and other quality assurance procedures. The PMA review process typically takes one to three years from submission but can take longer.

Novel devices are placed in Class III by default if the device type was not previously classified by the FDA and has no predicate. Manufacturers of such novel devices may request that the FDA reclassify the device to Class II or Class I via a *de novo* request. The Food and Drug Administration Modernization Act of 1997 established a route to market for low to moderate risk medical devices that are automatically placed into Class III due to the absence of a predicate device, called the "Request for Evaluation of Automatic Class III Designation," or the *de novo* classification procedure. This procedure allows a manufacturer whose novel device is automatically classified into Class III to request down-classification of its medical device into Class I or Class II on the basis that the device presents low or moderate risk, rather than requiring the submission and approval of a PMA. Prior to the enactment of the Food and Drug Administration Safety and Innovation Act ("FDASIA") in July 2012, a medical device could only be eligible for *de novo* classification if the manufacturer first submitted a 510(k) premarket notification and received a determination from the FDA that the device was not substantially equivalent. FDASIA streamlined the *de novo* classification pathway by permitting manufacturers to request *de novo* classification directly without first submitting a 510(k) premarket notification to the FDA and receiving a not substantially equivalent determination. FDASIA sets a review time for the FDA of 120 days following receipt of the *de novo* application, but the FDA does not routinely meet this timeline and has publicly only committed to a review of 150 days for 55% of applications. If the manufacturer seeks reclassification into Class II, the manufacturer must include a draft proposal for special controls that are necessary to provide a reasonable assurance of the safety and effectiveness of the medical device. The FDA may reject the reclassification petition if it identifies a legally marketed predicate device that would be appropriate for a 510(k) or determines that the device is not low to moderate risk or that

general and special controls would be inadequate to ensure the safety and effectiveness of the device. If the FDA agrees with the down-classification, the FDA will grant the device market authorization and establish a classification regulation for the device type. The device can then be used as a predicate device for future 510(k) submissions by the manufacturer or a competitor. In December 2018, the FDA issued proposed regulations to govern the *de novo* classification process, which include requirements beyond what has historically been required in *de novo* submissions. If finalized, these regulations could further impact this path to market.

A clinical trial may be required in support of a 510(k) or *de novo* submission and generally is required for a PMA application. These trials require an Investigational Device Exemption ("IDE") approved by the FDA for a specified number of patients and sites, unless the product is exempt from IDE requirements or deemed a non-significant risk device eligible for more abbreviated IDE requirements. Most clinical studies of IVDs are exempt from the IDE requirements, if certain requirements are met. The IDE application must be supported by appropriate data, such as animal and laboratory testing results, showing that it is safe to test the device in or on humans and that the testing protocol is scientifically sound. Clinical trials may begin 30 days after the submission of the IDE application unless the FDA disapproves the IDE or places the trial on clinical hold. Additionally, clinical trials may not begin until their protocol and informed consent receive approval from the appropriate ethical review boards, including IRBs. Unless an exemption applies, clinical trials intended to assess the safety or efficacy of a device must be conducted in accordance with the FDA's IDE requirements. Clinical investigations that are not assessing safety and effectiveness but are being used to generate other data to support FDA submissions are subject to the more broadly applicable informed consent and IRB regulations.

Even if regulatory clearance, authorization or approval of a device is granted, the FDA may impose limitations on the uses and indications for which the device may be labeled and promoted, and the device remains subject to significant regulatory requirements. Medical devices may be marketed only for the uses and indications for which they are cleared, authorized or approved.

After a device, including a device exempt from FDA premarket review, is placed on the market, numerous post-market regulatory requirements apply. These requirements as discussed above in the general controls. Some manufacturers also may be subject to post-market surveillance regulations. Facility records and manufacturing processes are subject to periodic unscheduled inspections by the FDA.

Failure to comply with applicable regulatory requirements can result in enforcement action by the FDA, which may include, among other things: untitled letters, public warning letters, fines, injunctions, civil or criminal penalties, recall or seizure of products, operating restrictions, partial suspension or total shutdown of production, delays in or refusals of 510(k), *de novo* or PMA submissions, withdrawing existing clearance, authorization and approval, and a recommendation by the FDA to disallow a device manufacturer from entering into government contracts. If certain conditions are met, the FDA also has the authority to order manufacturers to repair, replace or refund the cost of any devices that present an unreasonable risk of substantial harm to the public health. In the event that a supplier fails to maintain compliance with FDA or the device manufacturer's quality requirements, the manufacturer may have to qualify a new supplier and could experience manufacturing delays as a result.

Position in the European Union

In the EU, IVDs can be placed on the market by obtaining a "CE mark," which demonstrates conformity with the *In vitro* Diagnostic Medical Device Directive ("IVDD"). The requirements under the Directive include:

- *Essential Requirements*. The IVDD specifies "essential requirements" that all medical devices must meet to demonstrate the product is safe and effective under normal conditions of use.

The requirements are similar to those adopted by the FDA relating to quality systems and product labeling.

- *Conformity Assessment*. The requirements to obtain a CE mark are risk-based, and follow a similar classification system as in the United States. However, unlike the United States, which requires virtually all devices to undergo some level of premarket review by the FDA, the IVDD currently allows manufacturers to bring many devices to market using a process in which the manufacturer self-certifies that the device conforms to the applicable essential requirements.
- *Vigilance*. The IVDD specifies requirements for post market reporting similar to those adopted by the FDA.

On May 26, 2017, the EU released a new regulatory framework, the *In vitro* Diagnostic Medical Device Regulation ("IVDR"), which will replace the IVDD. Our products in the EU will have to comply with the IVDR requirements after May 26, 2022, subject to the applicable transitional provisions before full compliance is required. The IVDR is considerably stricter in regulatory oversight than the IVDD and will require more IVD devices to be reviewed by the relevant body before being placed on the market. Until that time, our products must continue to meet the requirements of IVDD for commercialization in the EU.

Laboratory Developed Tests in the United States

clonoSEQ is available as an LDT for use in assessing MRD for other lymphoid malignancies, including CLL and NHL, at our Seattle, Washington laboratory. LDTs have generally been considered to be tests that are designed, developed, validated and used within a single laboratory. The FDA takes the position that it has the authority to regulate such tests as medical devices under the FDCA, but the FDA has historically exercised enforcement discretion and has not required clearance, authorization or approval of LDTs prior to marketing. Laboratories certified as "high complexity" under CLIA may develop, manufacture, validate and run LDTs. The CLIA requirements are discussed below in "*—United States Federal and State Regulation of Laboratories*."

Although we believe we are within the scope of the FDA's policy on enforcement discretion for LDTs, the initial commercialization and continued commercial availability of an LDT is subject to uncertainty given the FDA's latitude in interpreting and applying its laws and policies. For example, the FDA does not consider tests to be subject to its LDT enforcement discretion if they were or are designed or manufactured completely, or partly, outside of the laboratory that offers and uses them, or if they are offered "over-the-counter," as opposed to being available to patients only when prescribed by a healthcare provider. Even for tests that appear to fall within the FDA's previously stated enforcement discretion, the FDA may decide to take action against certain LDTs on a case-by-case basis at any time if the FDA views them as presenting a risk to patients. The FDA Commissioner and the Director of the CDRH have expressed significant concerns regarding potential disparities in accuracy and quality between some LDTs and IVDs that have been reviewed and cleared, authorized or approved by the FDA. In addition, the U.S. Congress has been considering various legislative proposals that would reform the FDA's regulation of laboratory tests, and such legislation might lead to heightened FDA scrutiny of LDTs, particularly new LDTs, in the future. Whether such legislation will pass and, if so, what effect it may have on how the FDA regulates laboratory tests, including LDTs, is unknown. If the FDA disagrees with a laboratory test's LDT status, the FDA may consider the test to be an unapproved medical device, may subject us to FDA enforcement action, including, without limitation, requiring us to seek clearance, authorization or approval for the laboratory test.

On October 3, 2014, the FDA issued two draft guidance documents proposing a new regulatory paradigm for oversight of LDTs. These draft guidance documents proposed more active review of LDTs. The draft guidance documents were the subject of considerable controversy, and in November

2016, the FDA announced that it would not be finalizing the 2014 draft guidance documents. On January 13, 2017, the FDA issued a discussion paper which laid out elements of a possible revised future LDT regulatory framework, but did not establish any regulatory requirements.

The FDA's recent efforts to regulate LDTs have prompted the drafting of legislation governing diagnostic products and services that seeks to substantially revamp the regulation of both LDTs and IVDs. The U.S. Congress may act to provide further direction to the FDA on the regulation of LDTs and substantially modify the regulation of IVDs, which might result in heightened FDA scrutiny of LDTs, particularly new LDTs, in the future.

U.S. Federal and State Regulation of Laboratories

Given that aspects of our business at certain facilities involve acting as a clinical laboratory, we are required to hold certain federal and state licenses, certifications and permits to conduct our business.

As to federal certifications, CLIA establishes rigorous quality standards for all laboratories that perform testing on specimens derived from humans for the purpose of providing information for the diagnosis, prevention or treatment of disease, or the impairment of, or assessment of health. As a clinical laboratory, we must obtain a CLIA certificate based on the complexity of testing performed at the laboratory, such as a Certificate of Compliance for high-complexity testing. CLIA also mandates compliance with various operational, personnel, facilities administration, quality and proficiency requirements, intended to ensure that their clinical laboratory testing services are accurate, reliable and timely. CLIA compliance and certification is also a prerequisite to be eligible to bill for services provided to government payors and for many private payors. Furthermore, we are subject to survey and inspection every two years to assess compliance with program standards, and may be subject to additional unannounced inspections. Laboratories performing high-complexity testing are required to meet more stringent requirements than laboratories performing less complex tests.

In addition to CLIA requirements, we elect to participate in the accreditation program of the CAP. CMS, the agency that oversees CLIA, has deemed CAP standards to be equally or more stringent than CLIA regulations and has approved CAP as a recognized accrediting organization. Inspection by CAP is performed in lieu of CMS inspections for accredited laboratories. Therefore, because we are accredited by the CAP Laboratory Accreditation Program, we are deemed to also comply with CLIA.

CLIA provides that a state may adopt laboratory regulations that are more stringent than those under federal law, and a number of states have implemented their own more stringent laboratory regulatory requirements. Select states, including Washington, have laboratory regulations that have been deemed by the federal government to be at least as stringent as CLIA, and thus laboratories licensed under those state regimes are exempt from CLIA and the state Department of Health is permitted to issue a CLIA number, along with a state Medical Test Site license, rather than a certificate being issued by CMS. Our laboratory holds the required Washington license. State laws may require that laboratory personnel meet certain qualifications, specify certain quality control procedures, facility requirements or prescribe record maintenance requirements.

Several states additionally require the licensure of out-of-state laboratories that accept specimens from those states. For example, New York requires a laboratory to hold a permit which is issued after an on-site inspection and approval of each LDT offered by a laboratory, and has various, more stringent requirements than CLIA and CAP, including those for personnel qualifications, proficiency testing, physical facility and equipment and quality control standards. Our laboratory holds the required licenses for Maryland, Rhode Island, Pennsylvania and California. We are currently in the process of seeking a permit in the State of New York, and currently operate under the New York non-permitted laboratory test request program.

From time to time, other states may require out-of-state laboratories to obtain licensure in order to accept specimens from the state. If we identify any other state with such requirements, or if we are contacted by any other state advising us of such requirements, we intend to follow instructions from the state regulators as to how we should comply with such requirements.

If a clinical laboratory is found to be out of compliance with CLIA certification, CAP accreditation or a state license or permit, the applicable regulatory agency may, among other things, suspend, restrict or revoke the certification, accreditation, license or permit to operate the clinical laboratory, assess civil monetary penalties and impose specific corrective action plans, among other sanctions.

Federal and State Privacy, Security and Breach Notification Laws

Many state and federal laws govern the processing of personally identifiable information or individually identifiable health information. At the federal level, under the administrative simplification provisions of HIPAA and HITECH, the HHS issued regulations that establish standards for protecting the privacy and security of "protected health information" used or disclosed by certain healthcare providers and other "covered entities" and their "business associates." Three principal data protection-related regulations with which we are required to comply have been issued in final form under HIPAA and HITECH: privacy regulations, security regulations and security breach notification regulations.

The privacy regulations govern the use and disclosure of "protected" health information by covered healthcare providers, as well as health insurance plans. They also set forth certain rights that an individual has with respect to his or her protected health information maintained by a covered health care provider, including the right to access or amend certain records containing protected health information or to request restrictions on the use or disclosure of protected health information. The security regulations establish requirements for safeguarding the confidentiality, integrity and availability of protected health information that is electronically transmitted or electronically stored. HITECH, among other things, established certain health information security breach notification requirements. A covered entity must notify HHS and each affected individual of a breach of unsecured protected health information as well as the media if the breach involves more than 500 individuals.

HIPAA violations are subject to civil and criminal penalties. Additionally, to the extent that we submit electronic healthcare claims and payment transactions that do not comply with the electronic data transmission standards established under HIPAA and HITECH, payments to us may be delayed or denied. Although there is no private right of action, HIPAA has been used as the standard of care in negligence actions brought under state law.

Section 5(a) of the FTCA has also been used to regulate data privacy and security at the federal level. According to the FTC, failing to take appropriate steps to keep consumers' personal information secure or using or disclosing personal information in violation of a company's privacy notice may constitute unfair or deceptive acts or practices in or affecting commerce in violation of the FTCA. The FTC expects a company's data security measures to be reasonable and appropriate in light of the sensitivity and volume of consumer information it holds, the size and complexity of its business and the cost of available tools to improve security and reduce vulnerabilities.

In addition, certain state laws govern the privacy and security of health information, some of which are more stringent than HIPAA and many of which differ from each other in significant ways and may not have the same effect, thus complicating compliance efforts. In addition, there are state breach notification laws in every state. The HIPAA regulations establish a federal "floor" of protection and do not supersede state laws that may be more stringent or provide individuals with greater rights with respect to the privacy or security of, and access to their records containing health information. Failure to comply with these laws, where applicable, can result in the imposition of significant civil or criminal

penalties and private litigation. For example, California recently enacted legislation, the CCPA, which goes into effect January 1, 2020 and will be enforceable as of July 1, 2020. The CCPA, among other things, creates new data privacy obligations for covered companies and provides new privacy rights to California residents, including the right to opt out of certain disclosures of their information. The CCPA also creates a private right of action with statutory damages for certain data breaches, thereby potentially increasing risks associated with a data breach.

General Data Protection Regulation in the EU

The GDPR is a legal framework that sets requirements for the collection and processing of personal information of individuals within the EEA. The GDPR sets out the principles for data management and the rights of the individual, while also imposing very significant fines that can be revenue-based. It applies to U.S. companies that process personal information of persons in the EEA in connection with the offer of products or services to those persons, or the monitoring of such persons' behavior. It may also apply when a U.S. company processes personal information in the context of the activities of an entity established in the EEA. The GDPR became enforceable on May 25, 2018. The regulation applies to the human resources record of employees and even the Intellectual Property addresses of people using online services. The GDPR builds upon data rights that the EU had previously advocated, such as the right of an individual to be forgotten and the right to data portability.

Federal, State and Foreign Fraud and Abuse Laws

In the United States, there are various fraud and abuse laws with which we must comply and we are subject to regulation by various federal, state and local authorities, including CMS, other divisions of HHS, such as the OIG, the DOJ and individual U.S. Attorney offices within the DOJ, and state and local governments. We also may be subject to foreign fraud and abuse laws.

In the United States, the AKS prohibits, among other things, knowingly and willfully offering, paying, soliciting or receiving remuneration to induce or in return for patient referrals for, or purchasing, leasing, ordering or arranging for the purchase, lease or order of, any healthcare item or service reimbursable under a governmental payor program. Courts have stated that a financial arrangement may violate the AKS if any one purpose of the arrangement is to encourage patient referrals or other federal healthcare program business, regardless of whether there are other legitimate purposes for the arrangement. The definition of "remuneration" has been broadly interpreted to include anything of value, including gifts, discounts, meals, travel, credit arrangements, payments of cash, consulting fees, waivers of co-payments, ownership interests and providing anything at less than its fair market value. Recognizing that the AKS is broad and may technically prohibit many innocuous or beneficial arrangements within the healthcare industry, the OIG issued a series of regulatory "safe harbors." These safe harbor regulations set forth certain provisions, which, if met, will assure healthcare providers and other parties that they will not be prosecuted under the AKS. The failure of a transaction or arrangement to fit within a specific safe harbor does not necessarily mean that the transaction or arrangement is illegal or that prosecution under the AKS will be pursued. In those instances, arrangements will be evaluated on a case-by-case basis to determine whether enforcement will be pursued. Penalties for AKS violations are severe and can include imprisonment, criminal fines, civil monetary penalties and exclusion from participation in federal healthcare programs. The regulations establishing safe harbor protection are subject to change and could affect future operations. Many states also have anti-kickback statutes, some of which may apply to items or services reimbursed by any third-party payor, including commercial insurers as well as patient self-pay. A violation of the AKS may be grounds for the government or a whistleblower to assert that a claim for payment of items or services resulting from such violation constitutes a false or fraudulent claim for purposes of the federal civil False Claims Act.

The civil monetary penalties statute is another potential statute under which a clinical laboratory may be subject to enforcement. Among other things, the civil monetary penalties statute imposes fines against any person who is determined to have presented, or caused to be presented, claims to a federal healthcare program that the person knows, or should know, is for an item or service that was not provided as claimed or is false or fraudulent. The civil monetary penalties statute also prohibits a person from offering or providing remuneration to any Medicare or Medicaid beneficiary that is likely to influence the individual to order or receive its items or services from a particular provider or supplier.

The exclusion statute requires the exclusion of entities and individuals who have been convicted of federal-program related crimes or healthcare felony fraud or controlled substance charges. The statute also permits the exclusion of those that have been convicted of any form of fraud, the AKS, for obstructing an investigation or audit, certain controlled substance offenses, those whose healthcare license has been revoked or suspended and those who have filed claims for excessive charges or unnecessary services. If we were to be excluded, our products and services would be ineligible for reimbursement from any federal programs, including Medicare and Medicaid, and no other entity participating in those programs would be permitted to enter into contracts with us. In order to preserve access to beneficial healthcare items and services, the government may elect to exclude officers and key employees of manufacturers, rather than excluding the organization. Such enforcement actions would prohibit us from engaging those individuals, which could adversely affect operations and result in significant reputational harm.

Congress has also enacted statutes that impose criminal liability for healthcare fraud and abuse. The Health Care Fraud Statute prohibits knowingly and willfully executing, or attempting to execute, a scheme to defraud any healthcare benefit program, including private payors. A violation of this statute is a felony and may result in fines, imprisonment or exclusion from governmental payor programs such as the Medicare and Medicaid programs. The false statements statute prohibits knowingly and willfully falsifying, concealing or covering up a material fact or making any materially false, fictitious or fraudulent statement in connection with the delivery of or payment for healthcare benefit programs, items or services-public or private. A violation of this statute is a felony and may result in fines, imprisonment or exclusion from governmental payor programs.

The False Claims Act imposes liability on any person or entity that, among other things, knowingly presents, or causes to be presented, a false or fraudulent claim for payment by a federal governmental payor program. The *qui tam* provisions of the False Claims Act allow a private individual to bring actions on behalf of the federal government alleging that the defendant has defrauded the federal government by submitting a false claim to the federal government and permit such individuals to share in any amounts paid by the entity to the government in fines or settlement. *Qui tam* complaints are filed under seal, and the cases may progress for a number of years before a complaint is unsealed and a healthcare provider or supplier becomes aware of its existence. When an entity is determined to have violated the False Claims Act, it may be required to pay up to three times the actual damages sustained by the government, plus civil penalties ranging from $11,181 to $22,363 for each false claim. The False Claims Act is the federal government's primary civil tool in healthcare fraud cases. False Claims Act liability is not limited to direct providers of health items or services. The government has asserted liability under the False Claims Act against manufacturers and other third parties who caused another party to file a false claim.

In addition, various states have enacted false claim laws analogous to the federal False Claims Act, although many of these state laws apply where a claim is submitted to any third-party payor and not merely a governmental payor program.

On October 25, 2018, the SUPPORT Act was enacted. The SUPPORT Act included EKRA, which establishes an all-payor anti-kickback prohibition that extends to arrangements with recovery

homes, clinical laboratories and clinical treatment facilities. EKRA includes a number of statutory exceptions, and directs agencies to develop further exceptions. Current exceptions in some cases reference and in others differ from the AKS safe harbors. Significantly, the prohibitions apply with respect to the soliciting or receipt of remuneration for any referrals to recovery homes, clinical treatment facilities, or clinical laboratories, whether or not related to treating substance use disorders. Further, the prohibitions cover the payment or offer of remuneration to induce a referral to, or in exchange for, an individual using the services of, such providers. This new law creates additional risk that relationships with referral sources could be problematic.

For anti-corruption legislation, the FCPA is the most widely enforced law. It is the first to introduce corporate liability, responsibility for third parties and extraterritoriality for corruption offences, meaning companies and persons can be held criminally and civilly responsible for corruption offences committed abroad. It was enacted for the purpose of making it unlawful for certain classes of persons and entities to make payments to foreign government officials to assist in obtaining or retaining business. With the enactment of certain amendments in 1998, the anti-bribery provisions of the FCPA now also apply to foreign firms and persons who cause, directly or through agents, an act in furtherance of such a corrupt payment to take place within the territory of the United States. The FCPA also requires companies whose securities are listed in the United States to meet its accounting provisions, which were designed to operate in tandem with the anti-bribery provisions, require corporations covered by the provisions to (a) make and keep books and records that accurately and fairly reflect the transactions of the corporation and (b) devise and maintain an adequate system of internal accounting controls.

In Europe, various countries have adopted anti-bribery laws providing for severe consequences, in the form of criminal penalties or significant fines, for individuals or companies committing a bribery offence. Violations of these anti-bribery laws, or allegations of such violations, could have a negative impact on our business, results of operations and reputation. For instance, in the United Kingdom, under the Bribery Act 2010, which came into effect in July 2011, a bribery offense occurs when a person offers, gives or promises to give a financial or other advantage to induce or reward another individual to improperly perform certain functions or activities, including any function of a public nature. Bribery of foreign public officials also falls within the scope of the Bribery Act 2010. Under this regime, an individual found in breach of the Bribery Act 2010 faces imprisonment of up to 10 years. In addition, the individual can be subject to an unlimited fine, if found to have committed an offense, as can commercial organizations that are found to have failed to prevent bribery. Most recently, France has passed an anti-bribery and compliance law (“Sapin II”), and the new French anti-corruption agency (“AFA”) has been established. The Sapin II law makes it compulsory for companies within the scope of the law to implement internal procedures to fight corruption. One of the items that must be prepared is a corruption risk map, as well as an anti-corruption code of conduct. These documents are subject to investigation by the AFA and failure to comply with the requirements can lead to a fine of up to €1.0 million for a company and €200,000 for executives.

Currently, we are not subject to the jurisdictional requirements of the UK Bribery Act or Sapin II as we do not have offices in either country and do not employ a requisite amount of employees in these countries. If we were to have future growth in the European market, these laws could potentially apply to us.

U.S. Physician Referral Prohibitions

The Stark Law prohibits physicians from referring patients to entities with which the physician or an immediate family member has a financial relationship, such as ownership, investment or compensation, for DHS payable by Medicare and Medicaid, unless the financial arrangement meets an applicable exception. DHS includes clinical laboratory tests. See “*Risk Factors—Risks Relating to*

Government Regulation—We are subject to various laws and regulations, such as healthcare fraud and abuse laws, false claim laws and health information privacy and security laws, among others, and failure to comply with these laws and regulations may have an adverse effect on our business."

Corporate Practice of Medicine in the United States

Numerous states have enacted laws prohibiting business corporations, such as us, from practicing medicine and employing or engaging physicians to practice medicine, generally referred to as the prohibition against the corporate practice of medicine. These laws are designed to prevent interference in the medical decision-making process by anyone who is not a licensed physician. For example, California's Medical Board has indicated that determining what diagnostic tests are appropriate for a particular condition and taking responsibility for the ultimate overall care of the patient, including providing treatment options available to the patient, would constitute the unlicensed practice of medicine if performed by an unlicensed person. Violation of these corporate practice of medicine laws may result in civil or criminal fines, as well as sanctions imposed against us or the professional through licensure proceedings. Typically such laws are only applicable to entities that have a physical presence in the state.

Other Regulatory Requirements

Our laboratory is subject to federal, state and local regulations relating to the handling and disposal of regulated medical waste, hazardous waste and biohazardous waste, including chemical, biological agents and compounds, blood and bone marrow samples and other human tissue. Typically, we use outside vendors who are contractually obligated to comply with applicable laws and regulations to dispose of such waste. These vendors are licensed or otherwise qualified to handle and dispose of such waste.

Our partners in the development of therapeutic agents are responsible for developing and manufacturing those products. In so doing, they are subject to FDA and Medicare regulatory requirements related to, among other things, manufacture, promotion, price reporting and fraud and abuse laws.

Our laboratories are subject to extensive requirements related to workplace safety established by the U.S. Occupational Safety and Health Administration. These include requirements to develop and implement programs to protect workers from exposure to blood-borne pathogens by preventing or minimizing any exposure through needle stick or similar penetrating injuries.

U.S. Healthcare Reform

In the United States, a number of recent legislative and regulatory changes at the federal and state levels have sought to reduce healthcare costs and improve the quality of healthcare. For example, in March 2010, the ACA became law. This law substantially changed the way healthcare is financed by both commercial and government payors, and it has significantly impacted our industry. Since 2016 there have been efforts to repeal all or part of the ACA. For example, the TCJA, among other things, removes penalties for not complying with the ACA's individual mandate to carry health insurance. The U.S. Congress may take further action regarding the ACA, including, but not limited to, repeal or replacement. Additionally, all or a portion of the ACA and related subsequent legislation may be modified, repealed or otherwise invalidated through judicial challenge, which could result in lower numbers of insured individuals, or reduced coverage for insured individuals, and which could adversely affect our business. However, it remains to be seen whether or when new legislation modifying the ACA will be enacted, what any such the new legislation might provide and what impact it might have on the size and coverage of the insured population or on efforts to contain or lower the cost of healthcare.

We cannot predict the implications, if any, of such legislation on our and our collaborators' businesses and financial conditions.

We anticipate there will continue to be proposals by legislators at both the federal and state levels, regulators and commercial payors to reduce costs while trying to expand individual healthcare benefits. If enacted, some such proposals could expand or contract the insured population, increasing or decreasing demand for our products and services. On the other hand, some proposals could impose additional limitations on the prices we will be able to charge for our tests or on the coverage of or the amounts of reimbursement available for our tests from payors, including commercial payors and government payors.

The Physician Payments Sunshine Act and its implementing regulations, which requires applicable manufacturers of covered drugs, devices, biologics and medical supplies for which payment is available under Medicare, Medicaid or the State Children's Health Insurance Program, with certain exceptions, to annually report to HHS information related to certain payments or other transfers of value made or distributed to physicians, defined to include doctors, dentists, optometrists, podiatrists and chiropractors, and teaching hospitals, or to entities or individuals at the request of, or designated on behalf of, the physicians and teaching hospitals, as well as ownership and investment interests held by physicians and their immediate family members. The SUPPORT Act, under a provision entitled "Fighting the Opioid Epidemic with Sunshine," extends the Physician Payments Sunshine Act to payments and transfers of value to physician assistants, nurse practitioners and other mid-level healthcare providers, with reporting requirements going into effect in 2022 for payments and transfers of value made to these practitioners in 2021.

Coverage and Reimbursement Generally

Patients who have diagnostic tests ordered or are prescribed treatments and providers performing the prescribed services generally rely on third-party payors to reimburse all or part of the associated healthcare costs. Sales of our products and services will therefore depend substantially, both domestically and abroad, on the extent to which the costs of our products and services will be paid by third-party payors, including health maintenance, managed care and similar healthcare management organizations, or reimbursed by government health administration authorities, such as Medicare and Medicaid, private health insurers.

In the United States, our ability to commercialize and the commercial success of our product and service offerings will depend in part on the extent to which governmental payor programs at the federal and state levels, including Medicare and Medicaid, private health insurers and other third-party payors provide coverage for and establish adequate reimbursement levels for these offerings. Government authorities, private health insurers and other organizations generally decide which devices they will pay for and establish reimbursement levels for healthcare. Medicare is a federally funded program for the elderly and disabled managed by CMS, through local contractors that administer coverage and reimbursement for certain healthcare items and services. Medicaid is an insurance program for certain categories of patients whose income and assets fall below state defined levels that is funded jointly by federal and state governments and managed by each state. Similarly, the federal government manages other healthcare programs, including the Veterans Health Administration, the Indian Health Service, and Tricare, the healthcare program for military personnel, retirees and related beneficiaries. Many states have also created pharmacy assistance programs for individuals who do not qualify for federal programs. In the United States, private health insurers and other third-party payors often provide reimbursement for products and services based in part on the coverage and payment rates set by the Medicare or Medicaid programs.

Certain countries, including a number of member states of the EU, set prices and make reimbursement decisions for diagnostics and pharmaceutical products, or medicinal products, as they

are commonly referred to in the EU. In addition, an increasing number of countries are taking initiatives to attempt to control the healthcare budget by focusing cost-cutting efforts on medicinal products, and to a lesser extent, medical devices, provided under their state-run healthcare systems. These international price-control efforts have impacted all regions of the world, but have been most drastic in the EU. Additionally, some countries require approval of the maximum sale price of a product before it can be marketed, and this price may be reviewed during the product lifecycle, or mandatory discounts or profit caps may be applied. In many countries, the pricing review period begins after marketing or product licensing approval is granted or the CE mark is obtained.

Federal programs in the United States also sometimes impose price controls through mandatory ceiling prices on purchases by federal agencies and federally funded hospitals and clinics and mandatory rebates on retail pharmacy prescriptions paid by Medicaid and Tricare. These restrictions and limitations influence the purchase of healthcare services and products. Legislative proposals to reform healthcare or reduce costs under government programs may result in lower reimbursement for our products and services or exclusion of our products and services from coverage. In addition, government programs like Medicaid include what are in effect substantial penalties for increasing commercial prices of certain products over the rate of inflation which can affect realization and return on investment.

Increasing efforts by governmental and third-party payors, in the United States and abroad, to cap or reduce healthcare costs may cause such organizations to limit both coverage and level of reimbursement for newly approved healthcare products. At the state level, legislatures are increasingly passing legislation and implementing regulations designed to control pharmaceutical and biological program 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.

As a result of the above trends, we may need to conduct expensive studies in order to demonstrate the medical necessity and cost effectiveness of our products and services, in addition to the costs required to obtain the FDA and other comparable foreign regulatory authority approvals. Our products and services may not be considered medically necessary or cost effective, or the discount percentages required to secure coverage may not yield an adequate margin over cost.

There is often pressure to renegotiate pricing and reimbursement levels, including, in particular, in connection with changes to Medicare coverage and reimbursement. Third-party payors continue to demand discounted fee structures, and the trend toward consolidation among third-party payors tends to increase their bargaining power over price structures. If third-party payors reduce their rates for our products and services, then our revenue and profitability may decline and our operating margins will be reduced. Because some third-party payors rely on all or portions of Medicare payment systems to determine payment rates, changes to government healthcare programs that reduce payments under these programs may negatively impact payments from third-party payors. Our inability to maintain suitable financial arrangements with third-party payors could have a material adverse impact on our business. Additionally, the reimbursement process is complex and can involve lengthy delays. Third-party payors may disallow, in whole or in part, providers' requests for reimbursement based on determinations that certain amounts are not reimbursable under plan coverage, that the services provided were not medically necessary or that additional supporting documentation is necessary. Retroactive adjustments may change amounts realized from third-party payors. Delays and uncertainties in the reimbursement process may adversely affect market acceptance and utilization of our candidate products, resulting in reduced revenue. The unavailability or inadequacy of third-party coverage and reimbursement could negatively affect the market acceptance of our products and services and the future revenue we may expect to receive from those products and services. In addition, we are unable to predict what additional legislation or regulation relating to the healthcare

industry or third-party coverage and reimbursement may be enacted in the future, or what effect such legislation or regulation would have on our business.

Many hospitals implement a controlled and defined process for covering and approving diagnostic tests and medical devices. Any marketing efforts that are determined to have violated such policies could result in the denial or removal of our products from that hospital's list of approved products.

Moreover, a payor's decision to provide coverage for a device does not imply that an adequate reimbursement rate will be approved. Adequate third-party reimbursement may not be available to enable us to maintain price levels sufficient to realize an appropriate return on our investment in device development. Legislative proposals to reform healthcare or reduce costs under government insurance programs may result in lower reimbursement for our products and services or exclusion of our products and services from coverage. The cost containment measures that healthcare payors and providers are instituting and any healthcare reform could significantly reduce our revenue from the sale of any approved products and services. We cannot provide any assurances that we will be able to obtain and maintain third-party coverage or adequate reimbursement for our products and services in whole or in part.

For additional information on coverage and reimbursement, see "*Risk Factors—Risks Relating to Government Regulation—Future Medicare payment rates are uncertain*."

Our Compliance Program

Our compliance program is intended to prevent and detect violations of law or our policies. It was developed in view of both adopting the principles of the AdvaMed Code of Ethics and addressing the HHS OIG's elements of a compliance program. We have designed our compliance program to fit the size, resources, market position and other unique aspects of our company. Our code of conduct is our statement of ethical and compliance principles that guide our daily operations. In addition, we have developed policies and procedures, and corresponding education and training, to effectively communicate our standards to employees as it relates to job functions and legal obligations under applicable state and federal healthcare program requirements, as well as those outside the United States. We regularly perform live and process monitoring activities on a risk-based approach, and audit capabilities are built into our transparency procedures. We maintain a hotline available via multiple channels to report any known or suspected compliance violations, and we have a strict non-retaliation policy for all claims brought forward in good faith.

Facilities

Our corporate headquarters are located in Seattle, Washington, where we currently lease approximately 58,380 square feet of laboratory and office space. Our Seattle lease expires in June 2023, subject to two options to extend the lease for seven years. We also lease approximately 13,431 square feet of laboratory and office space in South San Francisco, California, pursuant to lease expiring in March 2026. We intend to add new facilities or expand existing facilities as we add employees and scale our operations, and we believe suitable additional or substitute space will be available as needed.

Legal Proceedings

From time to time, we may be subject to legal proceedings. We are not currently a party to or aware of any proceedings that we believe will have, individually or in the aggregate, a material adverse effect on our business, financial condition or results of operations. Regardless of outcome, litigation can have an adverse impact on us because of defense and settlement costs, diversion of management resources and other factors.

MANAGEMENT

Executive Officers

The following table sets forth certain information, as of March 31, 2019, concerning our executive officers who, subject to rights pursuant to any employment agreements, serve at the pleasure of our board of directors:

Name	Age	Position
Chad Robins	44	Chief Executive Officer, Co-Founder, Director and Chairman
Julie Rubinstein	47	President
Harlan Robins, PhD.	45	Chief Scientific Officer and Co-Founder
Chad Cohen	44	Chief Financial Officer
Sean Nolan	50	Chief Technical Officer
Lance Baldo, MD	46	Chief Medical Officer
Francis Lo	38	Chief People Officer
Charles Sang	51	Senior Vice President, Clinical Diagnostics
Sharon Benzeno, PhD.	45	Senior Vice President, Drug Discovery
Nancy Hill	55	Senior Vice President, Operations

The following is a biographical summary of the experience of our executive officers.

Chad Robins co-founded our company in September 2009 and has served as our Chief Executive Officer and a member of our board of directors since incorporation. Prior to co-founding our company, Mr. Robins held numerous executive-level positions in medical technology, investment and real estate companies. Mr. Robins holds an MBA from The Wharton School at the University of Pennsylvania and a BS in Managerial Economics from Cornell University. We believe Mr. Robins is qualified to serve as a member of our board of directors based on our review of his experience, qualifications, attributes and skills, including co-founding our company and his executive leadership experience in the biotechnology industry.

Julie Rubinstein has served as our President since February 2018. Prior to becoming our President, Ms. Rubinstein served as our Chief Business Officer from January 2016 to February 2018, and our head of Corporate and Business Development from April 2011 to January 2016. Prior to joining us, Ms. Rubinstein held various worldwide commercial development roles at Pfizer Inc.'s Oncology division, primarily focusing on cancer immunotherapy. She also served in various roles with Johnson & Johnson Services, Inc., including in Europe. Ms. Rubinstein currently serves on the Board of Trustees for The Valerie Fund, a pediatric oncology organization in New Jersey and New York. Ms. Rubinstein holds an MBA from Harvard Business School and dual undergraduate degrees from The Wharton School and Annenberg School of Communications at the University of Pennsylvania.

Harlan Robins, PhD, co-founded our company in September 2009 and has served as either our Chief Scientific Officer or our Head of Innovation since incorporation. Dr. Robins has served in various roles in the Computational Biology Program at Fred Hutch, including as an Assistant Faculty Member from 2006 to 2011, as an Associate from 2011 to April 2016 and as a Full Member and the Head of the program from April 2016 to June 2019. Dr. Robins holds a BS in Physics from Harvard University and a master's degree and PhD in Physics from the University of California, Berkeley with a visiting appointment to the California Institute of Technology. Dr. Robins received postdoctoral appointments in the particle theory group at the Weizmann Institute of Science in Israel and at the Institute for Advance Study at Princeton University. At Princeton, Dr. Robins developed bioinformatics algorithms for micro RNA targets and bacterial genome analysis.

Chad Cohen has served as our Chief Financial Officer since August 2015. Prior to joining us, Mr. Cohen served as the Chief Financial Officer of Zillow Group, Inc., a public company that operates a

real estate marketplace, from March 2011 to August 2015, where he also served as Corporate Controller from June 2006 to March 2011 and Vice President of Finance from September 2010 to March 2011. Prior to joining Zillow, Mr. Cohen served as Assistant Controller and Financial Integrity Manager at Ticketmaster Entertainment, Inc. from 2003 to 2006. Prior to becoming our Chief Financial Officer, Mr. Cohen served on our board of directors from February 2015 to August 2015. Mr. Cohen currently serves on the board of directors of Trupanion, Inc., a public pet insurance company, including as chair of the audit committee. Mr. Cohen holds a BS in Business Administration from Boston University.

Sean Nolan has served as our Chief Technical Officer since July 2014. Prior to joining us, Mr. Nolan served as the General Manager and Distinguished Engineer of Microsoft's HealthVault and Health Solutions Group from January 2006 to May 2014, ran his own consulting firm from January 2002 to January 2006, and served as Chief Technology Officer and Software Development Manager at Drugstore.com from 2000 to January 2002 and August 1998 to 2000, respectively. Mr. Nolan holds a BA in Computer Science from Dartmouth College.

Lance Baldo, MD, has served as our Chief Medical Officer since April 2019. From March 2010 to April 2019, Dr. Baldo served in various roles of ascending responsibility with the Roche Group, a global healthcare company, and its affiliates, including most recently as Senior Vice President and Head of U.S. Medical Affairs of Genentech. Prior to joining the Roche Group, Dr. Baldo served as Global Vice President, Medical Science and Affairs at The Medicines Company, a public biopharmaceuticals company, from October 2004 to February 2010. Dr. Baldo holds an MD from the University of Connecticut School of Medicine and a BA in Biology from John Hopkins University.

Francis Lo, has served as our Chief People Officer since April 2019. Prior to joining us, from March 2017 to April 2019 Mr. Lo served as Vice President, Human Resources at Whole Foods Market, Inc., a wholly-owned subsidiary of Amazon.com, Inc. that operates natural and organic food supermarkets. From August 2011 to March 2017, Mr. Lo also served in various roles of ascending responsibility with Starbucks Corporation, a public specialty coffee company, including as Director, Global Talent Management from October 2015 to March 2017. Mr. Lo holds an MBA in Business Administration from Stanford University Graduate School of Business and a BA in the Plan II Honors Program (Interdisciplinary Studies with Business Focus) from the University of Texas at Austin.

Charles Sang has served as our Senior Vice President, Clinical Diagnostics since April 2016. Prior to joining us, Mr. Sang served as the Vice President of Global Diagnostics for Nanostring Technologies, Inc., a public biotechnology company, from November 2012 to April 2016, and as the Marketing Director at Seattle Genetics, a public biotechnology company, from July 2010 to November 2012. Mr. Sang holds a BA in Psychology and Human Services from National Louis University and a master's degree in Social Work from New Mexico State University.

Sharon Benzeno, PhD, has served as our Senior Vice President, Drug Discovery since February 2018 and, before this, in business development roles of ascending responsibility with us since September 2014. Prior to joining us, Dr. Benzeno served as Senior Director at Elsevier Inc., a healthcare informatics company, from December 2013 to September 2014, as Senior Manager in the oncology business unit at Capgemini SE, a French consulting and technology services company, from May 2011 to December 2013, as Oncology Alliance Manager and Senior Scientific Manager at AstraZeneca plc from September 2005 to May 2011. Dr. Benzeno holds a PhD in Biomedical Sciences from New York University School of Medicine, an MBA in Finance and Leadership from New York University Stern School of Business and a BA in Biochemistry from New York University. Dr. Benzeno completed a postdoctoral fellowship in cancer biology at the University of Pennsylvania Abramson Cancer Center.

Nancy Hill has served as our Senior Vice President, Operations or other similar capacities since December 2013. Prior to joining us, Ms. Hill served as Vice President, Sales and Marketing and

member of the executive team at Spiration, Inc. from 2007 to 2013. Ms. Hill also served at Berlex Oncology as Vice President, Marketing from 2004 to 2005 and as Marketing Director from 2002 to 2004. Prior to that time, Ms. Hill held various positions of increasing responsibility on the new products and oncology commercial teams at Immunex Corporation and Amgen Inc. Ms. Hill holds an MBA from the Kellogg School of Management at Northwestern University and a BA in Business Administration from the University of Washington.

Non-Employee Directors

The following table sets forth certain information, as of March 31, 2019, concerning our non-employees who serve on our board of directors:

Name	Age	Position
Kevin Conroy	53	Director
Eric Dobmeier	50	Director
David Goel	49	Director
Michelle Griffin	53	Director
Robert Hershberg, PhD, MD	55	Director
Peter Neupert	63	Director
Michael Pellini, MD	53	Director
Andris Zoltners, PhD	73	Director

The following is a biographical summary of the experience of our non-employee directors.

Kevin Conroy has served on our board of directors since April 2019. Mr. Conroy has served as the President, Chief Executive Officer and Chairman of the board of directors of Exact Sciences Corporation, a public molecular diagnostic company, since March 2009. Mr. Conroy also serves on the board of directors of Epizyme, Inc., a public clinical-stage biopharmaceutical company, and Arya Sciences Acquisition Corp., a public special purpose acquisition company sponsored by an affiliate of Perceptive Advisors LLC. Prior to joining Exact Sciences Corporation, Mr. Conroy served as President and Chief Executive Officer of Third Wave Technologies, Inc., a molecular diagnostics company, from 2005 to 2008. Mr. Conroy holds a JD from the University of Michigan Law School and a BS in Electrical Engineering from Michigan State University. We believe Mr. Conroy is qualified to serve on our board of directors because of his extensive business, legal and executive leadership experience in the biotechnology industry.

Eric Dobmeier has served as a member of our board of directors since September 2016. Mr. Dobmeier has served as the President and Chief Executive Officer of Chinook Therapeutics, Inc., a biotechnology company, since April 2019. From January 2018 to June 2018, Mr. Dobmeier served as President and Chief Executive Officer of Silverback Therapeutics, Inc. and from 2002 to 2017, Mr. Dobmeier held positions of increasing responsibility at Seattle Genetics, Inc., a public biotechnology company, most recently as Chief Operating Officer from June 2011 to December 2017. Prior to joining Seattle Genetics, Mr. Dobmeier was an attorney with the law firms of Venture Law Group and Heller Ehrman LLP, where he represented technology companies in connection with public and private financings, mergers and acquisitions and corporate partnering transactions. Mr. Dobmeier currently serves on the board of directors of Atara Biotherapeutics, Inc., a publicly-traded biotechnology company. He holds a JD from the University of California, Berkeley School of Law and an AB in History from Princeton University. We believe Mr. Dobmeier is qualified to serve on our board of directors based on his extensive experience in the biotechnology industry as an executive officer and director.

David Goel has served on our board of directors since September 2016. Mr. Goel is Co-Founder and sole Managing General Partner of Matrix Capital Management Company, LP, an investment fund

focused on technology and life sciences. Mr. Goel serves as a director on several private company boards and previously served as a director of Popular, Inc., a public financial services company. He is a member of the Board of Trustees of The Winsor School and the Museum of Fine Arts in Boston, Massachusetts. Mr. Goel holds a BA, *magna cum laude*, from Harvard University. We believe Mr. Goel is qualified to serve on our board of directors based on his extensive risk management, corporate governance and capital markets experience.

Michelle Griffin has served on our board of directors since March 2019. Ms. Griffin currently serves on the board of directors of Acer Therapeutics, Inc, a public company, including as chair of the audit committee. Ms. Griffin also currently serves on the board of directors of HTG Molecular Diagnostics, Inc., a public company, including as chair of the audit committee. Ms. Griffin previously served on the board of directors and as chair of the audit committee of PhaseRx, Inc., a public company, from 2016 to 2018, OncoGenex Pharmaceuticals Inc., a Nasdaq listed company, from 2008 to 2011 and Sonus Pharmaceuticals, Inc., a public company, from 2004 to 2008. Ms. Griffin served as Executive Vice President, Operations, and Chief Financial Officer at OncoGenex Pharmaceuticals, Inc. from 2011 to 2013, served as Acting Chief Executive, Senior Vice President and Chief Operating Officer at Trubion Pharmaceuticals, Inc. from 2009 until its acquisition in 2010 and as its Chief Financial Officer from 2006 to 2009; and served as Senior Vice President and Chief Financial Officer of Dendreon Corp. from 2005 to 2006. Ms. Griffin holds a BS in marketing from George Mason University and an MBA from Seattle University. We believe Ms. Griffin is qualified to serve as a member of our board of directors based on our review of her extensive operational experience in the biotechnology industry and deep experience in public company financial matters.

Robert Hershberg, PhD, MD, has served on our board of directors since February 2013. Dr. Hershberg has been employed in positions of ascending responsibility at Celgene Corporation since August 2014, and currently serves as Executive Vice President, Business Development and Global Alliances. Dr. Hershberg previously served in several roles at VentiRx Pharmaceuticals, Inc., a clinical stage biopharmaceutical company, which he co-founded in 2006, and was Chief Executive Officer of VentiRx from 2012 until the company's acquisition by Celgene in February 2017. Dr. Hershberg currently serves on the board of directors of Nanostring Technologies, Inc., and as a clinical faculty member at the University of Washington School of Medicine. Dr. Hershberg holds a PhD in Biology from the University of California, San Diego's Affiliated PhD Program with the Salk Institute for Biological Studies and an MD and a BA from the University of California, Los Angeles. We believe Dr. Hershberg is qualified to serve on our board of directors based on his extensive technical expertise and executive leadership in the biotechnology industry.

Peter Neupert has served as a member of our board of directors since December 2013. Mr. Neupert currently serves as a member of the Board of Trustees of Fred Hutch. Mr. Neupert served as an Operating Partner at Health Evolution Partners, a private equity fund, from February 2012 to July 2014. Prior to joining Health Evolution Partners, Mr. Neupert served as Corporate Vice President, Health Solutions Group at Microsoft from August 2005 to January 2012, and as the Chief Executive Officer and Chairman of the board of directors of Drugstore.com, which he founded in 1998. Mr. Neupert currently serves on the board of directors of Laboratory Corporation of America Holdings, a public clinical laboratory company, and he previously served as a member of the board of directors of NextGen Healthcare, Inc., a public software company, and several private companies. Mr. Neupert holds an MBA from the Tuck School of Business at Dartmouth College and a BA in Philosophy from Colorado College. We believe Mr. Neupert is qualified to serve on our board of directors based on his extensive experience in leadership roles in the health services sector and as a member of the board of directors of several organizations in the biotechnology industry.

Michael Pellini, MD, has served on our board of directors since February 2018. Dr. Pellini currently serves as a Managing Partner of Section 32, LLC, a technology and life sciences-based

venture capital fund. Dr. Pellini currently serves as a member of the board of directors of the Personalized Medicine Coalition and the Mission Hospital Foundation and several private companies. Dr. Pellini previously served as chairman of the board of directors, Chief Executive Officer and President at Foundation Medicine, Inc., a molecular information company, which was acquired by F. Hoffmann-La Roche Ltd. in 2018. Dr. Pellini holds an MD from Jefferson Medical College, an MBA from Drexel University and a BA in Economics from Boston College. We believe Dr. Pellini is qualified to serve on our board of directors because of his medical and clinical experience in the biotechnology industry.

Andris Zoltners, PhD, has served on our board of directors since December 2009. Dr. Zoltners currently serves as the co-chairman of ZS Associates, Inc., a global management consulting firm, which he co-founded in 1983. Dr. Zoltners currently serves as a professor emeritus of Marketing at the Kellogg School of Management at Northwestern University and previously served as a member of the Business School Faculty at the University of Massachusetts. Dr. Zoltners holds a PhD and a MSIA in Industrial Administration from Carnegie Mellon University, a M.S. in Mathematics from Purdue University and a BS in Mathematics from the University of Miami. We believe Dr. Zoltners is qualified to serve on our board of directors based on our review of his experience, qualifications, attributes and skills, including his extensive executive leadership and marketing qualifications.

Our Board of Directors

Our board of directors consists of nine members. Our directors hold office until their successors have been elected and qualified or until the earlier of their resignation or removal. Our amended and restated articles of incorporation and amended and restated bylaws that will be in effect at the closing of this offering also provide that our directors may only be removed for cause and then only by the holders of the shares entitled to elect the director or directors whose removal is sought if, with respect to a particular director, the number of votes cast in favor of removing such director (or the entire board of directors) exceeds the number of votes cast against removal, and that any vacancy on our board of directors, including a vacancy resulting from an enlargement of our board of directors, may be filled only by vote of a majority of our directors then in office.

Director Independence

Our board of directors has determined that all members of our board of directors, except Chad Robins, are independent directors for purposes of the rules of Nasdaq and the SEC. In making this determination, our board of directors considered the relationships that each non-employee director has with us and all other facts and circumstances that our board of directors deemed relevant, including the beneficial ownership of our capital stock by each non-employee director. Mr. Robins is not an independent director under these rules because he is an executive officer of our company.

Upon the closing of this offering, we expect that the composition and functioning of our board of directors and each of our committees will comply with all applicable requirements of Nasdaq and the rules and regulations of the SEC.

Family Relationships

Chad Robins, our Co-Founder, Chief Executive Officer and a member of our board of directors, is the brother of Dr. Harlan Robins, our Chief Scientific Officer and other Co-Founder. There are no other family relationships among any of our directors or executive officers.

Staggered Board

In accordance with the terms of our amended and restated articles of incorporation and amended and restated bylaws that will be in effect at the closing of this offering, our board of directors will be

divided into three staggered classes of directors and each will be assigned to one of the three classes. At each annual meeting of the shareholders, a class of directors will be elected for a three-year term to succeed the directors of the same class whose terms are then expiring. The terms of the directors will expire upon the election and qualification of successor directors at the annual meeting of shareholders to be held during the years 2020 for Class I directors, 2021 for Class II directors and 2022 for Class III directors.

- Our Class I directors will be , and ;
- Our Class II directors will be , and ; and
- Our Class III directors will be , and .

Our amended and restated articles of incorporation and amended and restated bylaws that will be in effect at the closing of this offering will provide that the number of directors shall be fixed from time to time by a resolution of the majority of our board of directors.

The division of our board of directors into three classes with staggered three-year terms may delay or prevent shareholder efforts to effect a change of our management or a change in control.

Voting Arrangements

The current members of our board of directors were elected pursuant to a sixth amended and restated voting agreement ("Voting Agreement") that we entered into with certain holders of our common stock and our convertible preferred stock, and the related provisions of our amended and restated articles of incorporation in effect prior to this offering.

Pursuant to the Voting Agreement and these provisions, our board of directors consists of:

- our Chief Executive Officer, currently Mr. Robins;
- a director designated and elected by the holders of a majority of our Series A convertible preferred stock, Series B convertible preferred stock and Series C convertible preferred stock, voting as a single class on an as-converted basis ("Preferred Director"), currently Dr. Zoltners;
- two directors designated and elected by the holders of a majority of our Series E-1 convertible preferred stock, voting as a separate class, currently Ms. Griffin and Dr. Pellini;
- one director designated and elected by the holders of a majority of the shares of our common stock and convertible preferred stock held by Mr. Robins, Dr. Robins and Chris Carlson, voting as a separate class, currently Mr. Dobmeier; and
- four directors designated and elected by a majority vote of our board of directors and approved by the Preferred Director and the holders of a majority of the shares of our common stock and convertible preferred stock held by Mr. Robins, Dr. Robins and Chris Carlson, voting as a separate class, which directors are currently Mr. Goel, Dr. Hershberg, Mr. Neupert and Mr. Conroy.

The holders of our common stock and convertible preferred stock who are parties to the Voting Agreement are obligated to vote for such designees indicated above. The provisions of the Voting Agreement will terminate upon the closing of this offering and our current amended and restated articles of incorporation will be amended and restated, after which there will be no further contractual obligations or charter provisions regarding the election of particular directors.

Following this offering, our nominating and corporate governance committee and our board of directors will consider a broad range of factors relating to the qualifications and background of

nominees. Our nominating and corporate governance committee's and our board of directors' priority in selecting board members is the identification of persons who will further the interests of our shareholders through their established record of professional accomplishment, the ability to contribute positively to the collaborative culture among board members, knowledge of our business, understanding of the competitive landscape, and professional and personal experiences and expertise relevant to our growth strategy.

Board Leadership Structure

Our corporate governance guidelines provide our board of directors with flexibility to combine or separate the positions of Chairperson of our board of directors and Chief Executive Officer and to appoint a lead independent director in accordance with its determination that using one or the other structure would be in our best interests. Chad Robins is the current Chairperson of our board of directors and Peter Neupert currently serves as the lead independent director of our board of directors.

Our board of directors has concluded that our current leadership structure is appropriate at this time. Our board of directors believes that the combined role of Chairperson and Chief Executive Officer promotes united leadership and direction and provides management a clear focus to execute our strategy and business plans. As Chief Executive Officer, Mr. Robins is best suited to ensure that critical business issues are brought before our board of directors, which enhances our board of directors' ability to develop and implement business strategies. In his role as lead independent director, Mr. Neupert presides over the independent director sessions of our board of directors in which Mr. Robins, as our Chief Executive Officer, does not participate and serves as a liaison to management on behalf of the non-employee members of our board of directors.

All directors are encouraged to suggest the inclusion of agenda items and meeting materials, and any director is free to raise at any board meeting items that are not on the agenda for that meeting.

Our non-employee directors will regularly meet in executive session without the presence of any members of management. The lead independent director presides at these meetings and provides the guidance and feedback of our non-employee directors to our Chairperson and management team.

Committees of our Board of Directors

Our board of directors has established an audit committee, a compensation committee and a nominating and corporate governance committee, each of which will operate pursuant to a charter to be adopted by our board of directors and will be effective upon the closing of this offering. Our board of directors may also establish other committees from time to time to assist the board of directors. Effective upon the closing of this offering, the composition and functioning of all of our committees will comply with all applicable requirements of the Sarbanes-Oxley Act, Nasdaq and SEC rules and regulations. Upon our listing on The Nasdaq Global Select Market, each committee's charter will be available on our website at www.adaptivebiotech.com.

Audit Committee

Effective upon the closing of this offering, , and will serve on the audit committee, which will be chaired by . Our board of directors has determined that each member of the audit committee is "independent" as that term is defined in the SEC and Nasdaq rules, meets the heightened independence requirements for audit committees required under Section 10A of the Exchange Act and related SEC and Nasdaq rules, and has sufficient knowledge in financial and auditing matters to serve on the audit committee. Our board of directors has designated as

an “audit committee financial expert,” as defined under the applicable rules of the SEC. The audit committee’s responsibilities include:

- appointing, approving the compensation of and assessing the independence of our independent registered public accounting firm;
- pre-approving auditing and permissible non-audit services, and the terms of such services, to be provided by our independent registered public accounting firm;
- reviewing the overall audit plan with our independent registered public accounting firm and members of management responsible for preparing our financial statements;
- reviewing and discussing with management and our independent registered public accounting firm our annual and quarterly financial statements and related disclosures as well as critical accounting policies and practices used by us;
- coordinating the oversight and reviewing the adequacy of our internal control over financial reporting;
- establishing policies and procedures for the receipt and retention of accounting-related complaints and concerns;
- recommending based upon the audit committee’s review and discussions with management and our independent registered public accounting firm whether our audited financial statements shall be included in our Annual Report on Form 10-K;
- monitoring the integrity of our financial statements and our compliance with legal and regulatory requirements as they relate to our financial statements and accounting matters;
- preparing the audit committee report required by SEC rules to be included in our annual proxy statement;
- reviewing all related person transactions for potential conflict of interest situations and approving all such transactions; and
- reviewing quarterly earnings releases.

Compensation Committee

Effective upon the closing of this offering , and will serve on the compensation committee, which will be chaired by . Our board of directors has determined that each member of the compensation committee is “independent” as that term is defined in SEC and Nasdaq rules, meets the heightened independence requirements for compensation committee purposes under Section 10C of the Exchange Act and related SEC and Nasdaq rules, and is a “non-employee director” under Rule 16b-3 under the Exchange Act. The compensation committee’s responsibilities include:

- reviewing and approving our philosophy, policies and plans with respect to the compensation of our chief executive officer;
- making recommendations to our board of directors with respect to the compensation of our chief executive officer and our other executive officers;
- reviewing and assessing the independence of compensation advisors;
- overseeing and administering our equity incentive plans;
- reviewing and making recommendations to our board of directors with respect to director compensation; and

- preparing the Compensation Committee reports required by the SEC, including our "Compensation Discussion and Analysis" disclosure.

Nominating and Corporate Governance Committee

Effective upon the closing of this offering , and will serve on the nominating and corporate governance committee, which will be chaired by . Our board of directors has determined that each member of the nominating and corporate governance committee is "independent" as defined in Nasdaq rules. The nominating and corporate governance committee's responsibilities include:

- developing and recommending to the board of directors criteria for board and committee membership;
- establishing procedures for identifying and evaluating board of director candidates, including nominees recommended by shareholders;
- reviewing the composition of the board of directors to ensure that it is composed of members containing the appropriate skills and expertise to advise us;
- identifying and screening individuals qualified to become members of the board of directors;
- recommending to the board of directors the persons to be nominated for election as directors and to each of the board's committees;
- developing and recommending to the board of directors a code of business conduct and ethics and a set of corporate governance guidelines; and
- overseeing the evaluation of our board of directors and management.

Compensation Committee Interlocks and Insider Participation

None of the members of our compensation committee has during the prior fiscal year been one of our officers or employees or had a relationship requiring disclosure under "*Certain Relationships and Related Party Transactions*." None of our executive officers currently serves, or in the past fiscal year has served, as a member of the board of directors or compensation committee of any entity that has one or more executive officers serving on our board of directors or compensation committee.

Code of Conduct

We have adopted a written code of business conduct, that applies to our directors, officers and employees, including our principal executive officer, principal financial officer, principal accounting officer or controller, or persons performing similar functions. Upon the closing of this offering, a current copy of the code will be posted on the Investor Relations section of our website at www.adaptivebiotech.com. If we make any substantive amendments to, or grant any waivers from, the code of business conduct and ethics for any officer or director, we will disclose the nature of such amendment or waiver on our website or in a current report on Form 8-K.

Non-Employee Director Compensation

The following table presents the total compensation for each person who served as a non-employee member of our board of directors during the year ended December 31, 2018. Other than as set forth in the table and described more fully below, we did not pay any compensation, make any additional equity awards or non-equity awards to or pay any other compensation to any of the

non-employee members of our board of directors in 2018. We reimburse non-employee members of our board of directors for reasonable travel and out-of-pocket expenses incurred in attending meetings of our board of directors and committees of our board of directors.

We also do not, and do not expect to, provide separate compensation to our directors who are also our employees, such as Chad Robins, our Chief Executive Officer. Mr. Robins' compensation as our principal executive officer in 2018 is reported in the "*Executive Compensation*" section of this prospectus.

Name	Option Awards ($)(1)	Total ($)
Eric Dobmeier(2)	$ 62,634	$ 62,634
David Goel(3)	—	—
Robert Hershberg, PhD, MD(4)	62,634	62,634
Arnold Levine, PhD(5)	62,634	62,634
Peter Neupert(6)	417,557	417,557
Michael Pellini, MD(7)	626,336	626,336
Tom Willis(8)	62,634	62,634
Andris Zoltners, PhD(9)	62,634	62,634

(1) In accordance with SEC rules, amounts in this column reflect the aggregate grant date fair value of stock options granted during 2018 computed in accordance with ASC Topic 718, rather than the amounts paid or realized by the named individual. We provide information regarding the assumptions used to calculate the value of all stock options made to our directors in Note 13 to our financial statements.

(2) As of December 31, 2018, Mr. Dobmeier held options to purchase 115,000 shares of our common stock, 68,750 of which were vested as of such date.

(3) Mr. Goel did not hold any outstanding equity awards as of December 31, 2018.

(4) As of December 31, 2018, Dr. Hershberg held options to purchase 145,000 shares of our common stock, 142,500 of which were vested as of such date.

(5) Dr. Levine resigned from our board of directors in March 2019. As of December 31, 2018, Dr. Levine held options to purchase 37,084 shares of our common stock, 34,584 of which were vested as of such date.

(6) As of December 31, 2018, Mr. Neupert held options to purchase 280,000 shares of our common stock, 260,208 of which were vested as of such date.

(7) As of December 31, 2018, Dr. Pellini held options to purchase 150,000 shares of our common stock, none of which were vested as of such date.

(8) Mr. Willis resigned from our board of directors in January 2019. As of December 31, 2018, Mr. Willis held options to purchase 265,000 shares of our common stock, 231,250 of which were vested as of such date, and options to purchase 233,600 shares of our Series E-1 convertible preferred stock, all of which were vested as of such date.

(9) As of December 31, 2018, Dr. Zoltners held options to purchase 165,000 shares of our common stock, 162,500 of which were vested as of such date.

Non-Employee Director Compensation

Our board of directors intends to adopt a non-employee director compensation policy, to be effective upon the closing of this offering, that is designed to enable us to attract and retain, on a long-term basis, highly qualified non-employee directors. Specifically, we expect to provide a $40,000 annual cash payment to each director who is not an employee of ours from and after the closing of this offering, with additional amounts for those serving as Lead Independent Director and chairpersons of our audit, compensation, and nominating and corporate governance committees, as set forth below:

	Additional Annual Fee ($)
Lead Independent Director	35,000
Audit Committee Chairperson	20,000
Compensation Committee Chairperson	15,000
Nominating and Corporate Governance Committee Chairperson	10,000

In addition, subject to board discretion, each non-employee director initially elected or appointed to our board of directors following the closing of this offering will receive an option to purchase that number of shares that has a value equivalent to $340,000, with value determined in accordance with reasonable assumptions and methodologies for calculating the fair value of options under ASC 718 (as of the date of this prospectus such number would be shares), on the date of such director's election or appointment to the board of directors, with 25% of the shares vesting on the first anniversary of the vesting commencement date and 1/48th of the shares vesting in equal monthly installments thereafter, subject to continuous service through each applicable vesting date.

On the date of the first meeting of our board of directors of each calendar year, each continuing non-employee director will also receive an option to purchase that number of shares that has a value equivalent to $170,000, with value determined in accordance with reasonable assumptions and methodologies for calculating the fair value of options under ASC 718 (as of the date of this prospectus such number would be shares), which will vest in equal monthly installments over one year, subject to continued service as a director through such vesting date.

The aggregate amount of compensation, including both the grant date fair value of equity compensation and cash compensation, paid to any non-employee director in a calendar year will not exceed $750,000 for the first year of service and $600,000 for each year of service thereafter.

EXECUTIVE COMPENSATION

This section discusses the material components of the executive compensation program for our executive officers who are named in the "*—2018 Summary Compensation Table*" below. For the fiscal year ended December 31, 2018, our "named executive officers" and their positions were as follows:

- Chad Robins, Chief Executive Officer and Co-Founder;
- Julie Rubinstein, President; and
- Harlan Robins, PhD, Chief Scientific Officer and Co-Founder.

2018 Summary Compensation Table

The following table represents information regarding the total compensation awarded to, earned by or paid to our named executive officers during the fiscal year ended December 31, 2018:

Name and Principal Position	Year	Salary ($)	Option Awards ($)(1)	Non-Equity Incentive Plan Compensation ($)(2)	Total ($)
Chad Robins *CEO*	2018	422,815(3)	2,505,343	266,500	3,194,658
Julie Rubinstein *President*	2018	368,753(4)	1,670,228	187,500	2,226,481
Harlan Robins, PhD *Chief Scientific Officer*	2018	348,938(5)	1,670,228	158,500	2,177,666

(1) In accordance with SEC rules, amounts in this column reflect the aggregate grant date fair value of stock options granted during 2018 computed in accordance with ASC Topic 718, rather than the amounts paid or realized by the named individual. We provide information regarding the assumptions used to calculate the value of all stock options made to our directors in Note 13 to our financial statements.

(2) Represents bonuses based upon the board of directors' assessment of the achievement of corporate performance objectives for the year ended December 31, 2018, which were paid in March 2019. See "*—Non-Equity Incentive Plan Awards*" below for details of the award plan and awards.

(3) Following the completion of our annual performance and merit review cycle, Mr. Robins' annual salary was increased from $412,000 to $426,420, effective April 1, 2018.

(4) Following the completion of our annual performance and merit review cycle, Ms. Rubenstein's annual salary was increased from $350,010 to $375,000, effective April 1, 2018.

(5) Following the completion of our annual performance and merit review cycle, Dr. Robins' annual salary was increased from $309,000 to $362,250, effective April 1, 2018.

Long-Term Equity Incentive Awards

We grant equity incentive awards intended to align the interests of our named executive officers with those of our shareholders and to motivate them to make important contributions to our performance. These awards are often subject to time-based vesting conditions. For more information see the "*—Outstanding Equity Awards at December 31, 2018*" and "*—Employee Benefit and Equity Compensation Plans*" sections of this prospectus.

Non-Equity Incentive Plan Awards

We grant non-equity incentive plan awards intended to create a direct correlation between the executive's role and responsibilities and the ability to earn variable pay. During the fiscal year ended December 31, 2018, our named executive officers were eligible to earn cash-based awards based on the achievement of corporate performance objectives. For the fiscal year ended December 31, 2018,

Chad Robins, Julie Rubinstein and Dr. Harlan Robins had an annual bonus opportunity targeted at 50%, 40% and 35% of their respective base salary. For each of our named executive officers, their annual bonus opportunity was based entirely on the achievement of corporate performance goals. For the fiscal year ended December 31, 2018, our compensation committee determined that the corporate performance goals were attained at a level of 125% and approved bonuses for the named executive officers at that level. The annual cash bonuses actually earned by each named executive officer for performance during the fiscal year ended December 31, 2018 are set forth above in the section titled "*—2018 Summary Compensation Table*" in the "*Non-Equity Incentive Plan Compensation*" column.

Employment Arrangements with our Named Executive Officers

Chad Robins

Pursuant to the terms of his amended and restated employment agreement, which will be effective on the closing of this offering, Mr. Robins will continue in his current role, on an at-will basis, and will remain eligible to participate in our fringe benefit plans, including group health insurance and vacation programs. In addition, Mr. Robins may in the future be granted equity incentive awards under our 2019 Plan, which will be effective on the closing of this offering, and any equity incentive awards granted to him under our 2009 Plan will continue to be subject to the terms and provisions of the applicable award documentation. All future and existing equity incentive awards granted to Mr. Robins will also be subject to the terms set forth in the amended and restated employment agreement providing for 100% acceleration of vesting upon a termination of his employment by us other than for death, disability or "cause" within the period beginning three months prior to and 12 months following a "change in control."

We have also entered into an employee non-disclosure and assignment agreement with Mr. Robins, under which Mr. Robins has agreed (1) not to compete with us for a period of one year after the termination of his or employment, (2) not to solicit our employees during his employment and for a period of one year after the termination of such employment, (3) to protect our confidential and proprietary information and (4) to assign to us related intellectual property developed during the course of his employment. Mr. Robins will continue to be subject to this agreement on the closing of this offering.

Julie Rubinstein

Pursuant to the terms of her amended and restated employment agreement, which will be effective on the closing of this offering, Ms. Rubinstein will continue in her current role, on an at-will basis, and will remain eligible to participate in our fringe benefit plans, including group health insurance and vacation programs. In addition, Ms. Rubinstein may in the future be granted equity incentive awards under our 2019 Plan, which will be effective on the closing of this offering, and any equity incentive awards granted to her under our 2009 Plan will continue to be subject to the terms and provisions of the applicable award documentation. All future and existing equity incentive awards granted to Ms. Rubinstein will also be subject to the terms set forth in the amended and restated employment agreement providing for 100% acceleration of vesting upon a termination of her employment by us other than for death, disability or "cause" within the period beginning three months prior to and 12 months following a "change in control."

We have also entered into an employee non-disclosure and assignment agreement with Ms. Rubinstein, under which Ms. Rubinstein has agreed (1) not to solicit our employees during her employment and for a period of one year after the termination of such employment, (2) to protect our confidential and proprietary information and (3) to assign to us related intellectual property developed during the course of her employment. Ms. Rubinstein will continue to be subject to this agreement on the closing of this offering.

Harlan Robins, PhD

Pursuant to the terms of his amended and restated employment agreement, which will be effective on the closing of this offering, Dr. Robins will continue in his current role, on an at-will basis, and will remain eligible to participate in our fringe benefit plans, including group health insurance and vacation programs. In addition, Dr. Robins may in the future be granted equity incentive awards under our 2019 Plan, which will be effective on the closing of this offering, and any equity incentive awards granted to him under our 2009 Plan will continue to be subject to the terms and provisions of the applicable award documentation. All future and existing equity incentive awards granted to Dr. Robins will also be subject to the terms set forth in the amended and restated employment agreement providing for 100% acceleration of vesting upon a termination of his employment by us other than for death, disability or "cause" within the period beginning three months prior to and 12 months following a "change in control."

We have also entered into an employee non-disclosure and assignment agreement with Dr. Robins, under which Dr. Robins has agreed (1) not to compete with us for a period of one year after the termination of his or employment, (2) not to solicit our employees during his employment and for a period of one year after the termination of such employment, (3) to protect our confidential and proprietary information and (4) to assign to us related intellectual property developed during the course of his employment. Dr. Robins will continue to be subject to this agreement on the closing of this offering.

Certain Definitions

For purposes of the employment agreements of each of our named executive officers:

- "Cause" means (i) theft, dishonesty, willful misconduct, breach of fiduciary duty for personal profit or falsification of any of our documents or records by the executive, (ii) the executive's material failure to abide by our code of conduct or other policies, (iii) the executive's unauthorized use, misappropriation, destruction or diversion of our assets or corporate opportunity, (iv) any intentional act by the executive which has a material detrimental effect on our reputation or business, (v) the executive's repeated failure or inability to perform any reasonable assigned duties after written notice of, and a reasonable opportunity to cure, such failure or inability, (vi) the executive's material breach of any employment, service, non-disclosure, non-competition, non-solicitation or other similar agreement between the executive and us, which breach is not cured pursuant to the terms of such agreement or (vii) the executive's conviction of any criminal act involving fraud, dishonesty, misappropriation or moral turpitude, or which impairs the executive's ability to perform his or her duties with us.
- "Change in Control" means (i) any person or entity becoming a beneficial owner of our securities representing more than 50% of the total fair market value or total combined voting power of our then-outstanding securities entitled to vote generally in the election of directors, unless such degree of beneficial ownership results from (a) an acquisition by a person or entity who was a beneficial owner of more than 50% of such voting power on the effective date of our 2009 Plan, (b) any acquisition directly from us, (c) any acquisition by us, a trustee or other fiduciary under our employee benefit plan, or an entity owned by our shareholders in substantially the same proportions as their ownership of our voting securities; or (ii) an ownership change transaction in which our shareholders immediately before such transaction do not retain immediately after the transaction, direct or indirect beneficial ownership of more than 50% of the total combined voting power of our outstanding securities entitled to vote generally in the election of directors or the entity to which our assets were transferred; or (iii) our liquidation or dissolution. Notwithstanding the foregoing, a "change of control" does not include a transaction described in (i) or (ii) in which a majority of the board of directors of the

continuing, surviving or successor entity, or parent thereof, immediately after such transaction is comprised of our incumbent directors.

Outstanding Equity Awards at December 31, 2018

The following table presents information regarding outstanding equity awards held by our named executive officers as of December 31, 2018. All awards were granted under our 2009 Plan.

	Option Awards				
Name	Grant Date	Number of Securities Underlying Unexercised Options (#) Exercisable	Number of Securities Underlying Unexercised Options (#) Unexercisable	Option Exercise Price ($)	Option Expiration Date
Chad Robins[1]	12/20/2011	800,000[2]	—	0.33	12/20/2021
CEO	6/9/2015	800,000[3]	100,000	6.32	6/9/2025
	2/7/2018	600,000[4]	425,000	6.55	2/7/2028
Julie Rubinstein[1]	7/19/2011	100,000[5]	—	0.33	7/19/2021
President	12/20/2011	25,000[2]	—	0.33	12/20/2021
	8/21/2012	70,000[6]	—	0.45	8/21/2022
	2/4/2013	100,000[7]	—	0.45	2/4/2023
	11/3/2013	65,000[8]	—	0.84	11/3/2023
	3/13/2014	360,000[9]	—	0.84	3/13/2024
	6/9/2015	500,000[3]	62,500	6.32	6/9/2025
	2/7/2018	400,000[4]	283,334	6.55	2/7/2028
Harlan Robins, PhD[1]	6/9/2015	600,000[3]	75,000	6.32	6/9/2025
Chief Scientific Officer	2/7/2018	400,000[4]	283,334	6.55	2/7/2028

(1) Each equity award is subject to the acceleration of vesting provisions in each named executive officer's amended and restated employment agreement, as set forth above in the section titled "*—Employment Arrangements with our Named Executive Officers*."
(2) The shares underlying this option vested 25% on January 1, 2013, then in 36 equal monthly installments thereafter.
(3) The shares underlying this option vested 25% on June 8, 2016, then in 36 equal monthly installments thereafter.
(4) The shares underlying this option vested 25% on November 1, 2018, then in 36 equal monthly installments thereafter.
(5) The shares underlying this option vested 25% on May 1, 2012, then in 36 equal monthly installments thereafter.
(6) The shares underlying this option vested 25% on July 1, 2013, then in 36 equal monthly installments thereafter.
(7) The shares underlying this option vested 25% on January 1, 2014, then in 36 equal monthly installments thereafter.
(8) The shares underlying this option vested 25% on November 3, 2014, then in 36 equal monthly installments thereafter.
(9) The shares underlying this option vested 100% upon the date of grant on March 13, 2014.

Employee Benefit and Equity Compensation Plans

The principal features of our employee benefit and equity incentive plans are summarized below. These summaries are qualified in their entirety by reference to the actual text of our plans, each of which is filed as an exhibit to the registration statement of which this prospectus is a part.

2019 Equity Incentive Plan

Our 2019 Plan was approved by our board of directors and our shareholders in , 2019. It is intended to make available incentives that will assist us to attract, retain and motivate employees,

including officers, consultants and directors. We may provide these incentives through the grant of stock options, stock appreciation rights, restricted stock, restricted stock units, performance shares and units and other cash-based or share-based awards.

A total of shares of our common stock will be initially authorized and reserved for issuance under our 2019 Plan. This reserve will automatically increase on January 1, 2020 and each subsequent anniversary by an amount equal to the smaller of (a) 5.0% of the number of shares of common stock issued and outstanding on the immediately preceding December 31 or (b) an amount determined by our board of directors. In addition, this reserve will be increased to include up to shares that remained available for grant under our 2009 Plan upon its termination or that are subject to options granted under our 2009 Plan that expire or terminate without having been exercised in full.

Appropriate adjustments will be made in the number of authorized shares and other numerical limits in our 2019 Plan and in outstanding awards to prevent dilution or enlargement of participants' rights in the event of a stock split or other change in our capital structure. Shares subject to awards which expire or are cancelled or forfeited will again become available for issuance under our 2019 Plan. The shares available will not be reduced by awards settled in cash or by shares withheld to satisfy tax withholding obligations. Only the net number of shares issued upon the exercise of stock appreciation rights or options exercised by means of a net exercise or by tender of previously owned shares will be deducted from the shares available under our 2019 Plan.

Our 2019 Plan will be generally administered by our compensation committee. Subject to the provisions of our 2019 Plan, our compensation committee will determine in its discretion the persons to whom and the times at which awards are granted, the sizes of such awards and all of their terms and conditions. However, our compensation committee may delegate to one or more of our officers the authority to grant awards to persons who are not officers or directors, subject to certain limitations contained in our 2019 Plan and award guidelines established by our compensation committee. Our compensation committee will have the authority to construe and interpret the terms of our 2019 Plan and awards granted under it. Our 2019 Plan provides, subject to certain limitations, for indemnification by us of any director, officer or employee against all reasonable expenses, including attorneys' fees, incurred in connection with any legal action arising from such person's action or failure to act in administering our 2019 Plan.

Our 2019 Plan will authorize our compensation committee, without further shareholder approval, to provide for the cancellation of stock options or stock appreciation rights with exercise prices in excess of the fair market value of the underlying shares of common stock in exchange for new options or other equity awards with exercise prices equal to the fair market value of the underlying common stock or a cash payment.

Our 2019 Plan limits the grant date fair value of all equity awards and the amount of cash compensation that may be provided to a non-employee director in any fiscal year to an aggregate of $750,000 for the first year of service and $600,000 for each year of service thereafter.

Awards may be granted under our 2019 Plan to our employees, including officers, directors or consultants or those of any future parent or subsidiary corporation or other affiliated entity. All awards will be evidenced by a written agreement between us and the holder of the award and may include any of the following:

- *Stock options*: We may grant non-statutory stock options or incentive stock options (as described in Section 422 of the Code), each of which gives its holder the right, during a specified term (not exceeding 10 years) and subject to any specified vesting or other

conditions, to purchase a number of shares of our common stock at an exercise price per share determined by the administrator, which may not be less than the fair market value of a share of our common stock on the date of grant.

- *Stock appreciation rights*: A stock appreciation right gives its holder the right, during a specified term (not exceeding 10 years) and subject to any specified vesting or other conditions, to receive the appreciation in the fair market value of our common stock between the date of grant of the award and the date of its exercise. We may pay the appreciation in shares of our common stock or in cash.
- *Restricted stock*: The administrator may grant restricted stock awards either as a bonus or as a purchase right at such price as the administrator determines. Shares of restricted stock remain subject to forfeiture until vested, based on such terms and conditions as the administrator specifies. Holders of restricted stock will have the right to vote the shares and to receive any dividends paid, except that the dividends will be subject to the same vesting conditions as the related shares.
- *Restricted stock units*: Restricted stock units represent rights to receive shares of our common stock (or their value in cash) at a future date without payment of a purchase price, subject to vesting or other conditions specified by the administrator. Holders of restricted stock units have no voting rights or rights to receive cash dividends unless and until shares of common stock are issued in settlement of such awards. However, the administrator may grant restricted stock units that entitle their holders to dividend equivalent rights subject to the same vesting conditions as the related units.
- *Performance shares and performance units*: Performance shares and performance units are awards that will result in a payment to their holder only if specified performance goals are achieved during a specified performance period. Performance share awards are rights denominated in shares of our common stock, while performance unit awards are rights denominated in dollars. The administrator establishes the applicable performance goals based on one or more measures of business performance enumerated in our 2019 Plan, such as revenue, gross margin, net income or total shareholder return. To the extent earned, performance share and unit awards may be settled in cash or in shares of our common stock. Holders of performance shares or performance units have no voting rights or rights to receive cash dividends unless and until shares of common stock are issued in settlement of such awards. However, the administrator may grant performance shares that entitle their holders to dividend equivalent rights subject to the same vesting conditions as the related units.
- *Cash-based awards and other share-based awards*: The administrator may grant cash-based awards that specify a monetary payment or range of payments or other share-based awards that specify a number or range of shares or units that, in either case, are subject to vesting or other conditions specified by the administrator. Settlement of these awards may be in cash or shares of our common stock, as determined by the administrator. Their holder will have no voting rights or right to receive cash dividends unless and until shares of our common stock are issued pursuant to the award. The administrator may grant dividend equivalent rights with respect to other share-based awards.

In the event of a change in control as described in our 2019 Plan, the acquiring or successor entity may assume or continue all or any awards outstanding under our 2019 Plan or substitute substantially equivalent awards. Any awards which are not assumed or continued in connection with a change in control or are not exercised or settled prior to the change in control will terminate effective as of the time of the change in control. Our compensation committee may provide for the acceleration of vesting of any or all outstanding awards upon such terms and to such extent as it determines, except that the vesting of all awards held by members of our board of directors who are not employees will

automatically be accelerated in full in the event of a change in control. Our 2019 Plan will also authorize the compensation committee, in its discretion and without the consent of any participant, to cancel each or any outstanding award denominated in shares upon a change in control in exchange for a payment to the participant with respect to each share subject to the cancelled award of an amount equal to the excess of the consideration to be paid per share of common stock in the change in control transaction over the exercise price per share, if any, under the award.

Our 2019 Plan will continue in effect until it is terminated by the administrator, provided, however, that all awards will be granted, if at all, within 10 years of its effective date. The administrator may amend, suspend or terminate our 2019 Plan at any time, provided that without shareholder approval, our 2019 Plan cannot be amended to increase the number of shares authorized, change the class of persons eligible to receive incentive stock options or effect any other change that would require shareholder approval under any applicable law or listing rule.

Awards under our 2019 Plan generally may not be transferred or assigned except by will or by the laws of descent and distribution, unless otherwise determined by the plan administrator and subject to applicable securities laws.

2009 Equity Incentive Plan

Our 2009 Plan was originally adopted by our board of directors and approved by our shareholders on December 17, 2009. The maximum aggregate number of shares of common stock that may be issued under our 2009 Plan is 22,848,899. Upon the closing of this offering, our board of directors will terminate our 2009 Plan and we will not grant any further awards under such plan, but our 2009 Plan will continue to govern outstanding awards granted thereunder. Our compensation committee administers our 2009 Plan and has the authority, among other things, to construe and interpret the terms of our 2009 Plan and awards granted thereunder.

Our 2009 Plan permits the grant of options, stock appreciation rights, restricted stock purchase rights, restricted stock bonuses, restricted stock units, performance shares, performance units, cash-based awards and other share-based awards. As of December 31, 2018, we had options to purchase 14,893,253 shares of common stock outstanding under our 2009 Plan. Appropriate and proportionate adjustments will be made to the number of shares subject to outstanding awards to prevent dilution or enlargement of participants' rights in the event of a recapitalization, reclassification, stock dividend, stock split, reverse stock split, split-up, split-off, spin-off, combination of shares, exchange of shares or similar change in our capital structure, or in the event of payment of a dividend or distribution to the our shareholders in a form other than shares (excepting normal cash dividends).

In its discretion, our compensation committee may provide for acceleration of the exercisability, vesting or settlement of awards in connection with a "change in control," as defined under our 2009 Plan, of each or any outstanding award or portion thereof and common stock acquired pursuant thereto upon such conditions, including termination of the plan participant's service prior to, upon or following such change in control, and to such extent as our compensation committee determines. In the event of a change in control, the surviving, continuing, successor or purchasing corporation or other business entity or parent thereof, as the case may be, may, without the consent of any plan participant, either assume or continue the rights and obligations under each or any award or portion thereof outstanding immediately prior to the change in control or substitute for each or any such outstanding award or portion thereof a substantially equivalent award with respect to its own stock, as applicable. Any award or portion thereof which is neither assumed nor continued by the surviving, continuing, successor or purchasing corporation or other business entity or parent thereof in connection with the change in control nor exercised or settled as of the time of consummation of the change in control shall terminate and cease to be outstanding effective as of the time of consummation of the change in control.

Sequenta 2008 Stock Plan

In connection with our Sequenta Acquisition, we assumed our Sequenta Plan, including all awards that were then-outstanding under our Sequenta Plan. We have not granted any further awards following our assumption of our Sequenta Plan. Our Sequenta Plan terminated pursuant to its terms in 2018, but all outstanding awards thereunder continue to be governed by their existing terms. Our compensation committee administers our Sequenta Plan and has the authority, among other things, to construe and interpret the terms of our Sequenta Plan and awards granted thereunder.

As of December 31, 2018, there were 264,677 stock options to purchase shares of our Series E-1 convertible preferred stock outstanding under our Sequenta Plan. In connection with the closing of this offering, all outstanding stock options to purchase shares of our Series E-1 convertible preferred stock under our Sequenta Plan will convert into stock options to purchase shares of our common stock. Appropriate and proportionate adjustments will be made to the number of shares subject to outstanding awards to prevent dilution or enlargement of participants' rights in the event of a recapitalization, reclassification, stock dividend, stock split, reverse stock split, split-up, split-off, spin-off, combination of shares, exchange of shares or similar change in our capital structure, or in the event of payment of a dividend or distribution to our shareholders in a form other than shares (excepting normal cash dividends). In the event of a merger or "change in control" (as defined in our Sequenta Plan), each outstanding award will be treated as the plan administrator determines, including, without limitation, that each award be assumed or an equivalent award substituted by the successor corporation or a parent or subsidiary of the successor corporation, provided that in the event of a change of control in which the successor corporation does not assume or substitute for an award under such plan, an awardee shall fully vest in and have the right to exercise his or her outstanding awards, including shares as to which such award would not otherwise be vested or exercisable, and restrictions on all of the awardee's restricted stock shall lapse.

2019 Employee Stock Purchase Plan

Our ESPP was approved by our board of directors in April 2019 and our shareholders in 2019. A total of shares of our common stock are available for sale under our ESPP. In addition, our ESPP provides for annual increases in the number of shares available for issuance under our ESPP on January 1, 2020 and each subsequent anniversary, equal to the smaller of:

- 1.0% of the outstanding shares of our common stock on the immediately preceding December 31; or
- such other amount as may be determined by our compensation committee.

Appropriate adjustments will be made in the number of authorized shares and in outstanding purchase rights to prevent dilution or enlargement of participants' rights in the event of a stock split or other change in our capital structure. Shares subject to purchase rights which expire or are cancelled will again become available for issuance under the ESPP.

Our compensation committee will administer our ESPP and have full authority to interpret the terms of our ESPP. Our ESPP provides, subject to certain limitations, for indemnification by us of any director, officer or employee against all reasonable expenses, including attorneys' fees, incurred in connection with any legal action arising from such person's action or failure to act in administering our ESPP.

All of our employees, including our named executive officers, are eligible to participate if they are customarily employed by us for more than 20 hours per week and more than five months in any calendar year, subject to any local law requirements applicable to participants in jurisdictions outside

the United States. However, an employee may not be granted rights to purchase stock under our ESPP if such employee:

- immediately after the grant would own stock or options to purchase stock possessing 5.0% or more of the total combined voting power or value of all classes of our capital stock; or
- holds rights to purchase stock under any of our employee stock purchase plans that would accrue at a rate that exceeds $25,000 worth of our stock for each calendar year in which the right to be granted would be outstanding at any time.

Our ESPP is intended to qualify under Section 423 of the Code but also permits us to include our non-U.S. employees in offerings not intended to qualify under Section 423. Our ESPP will typically be implemented through consecutive six-month offering periods. The offering periods will be determined by our compensation committee in its sole discretion. In addition, our compensation committee may, in its discretion, modify the terms of future offering periods, including establishing offering periods of up to 27 months and providing for multiple purchase dates. Our compensation committee may vary certain terms and conditions of separate offerings for employees of any future non-U.S. subsidiaries where required by local law or desirable to obtain intended tax or accounting treatment.

Our ESPP permits participants to purchase common stock through payroll deductions of up to 15.0% of their eligible compensation.

Amounts deducted and accumulated from participant compensation, or otherwise funded in any participating non-U.S. jurisdiction in which payroll deductions are not permitted, are used to purchase shares of our common stock at the end of each offering period. The purchase price of the shares will be 85.0% of the lower of the fair market value of our common stock on the first trading day of the offering period and the fair market value of our common stock on the last day of the offering period. Participants may end their participation at any time during an offering period and will be paid their accrued payroll deductions that have not yet been used to purchase shares of common stock. Participation ends automatically upon termination of employment with us.

Each participant in any offering will have an option to purchase for each full month contained in the offering period a number of shares determined by dividing $2,083.33 by the fair market value of a share of our common stock on the first day of the offering period or 300 shares, if less, and except as limited in order to comply with Section 423 of the Code. Prior to the beginning of any offering period, our compensation committee may alter the maximum number of shares that may be purchased by any participant during the offering period or specify a maximum aggregate number of shares that may be purchased by all participants in the offering period. If insufficient shares remain available under our ESPP to permit all participants to purchase the number of shares to which they would otherwise be entitled, our compensation committee will make a pro rata allocation of the available shares. Any amounts withheld from participants' compensation in excess of the amounts used to purchase shares will be refunded, without interest.

A participant may not transfer rights granted under our ESPP other than by will, the laws of descent and distribution or as otherwise provided under our ESPP.

In the event of a change in control, an acquiring or successor corporation may assume our rights and obligations under outstanding purchase rights or substitute substantially equivalent purchase rights. If the acquiring or successor corporation does not assume or substitute for outstanding purchase rights, then the purchase date of the offering periods then in progress will be accelerated to a date prior to the change in control.

Our ESPP will continue in effect until terminated by our compensation committee. Our compensation committee has the authority to amend, suspend or terminate our ESPP at any time.

401(k) Plan

Effective as of January 1, 2012, we adopted a tax-qualified retirement plan that provides eligible employees with an opportunity to save for retirement on a tax-advantaged basis. All participants' interests in their contributions are 100% vested when contributed. Under the plan, we can make discretionary matching contributions, although we did not do so in 2018. The retirement plan is intended to qualify under Sections 401(a) and 501(a) of the Code.

Health and Welfare Plans

All of our full-time employees, including our named executive officers, are eligible to participate in our health and welfare plans, including medical and dental benefits, short-term and long-term disability insurance, and life insurance.

Limitation of Liability and Indemnification Matters

Our amended and restated articles of incorporation and our amended and restated bylaws which will be in effect upon the closing of this offering will provide that we will indemnify our directors and officers to the fullest extent permitted under the laws of the State of Washington. Under the WBCA, our amended and restated articles of incorporation may contain provisions not inconsistent with law that eliminate or limit the personal liability of our directors for monetary damages for conduct as directors, except for the following:

- acts or omissions that involve intentional misconduct by a director or a knowing violation of law by a director;
- conduct violating RCW 23B.08.310 relating to unlawful distributions;
- any transaction from which the director will personally receive a benefit in money, property or services to which the director is not legally entitled; or
- any act or omission occurring prior to the date when the provision eliminating or limiting the liability of our directors becomes effective.

Our amended and restated articles of incorporation, upon the closing of this offering, will also provide that if Washington law is amended to authorize corporate action further eliminating or limiting the personal liability of a director, then the liability of our directors will be eliminated or limited to the fullest extent permitted by Washington law, as so amended. We may also purchase and maintain liability insurance on behalf of our directors, officers, employees and agents. We currently maintain a liability insurance policy pursuant to which our directors and officers may be indemnified against liability incurred as a result of serving in their capacities as directors and officers, subject to certain exclusions.

We have entered into indemnification agreements with each of our current directors and executive officers, and may enter into indemnification agreements with future directors and executive officers, to provide such directors and officers additional contractual assurances regarding the scope of the indemnification set forth in our amended and restated articles of incorporation and amended and restated bylaws and to provide additional procedural protections.

We believe these charter provisions and indemnification agreements are necessary to attract and retain qualified persons as directors and executive officers.

The above description of the relevant portions of Washington law, and the indemnification provisions of our amended and restated articles of incorporation, our amended and restated bylaws and our indemnification agreements, is not complete and is qualified in its entirety by reference to the WBCA, our amended and restated articles of incorporation, our amended and restated bylaws and the indemnification agreements between us and our directors and executive officers, each of which is filed as an exhibit to our registration statement of which this prospectus forms a part.

The limitation of liability and indemnification provisions in our amended and restated articles of incorporation and amended and restated bylaws may discourage shareholders from bringing a lawsuit against our directors and officers for breach of their fiduciary duty. They may also reduce the likelihood of derivative litigation against our directors and officers, even though an action, if successful, might benefit us and our shareholders. Further, a shareholder's investment may be adversely affected to the extent that we pay the costs of settlement and damage awards against directors and officers as required by these indemnification provisions.

The indemnification provisions in our amended and restated articles of incorporation and amended and restated bylaws and the indemnification agreements entered into or to be entered into between us and each of our directors and executive officers may not be sufficiently broad to permit indemnification of our directors and executive officers for liabilities arising under the Securities Act.

Insofar as indemnification for liabilities arising under the Securities Act may be permitted to directors, officers or persons controlling us pursuant to the foregoing provisions, we have been informed that, in the opinion of the SEC, such indemnification is against public policy as expressed in the Securities Act and is therefore unenforceable.

There is no pending litigation or proceeding naming any of our directors or officers as to which indemnification is being sought, nor are we aware of any pending or threatened litigation that may result in claims for indemnification by any director or officer.

CERTAIN RELATIONSHIPS AND RELATED PARTY TRANSACTIONS

Other than the compensation agreements and other arrangements described in the "*Executive Compensation*" section of this prospectus and the transactions described below, since January 1, 2016, there has not been and there is not currently proposed, any transaction or series of similar transactions to which we were, or will be, a party in which the amount involved exceeded, or will exceed, $120,000 and in which any director, executive officer, holder of 5% or more of any class of our capital stock or any member of the immediate family of, or entities affiliated with, any of the foregoing persons, had, or will have, a direct or indirect material interest.

Private Placement of Securities

On December 11, 2017 we entered into a Series F-1 Preferred Stock Purchase Agreement, pursuant to which we issued and sold an aggregate of 4,686,649 shares of our Series F-1 convertible preferred stock at a price per share of $10.6686, for an aggregate purchase price of $49,999,984. The following table sets forth the number of shares of our Series F-1 convertible preferred stock that we issued to entities under common control with certain of our 5% shareholders and their affiliates in this transaction:

Name	Shares of Series F-1 Convertible Preferred Stock	Total Purchase Price
Viking Global Entities(1)	290,572	$ 3,099,996
Matrix Capital Management Master Fund, LP(2)(3)	84,359	899,992

(1) Viking Global Entities consists of Viking Global Equities Master Ltd., Viking Global Equities II LP, Viking Long Fund Master Ltd. and Viking Global Opportunities Illiquid Investments Sub-Master LP ("Viking Global Entities"), and collectively hold 5% or more of our capital stock.
(2) David Goel, one of our directors, is the sole Managing General Partner of Matrix Capital Management Company, LP.
(3) Matrix Capital Management Master Fund, LP is a holder of 5% or more of our capital stock.

Agreements with our Shareholders

In connection with our Series F-1 convertible preferred stock financing, we entered into a sixth amended and restated investors' rights agreement and the Voting Agreement, in each case, with the purchasers of our Series F-1 convertible preferred stock and certain holders of our common and convertible preferred stock, including Viking Global Equities Master Ltd., Viking Long Fund Master Ltd., Viking Global Equities II LP and Matrix Capital Management Master Fund, LP. The Voting Agreement contains provisions with respect to the election of our board of directors and its composition. The Voting Agreement will terminate automatically upon the closing of this offering.

On , 2019, we entered into a seventh amended and restated investors' rights agreement ("Investors' Rights Agreement"), which superseded our sixth amended and restated investors' rights agreement. In addition to certain registration rights, the Investors' Rights Agreement provides for certain information rights, rights of first offer and rights of first refusal.

See the "*Description of Capital Stock—Registration Rights*" section of this prospectus for more information regarding the registration rights provided in this agreement.

The provisions described above, except for the registration rights, will terminate automatically upon the closing of this offering. This is not a complete description of the Investors' Rights Agreement and is qualified by the full text of the Investors' Rights Agreement filed as an exhibit to the registration statement of which this prospectus is a part.

Side Letter Agreement

In connection with our Series F-1 convertible preferred stock financing, we entered into a side letter agreement with the Viking Global Entities, collectively a greater than 5% beneficial owner of our common stock, which we amended and restated in April 2019 ("Letter Agreement"). The Letter Agreement imposes on the Viking Global Entities certain standstill and support obligations until the earlier of our consummation of a change of control transaction, April 3, 2024, and the date on which they cease to have beneficial ownership of at least 10% of any class of our voting securities.

With respect to the standstill obligations, the Viking Global Entities have agreed, subject to certain exceptions, not to (i) acquire beneficial ownership of any additional shares of our common stock or other securities; (ii) transfer any shares of our common stock issued upon conversion of our convertible preferred stock to our competitors, or to any other person if, after the transfer, the transferee would beneficially own more than 10% of our capital stock and, to the knowledge of the transferor, be involved any of the actions prohibited by clauses (iii) or (iv); (iii) make, vote for or encourage any proposal to amend our amended and restated bylaws that our board of directors has recommended against, approve any shareholder proposal that our board of directors has recommended against or approve any "significant business transaction" as defined under the WBCA in which the Viking Global Entities would be a buyer in such transaction; (iv) encourage any third party to commence a tender offer for shares of our common stock, solicit shareholder proxies with respect to any matter, call a special meeting of our shareholders or make a request for a list of our shareholders; or (v) form, join in or participate in a "group" (within the meaning of the Exchange Act) for the purpose of acting in a concerted manner.

With respect to the support obligations, each of the Viking Global Entities has agreed that it will cause all of our shares of capital stock legally or beneficially owned by it to be voted in favor of any proposal that both (i) has been recommended by our board of directors and (ii) relates to a transaction that would constitute a change of control, but only, at the option of such Viking Global Entity, as recommended by our board of directors or in the same proportions as all of our other shareholders voting on such proposal. Each of the Viking Global Entities has granted our chief executive officer a proxy to vote its shares in accordance with the support obligations, subject to certain exceptions.

Adaptimmune Master Collaboration Agreement

We are party to a master collaboration agreement with Adaptimmune Limited, pursuant to which we provide Adaptimmune with certain services related to our ImmunoSEQ product and service pursuant to agreed upon project orders. David Goel, one of our directors, is sole Managing General Partner of Matrix Capital Management Master Fund, LP, which owns greater than 10% of the outstanding equity interest in Adaptimmune. In the fiscal year ended December 31, 2017, Adaptimmune paid us $128,000 for services provided under the master collaboration agreement.

ZS Associates Master Services Agreement

We are party to a management services agreement, which was extended to August 2019 by amendment, with ZS Associates, pursuant to which ZS Associates provides us with certain sales and marketing services pursuant to agreed-upon work orders. Andris Zoltners, PhD, one of our directors, is a Co-Chairman and Founding Director of ZS Associates. For the fiscal year ended December 31, 2018, we paid ZS Associates $143,000 for services provided under the management services agreement.

Executive Severance Agreements

We have entered into executive severance agreements with certain of our executive officers that provide, cash benefits if the officer is terminated without cause or resigns for good reason (as defined in each officer's respective executive severance agreement, an "Involuntary Separation"), subject to that officer entering into a release of claims with us.

In the event of an Involuntary Separation, Dr. Baldo's, executive severance agreement provides that he would receive a multiple of his base salary depending on the length of his service with us at the time of separation: (i) if less than 12 months of service, 12 months of base salary; (ii) if greater than 12 months, but less than 24 months of service, six months of base salary; or (iii) if greater than 24 months of service, three months of base salary. Similarly, in the event of an Involuntary Separation, Mr. Cohen would receive three months base salary and Mr. Sang would receive 12 months base salary.

Indemnification Agreements

We have entered into agreements to indemnify our directors and executive officers. These agreements, among other things, require us to indemnify these individuals for certain expenses (including attorneys' fees), judgments, fines and settlement amounts reasonably incurred by such person in any action or proceeding, including any action by or in our right, on account of any services undertaken by such person on behalf of us or that person's status as a member of our board of directors to the maximum extent allowed under Washington law.

Policies and Procedures for Related Party Transactions

Our board of directors has adopted a written policy with respect to related person transactions, to be effective upon the closing of this offering, setting forth the policies and procedures for the review and approval or ratification of related person transactions. Under the policy, related person transactions that are identified as such prior to the consummation or amendment of such transaction may be consummated or amended only if certain steps are taken, including review and approval by our audit committee. In the event we become aware of a related person transaction that has not been previously approved or previously ratified under the policy, the transaction is submitted to our audit committee for review and ratification, amendment, termination or rescission as the audit committee deems appropriate. For purposes of this policy, related person transactions mean transactions in which we were or are to be a participant, where the amount involved exceeds $120,000 and a related person had, has or will have a direct or indirect material interest. For purposes of this policy, a related person means a director, executive officer, nominee for director or greater than 5% beneficial owner of our common stock, in each case since the beginning of the most recently completed year, and such person's immediate family members.

PRINCIPAL SHAREHOLDERS

The following table sets forth information regarding the beneficial ownership of our common stock by:

- each person or group of affiliated persons known by us to be the beneficial owner of more than 5% of our capital stock;
- each of our named executive officers;
- each of our directors; and
- all of our directors and executive officers as a group.

Beneficial ownership is determined in accordance with the rules of the SEC and generally includes voting or investment power with respect to securities. Common stock issuable upon exercise or conversion of options, warrants or other rights to acquire common stock that are currently exercisable or convertible, or exercisable or convertible within 60 days of March 31, 2019 are deemed to be outstanding and beneficially owned by the holder for the purpose of computing share and percentage ownership of that holder, but are not treated as outstanding for the purpose of computing the percentage ownership of any other person. Except as indicated in the footnotes to the table below, and subject to community property laws where applicable, we believe the persons and entities named in the table below have sole voting and investment power with respect to all common stock shown as beneficially owned by them.

In the table below, the percentage of beneficial ownership before this offering is based on 105,954,230 shares of common stock outstanding as of March 31, 2019, assuming the conversion of all outstanding shares of our convertible preferred stock into an aggregate of 93,023,694 shares of common stock upon the closing of this offering, and the percentage of beneficial ownership after this offering further assumes the issuance of shares of common stock in this offering, assuming no exercise of the underwriters' option to purchase additional shares. Unless otherwise indicated, the address of each of the individuals and entities named below is c/o Adaptive Biotechnologies Corporation, 1551 Eastlake Avenue East, Suite 200, Seattle, Washington 98102.

Name of Beneficial Owner	Number of Shares Beneficially Owned Prior to Offering	Percentage of Shares Beneficially Owned	
		Before this Offering	After this Offering
5% and Greater Shareholders:			
Viking Global Entities(1)	38,156,607	36.0%	%
Matrix Capital Management Master Fund, LP(2)	17,332,191	16.4	
Named Executive Officers and Directors:			
Chad Robins(3)	6,754,013	6.3	
Julie Rubinstein(4)	1,359,583	1.3	
Harlan Robins, PhD(5)	1,608,179	1.5	
Eric Dobmeier(6)	86,666	*	
David Goel(2)	17,332,191	16.4	
Michelle Griffin	—	—	
Robert Hershberg, PhD, MD(7)	148,750	*	
Peter Neupert(8)	286,250	*	
Michael Pellini, MD(9)	50,625	*	
Andris Zoltners, PhD(10)	4,034,766	3.8	
All directors and executive officers as a group (15 persons)	33,752,896	30.0	

* Represents beneficial ownership of less than 1% of our outstanding common stock.

(1) Consists of (i) 26,405,953 shares of common stock held by Viking Global Equities Master Ltd. ("VGE Master"), (ii) 538,898 shares of common stock held by Viking Global Equities II LP ("VGE II"), (iii) 9,786,756 shares of common stock held by Viking Long Fund Master Ltd. ("VLF") and (iv) 1,425,000 shares of common stock held by Viking Global Opportunities Illiquid Investments Sub-Master LP ("Viking Opportunities," and together with VGE Master, VGE II, VLF and Viking Opportunities, the "Viking Global Entities"). VGE Master has the power to dispose of and vote the shares directly owned by it, which power may be exercised by its investment manager, Viking Global Performance LLC ("VGP"), and by Viking Global Investors LP ("VGI"), which provides managerial services to VGE Master. VGE II has the power to dispose of and vote the shares directly owned by it, which power may be exercised by its general partner, VGP, and by VGI, which provides managerial services to VGE II. VLF has the power to dispose of and vote the shares directly owned by it, which power may be exercised by its investment manager, Viking Long Fund GP LLC ("VLFGP"), and by VGI, which provides managerial services to VLF. Viking Opportunities has the power to dispose of and vote the shares directly owned by it, which power may be exercised by its general partner, Viking Global Opportunities Portfolio GP LLC ("Viking Opportunities GP"), and by VGI, which provides managerial services to Viking Opportunities. O. Andreas Halvorsen, David C. Ott and Rose Shabet, as Executive Committee members of Viking Global Partners LLC (the general partner of VGI), VGP, VLFGP and Viking Opportunities GP, have shared power to direct the voting and disposition of investments beneficially owned by VGI, VGP, VLFGP and Viking Opportunities GP. The business address of each of the Viking Global Entities is c/o Viking Global Investors LP, 55 Railroad Avenue, Greenwich, Connecticut 06830.

(2) Matrix Capital Management Company, LP, the investment adviser of Matrix Capital Management Master Fund, LP ("Matrix Fund"), has discretionary authority to vote and dispose of the shares held by the Matrix Fund and may be deemed to be the beneficial owner of these shares. David Goel, a member of our board of directors, in his capacity as the sole Managing General Partner of Matrix Capital Management Company, LP, may also be deemed to have investment and voting power over the shares held by the Matrix Fund. The registered office of Matrix Capital Management Master Fund, LP is c/o Matrix Capital Management Company, LP, 1000 Winter Street, Suite 4500, Waltham, MA 02451.

(3) Consists of (i) 1,858,180 shares of common stock held directly by Chad Robins, (ii) 1,808,333 shares of common stock issuable upon exercise of options exercisable within 60 days of March 31, 2019, (iii) 2,237,500 shares of common stock held by South Dakota Trust Company, Trustee of the Harlan Robins 2017 Trust, for the benefit of Dr. Harlan Robins and his descendants and of which Mr. Robins is a trustee, (iv) 500,000 shares of common stock held by HSR 2014 Mother's Trust UTA dated June 17, 2014 for the benefit of Mr. Robins' mother and daughter and of which Mr. Robins is a trustee and (v) 350,000 shares of common stock held by HSR 2017 Trust for Descendants, u/a/d November 10, 2017 for the benefit of Dr. Robins' descendants and of which Mr. Robins is trustee.

(4) Consists of 1,359,583 shares of common stock issuable upon exercise of options exercisable within 60 days of March 31, 2019.

(5) Consists of (i) 70,679 shares of common stock held directly by Dr. Harlan Robins, (ii) 737,500 shares of common stock issuable upon exercise of options exercisable within 60 days of March 31, 2019, (iii) 300,000 shares of common stock held by CMR 2014 Brother's Trust u/t/a dated July 2, 2014 for the benefit of Dr. Robins and of which Dr. Robins is a trustee and (iv) 500,000 shares of common stock held by CMR 2014 Mother's Trust u/t/a dated July 2, 2014 for the benefit of Dr. Robins' mother and Chad Robins' daughter and of which Dr. Robins is a trustee.

(6) Consists of 86,666 shares of common stock issuable upon exercise of options exercisable within 60 days of March 31, 2019.

(7) Consists of 148,750 shares of common stock issuable upon exercise of options exercisable within 60 days of March 31, 2019.

(8) Consists of 286,250 shares of common stock issuable upon exercise of options exercisable within 60 days of March 31, 2019.

(9) Consists of 50,625 shares of common stock issuable upon exercise of options exercisable within 60 days of March 31, 2019.

(10) Consists of (i) 3,866,016 shares of common stock and (ii) 168,750 shares of common stock issuable upon exercise of options exercisable within 60 days of March 31, 2019.

DESCRIPTION OF CAPITAL STOCK

The following summary describes our capital stock and the provisions of our amended and restated articles of incorporation, amended and restated bylaws and amended and restated investors' rights agreement that will be in effect upon the closing of this offering. Copies of these documents are filed with the SEC as exhibits to our registration statement of which this prospectus forms a part. The descriptions of our common stock and convertible preferred stock reflect changes to our capital structure that will occur in connection with the closing of this offering.

General

Upon the closing of this offering, our authorized capital stock will consist of 340,000,000 shares of common stock, par value $0.0001 per share, and 10,000,000 shares of preferred stock, par value $0.0001 per share, all of which shares of preferred stock will be undesignated.

As of , 2019, shares of our common stock and shares of convertible preferred stock were outstanding and held by shareholders of record. This amount does not take into account the conversion of all outstanding shares of our convertible preferred stock into common stock upon the closing of this offering.

Common Stock

The holders of our common stock are entitled to one vote for each share held on all matters submitted to a vote of the shareholders. The holders of our common stock do not have any cumulative voting rights. Holders of our common stock are entitled to receive ratably any dividends declared by our board of directors out of funds legally available for that purpose, subject to any preferential dividend rights of any outstanding convertible preferred stock. Our common stock has no preemptive rights, conversion rights or other subscription rights or redemption or sinking fund provisions.

In the event of our liquidation, dissolution or winding up, holders of our common stock will be entitled to share ratably in all assets remaining after payment of all debts and other liabilities and any liquidation preference of any outstanding convertible preferred stock. The shares to be issued by us in this offering will be, when issued and paid for, fully paid and non-assessable.

Preferred Stock

Upon the closing of this offering, all outstanding shares of our convertible preferred stock will be converted into shares of our common stock on a one-to-one basis. Following that conversion and the effectiveness of our amended and restated articles of incorporation, our board of directors will have the authority, without further action by our shareholders, to issue up to 10,000,000 shares of preferred stock in one or more series and to fix the rights, preferences, privileges and restrictions thereof. These rights, preferences and privileges could include dividend rights, conversion rights, voting rights, terms of redemption, liquidation preferences and the number of shares constituting, or the designation of, such series, any or all of which may be greater than the rights of common stock. The issuance of our preferred stock could adversely affect the voting power of holders of common stock and the likelihood that such holders will receive dividend payments and payments upon our liquidation. In addition, the issuance of preferred stock could have the effect of delaying, deferring or preventing a change in control of our company or other corporate action. Immediately after the closing of this offering, no shares of preferred stock will be outstanding, and we have no present plan to issue any shares of preferred stock.

Stock Options

As of December 31, 2018, options to purchase 264,677 shares of our Series E-1 convertible preferred stock were outstanding under our Sequenta Plan, of which 264,639 were vested and exercisable as of that date, and options to purchase 14,893,253 shares of our common stock were outstanding under our 2009 Plan, of which 10,062,291 were vested and exercisable as of that date. In addition, shares of common stock are reserved for future issuance under our 2019 Plan.

Warrants

As of December 31, 2018, warrants to purchase a total of 55,032 shares of common stock were outstanding, with exercise prices ranging from $0.33 per share to $0.45 per share and an average exercise price of $0.37 per share. Of these, a warrant to purchase 20,000 shares of our common stock will expire upon the closing of this offering unless earlier exercised, with the remaining warrant to purchase 35,032 shares of our common stock expiring in June 2022. In addition, as of December 31, 2018, a warrant to purchase 56,875 shares of our convertible preferred stock was outstanding, with an exercise price of $2.64 per share. This will convert into a warrant to purchase an equivalent number of shares of our common stock upon the closing of this offering, and will expire in April 2021.

Registration Rights

Upon the closing of this offering, holders of shares of our common stock, which shares we refer to as "registrable securities," will be entitled to rights with respect to the registration of these registrable securities under the Securities Act. These rights are provided under the terms of the Investors' Rights Agreement. The Investors' Rights Agreement includes demand registration rights, short-form registration rights and piggyback registration rights.

All underwriting discounts, selling commissions and stock transfer taxes applicable to the sale of registrable securities pursuant to the Investors' Rights Agreement shall be borne by the holders of registrable securities participating in such sale. Any additional expenses incurred in connection with exercise of registration rights under the Investors' Rights Agreement, including all registration, filing and qualification fees, printers' and accounting fees, and fees and disbursements of our counsel shall be borne by us. We are also responsible for the reasonable fees and disbursements, not to exceed $100,000, or such greater amount as agreed upon in the applicable underwriting agreement, of one counsel for the selling holders of registrable securities, and any legal expenses incurred by such selling holders in excess of $100,000 shall be borne by such holders.

Subject to certain exceptions contained in the Investors' Rights Agreement, we and the underwriters may limit the number of shares included in an underwritten offering by holders of registrable securities to the number of shares which we and the underwriters determine in our sole discretion will not jeopardize the success of the offering.

Demand Registration Rights

Beginning six months after the completion date of this offering, the holders of registrable securities are entitled to demand registration rights under certain conditions. Under the terms of the Investors' Rights Agreement, we will be required, upon the written request of (i) holders of at least 30% of registrable securities then outstanding or (ii) the Viking Global Entities (so long as the Viking Global Entities remain a holder of at least 550,000 registrable securities), to use our best efforts to file a registration statement on Form S-1 or Form S-3 with respect to the registrable securities identified

by the holders initiating such request so long as the anticipated aggregate offering price of such registrable securities pursuant to such registration would be at least $5.0 million in the aggregate. We are not obligated to effect, or to take any action to effect, any registration pursuant to these demand registration rights (a) during the period that is 30 days before our good faith estimate of the date of filing of, and ending on a date that is 60 days after the effective date of, a registration statement pertaining to an underwritten public offering of our securities or (b) after we have effected five registrations pursuant to these demand registration rights if the initiating holder for at least two of such registrations is one of the Viking Global Entities.

Shelf Registration Rights

Pursuant to the Investors' Rights Agreement, beginning six months after the completion date of this offering, upon the written request of (i) holders of at least 20% of registrable securities then outstanding or (ii) one of the Viking Global Entities (so long as one of the Viking Global Entities remains a holder of at least 550,000 registrable securities), we will be required to use commercially reasonable efforts to effect a registration of with respect to the registrable securities identified by the holders initiating such request by filing either a shelf registration statement on Form S-3 or an evergreen registration statement on Form S-1 with the SEC. We are not obligated to effect, or to take any action to effect, any registration pursuant to these registration rights (i) if the holders of registrable securities intending to sell pursuant to such rights propose to sell registrable securities at an aggregate offering price to the public, net of selling expenses, of less than $2.0 million or (ii) if we furnish to such initiating holders a certificate signed by the chair of our board of directors stating that in the good-faith judgment of our board of directors, after consultation with our outside counsel, it would be materially detrimental to us and our shareholders for such registration to be effected at such time, subject to certain limitations.

An offering or sale of registrable securities pursuant to a shelf registration statement may be initiated at any time by one or more holders of at least 550,000 shares of registrable securities, provided that the minimum market value of registrable securities that such holders propose to sell in such offering must be equal to at least $1.0 million or such lower amount approved by our board of directors. The right to have such shares registered on a shelf registration statement is further subject to other specified conditions and limitations.

Piggyback Registration Rights

Pursuant to the Investors' Rights Agreement, if we register any of our securities either for our own account or for the account of other security holders, subject to certain exceptions, the holders of registrable securities are entitled to include their shares in the registration.

Expiration of Registration Rights

The demand registration rights, short form registration rights and piggyback registration rights granted to any holder of registrable securities under the Investors' Rights Agreement will terminate upon the earliest to occur of (i) the fifth anniversary of the closing of this offering or (ii) such time after this offering when the holder's registrable securities may be sold without restriction pursuant to Rule 144 within a 90-day period; provided, however, that the demand registration rights, short-form registration rights and piggyback registration rights under the Investors' Rights Agreement of any holder of at least 550,000 shares of registrable securities shall not terminate until such time as such holder holds no registrable securities.

Anti-Takeover Effects of our Articles of Incorporation, Bylaws and Washington Law

Our amended and restated articles of incorporation and amended and restated bylaws will include a number of provisions that may have the effect of delaying, deferring or preventing another party from acquiring control of us and encouraging persons considering unsolicited tender offers or other unilateral takeover proposals to negotiate with our board of directors rather than pursue non-negotiated takeover attempts. These provisions include the items described below.

Board Composition and Filling Vacancies

Our amended and restated articles of incorporation will provide for the division of our board of directors into three classes serving staggered three-year terms, with one class being elected each year. Our amended and restated articles of incorporation will also provide that directors may be removed only for cause and then only if the number of votes of the holders of the shares entitled to elect the director cast in favor of removing such director exceeds the number of votes cast against removal. Furthermore, any vacancy on our board of directors, however occurring, including a vacancy resulting from an increase in the size of our board, may only be filled by the affirmative vote of a majority of our remaining directors. The classification of directors, together with the limitations on removal of directors and treatment of vacancies, has the effect of making it more difficult for shareholders to change the composition of our board of directors.

Unanimous Written Consent of Shareholders

Washington law limits the ability of shareholders to act by written consent by requiring unanimous written consent for shareholder action to be effective. This limit may lengthen the amount of time required to take shareholder actions and would prevent the amendment of our amended and restated articles of incorporation, our amended and restated bylaws or removal of directors by our shareholders without holding a meeting of shareholders.

Meetings of Shareholders

Our amended and restated articles of incorporation and our amended and restated bylaws will provide that only our board of directors, our Chairperson of our board of directors, our Chief Executive Officer or our President may call special meetings of shareholders and only those matters set forth in the notice of the special meeting may be considered or acted upon at a special meeting of shareholders. Our amended and restated bylaws will limit the business that may be conducted at an annual meeting of shareholders to those matters properly brought before the meeting.

Advance Notice Requirements

Our amended and restated bylaws will establish advance notice procedures with regard to shareholder proposals relating to the nomination of candidates for election as directors or new business to be brought before meetings of our shareholders. These procedures provide that notice of shareholder proposals must be timely given in writing to our corporate secretary prior to the meeting at which the action is to be taken. Generally, to be timely, notice must be received at our principal executive offices not less than 90 days nor more than 120 days prior to the first anniversary of the date that our proxy statement was released to shareholders in connection with the previous year's annual meeting. Our amended and restated bylaws will specify the requirements as to form and content of all shareholders' notices. These requirements may preclude shareholders from bringing matters before the shareholders at an annual or special meeting.

Amendment to our Articles of Incorporation and Bylaws

Any amendment of our amended and restated articles of incorporation must first be submitted to our shareholders by us or our board of directors, and the amendment of certain articles or sections,

including articles or sections relating to who may call special meetings of the shareholders, our board of directors, indemnification of our directors and officers, supermajority voting and amendments to our amended and restated bylaws, requires the affirmative vote of at least two-thirds of the outstanding shares entitled to vote on the amendment voting together as a single group. Our amended and restated bylaws may be amended by our board of directors, subject to any limitations set forth in our amended and restated bylaws, and may also be amended by the affirmative vote of at least two-thirds of the outstanding shares entitled to vote on the amendment voting together as a single group.

Undesignated Preferred Stock

Our amended and restated articles of incorporation will provide for authorized shares of preferred stock. The existence of authorized but unissued shares of preferred stock may enable our board of directors to discourage an attempt to obtain control of us by means of a merger, tender offer, proxy contest or otherwise. For example, if in the due exercise of its fiduciary obligations, our board of directors were to determine that a takeover proposal is not in the best interests of our shareholders, our board of directors could cause shares of preferred stock to be issued without shareholder approval in one or more private offerings or other transactions that might dilute the voting or other rights of the proposed acquirer or insurgent shareholder or shareholder group. In this regard, our amended and restated articles of incorporation will grant our board of directors broad power to establish the rights and preferences of authorized and unissued shares of preferred stock. The issuance of shares of preferred stock could decrease the amount of earnings and assets available for distribution to holders of shares of common stock. The issuance may also adversely affect the rights and powers, including voting rights, of these holders and may have the effect of delaying, deterring or preventing a change in control of us.

Exclusive Forum

Our amended and restated articles of incorporation that will be in effect at the closing of this offering will provide that, unless we consent in writing to the selection of an alternative forum, the state courts located in King County, Washington (or, if the state courts located within King County, Washington do not have jurisdiction, the federal district court for the Western District of Washington) shall be the sole and exclusive forum for commencing and maintaining any proceeding (i) asserting a claim based on a violation of a duty under the laws of the State of Washington by any of our current or former directors, officers or shareholders in such capacity, (ii) commenced or maintained in the right of the corporation, (iii) asserting a claim arising pursuant to any provision of the WBCA, our amended and restated articles of incorporation or our amended and restated bylaws (as either may be amended from time to time) or (iv) asserting a claim concerning our internal affairs that is not included in clauses (i) through (iii) above, in all cases to the fullest extent permitted by law and subject to the court having personal jurisdiction over the indispensable parties named as defendants. These provisions would not apply to suits brought to enforce a duty or liability created by the Exchange Act, or any other claim for which the federal courts have exclusive jurisdiction. Our amended and restated articles of incorporation will further provide 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 applicable law. Any person or entity purchasing or otherwise acquiring any interest in our securities shall be deemed to have notice of and consented to these provisions. Although we believe these provisions benefit us by providing increased consistency in the application of Washington law for the specified types of actions and proceedings, the provisions may have the effect of discouraging lawsuits against us or our directors, officers and other employees.

Washington Anti-Takeover Law

Washington law imposes restrictions on some transactions between a corporation and significant shareholders. Chapter 23B.19 of the WBCA generally prohibits a target corporation from engaging in

specified “significant business transactions” with an “acquiring person.” This statute could prohibit or delay the accomplishment of mergers or other takeover or change in control attempts with respect to us and, accordingly, may discourage unsolicited attempts to acquire us. An “acquiring person” is generally defined as a person or group of persons that beneficially owns the voting shares entitled to cast votes comprising 10% or more of the voting power of the target corporation. The target corporation may not engage in “significant business transactions,” as defined in Chapter 23B.19, for a period of five years after the date of the transaction in which the person became an acquiring person, unless (1) the significant business transaction or the acquiring person’s purchase of shares was approved by a majority of the members of the target corporation’s board of directors prior to the share acquisition causing the person to become an “acquiring person,” or (2) the significant business transaction was both approved by the majority of the members of the target corporation’s board of directors and authorized at a shareholder meeting by at least two-thirds of the votes entitled to be cast by the outstanding voting shares (excluding the acquiring person’s shares or shares over which the acquiring person has voting control) at or subsequent to the acquiring person’s share acquisition. “Significant business transactions” include, among other things:

- a merger or share exchange with, disposition of assets to or issuance or redemption of stock to or from, the acquiring person;
- a termination of 5% or more of the employees of the target corporation employed in the State of Washington as a result of the acquiring person’s acquisition of 10% or more of the shares, whether at one time or over the five-year period following the share acquisition;
- a transaction in which the acquiring person is allowed to receive a disproportionate benefit as a shareholder; or
- liquidating or dissolving the target corporation.

After the five-year period, a “significant business transaction” may occur, as long as it complies with “fair price” provisions specified in the statute or is approved at a meeting of shareholders by a majority of the votes entitled to be counted within each voting group entitled to vote separately on the transaction, not counting the votes of shares as to which the acquiring person has beneficial ownership or voting control. A corporation may not opt out of this statute.

Nasdaq Global Select Market listing

We have applied to list our common stock on The Nasdaq Global Select Market under the symbol “ADPT.”

Transfer Agent and Registrar

The transfer agent and registrar for our common stock will be Computershare Trust Company, N.A. The transfer agent and registrar’s address is 250 Royall Street, Canton, Massachusetts 02021.

SHARES ELIGIBLE FOR FUTURE SALE

Prior to this offering, there has been no public market for our common stock. Future sales of our common stock in the public market, or the availability of such shares for sale in the public market, could adversely affect market prices prevailing from time to time. As described below, only a limited number of shares will be available for sale shortly after this offering due to contractual and legal restrictions on resale. Nevertheless, sales of our common stock in the public market after such restrictions lapse, or the perception that such sales may occur, could adversely affect the prevailing market price at such time and our ability to raise equity capital in the future.

Based on the number of shares of our common stock outstanding as of , 2019, upon the closing of this offering, shares of our common stock will be outstanding assuming no exercise of the underwriters' option to purchase additional shares of common stock and no exercise of outstanding options or warrants. Of the outstanding shares of our common stock, all of the shares sold in this offering will be freely tradable, except that any such shares of our common stock acquired by our affiliates, as that term is defined in Rule 144 under the Securities Act, may only be sold by them in compliance with the limitations described below. All remaining shares of our common stock held by existing shareholders immediately prior to the closing of this offering will be "restricted securities" as that term is defined in Rule 144. These restricted securities may be offered and sold to the public only if registered under the Securities Act or if an exemption from registration is available, including the exemptions provided by Rule 144 or Rule 701, summarized below.

Subject to the provisions of Rule 144 or Rule 701, shares will be available for sale in the public market as follows:

- beginning on the date of this prospectus, all of the shares sold in this offering will be immediately available for sale in the public market; and
- beginning 181 days after the date of this prospectus, additional shares will become eligible for sale in the public market, of which shares will be held by affiliates and subject to the volume and other restrictions of Rule 144, as described below.

Rule 144

In general, a person who has beneficially owned restricted securities for at least six months may be entitled to sell the person's securities, subject to certain conditions. If the person is not deemed to be one of our affiliates at the time of the sale or at any time during the 90 days preceding it, we have been subject to the Exchange Act periodic reporting requirements for at least 90 days and we have made all filings under the Exchange Act necessary for the current public information requirements of Rule 144, then the non-affiliate may sell its shares. The non-affiliate may sell without regard to the current public information requirements of Rule 144 if it has beneficially owned the shares for 12 months and we have been subject to the Exchange Act periodic reporting requirements for at least 90 days.

If the person is deemed to be one of our affiliates at the time of the sale or at any time during the 90 days preceding it, and the affiliate has beneficially owned the shares to be sold for at least six months, the affiliate may sell up to the following volume limitations in any three-month period:

- 1% of the number of shares of our common stock then outstanding, which will equal approximately shares immediately after this offering, assuming no exercise of the underwriters' option to purchase additional shares, based on the number of shares outstanding as of , 2019; or

- the average weekly trading volume of our common stock on The Nasdaq Global Select Market during the four calendar weeks preceding the filing of a notice on Form 144 with respect to such sale;

provided, in each case, that we have been subject to the Exchange Act periodic reporting requirements for at least 90 days, we have made all filings under the Exchange Act necessary for the current public information requirements of Rule 144, and the affiliate complies with the manner of sale and notice provisions of Rule 144.

Rule 701

Rule 701 under the Securities Act, as in effect on the date of this prospectus, permits resales of stock in reliance upon Rule 144 but without compliance with certain restrictions of Rule 144, including the holding period requirement. Most of our employees, executive officers or directors who purchased shares under a written compensatory plan or contract may be entitled to rely on the resale provisions of Rule 701, but all holders of Rule 701 shares are required to wait until 90 days after the date of this prospectus before selling their shares.

Lock-Up Agreements

We, our directors and executive officers and holders of substantially all of our common stock have signed lock-up agreements that prevent us and them from selling any of our common stock or any securities convertible into or exercisable or exchangeable for common stock for a period of not less than 180 days from the date of this prospectus without the prior written consent of the underwriters, subject to certain exceptions. See the "*Underwriting*" section of this prospectus for more information.

Registration Rights

Upon the closing of this offering, holders of shares of our common stock will be entitled to various rights with respect to registration of their shares of our common stock under the Securities Act. Registration of these shares under the Securities Act would result in these shares becoming fully tradable without restriction under the Securities Act immediately upon the effectiveness of the registration statement. See the "*Description of Capital Stock—Registration Rights*" section of this prospectus for more information.

Equity Incentive Plans

We intend to file one or more registration statements on Form S-8 under the Securities Act to register shares of our common stock issued or reserved for issuance under our equity incentive plans. The first such registration statement is expected to be filed soon after the date of this prospectus and will automatically become effective upon filing with the SEC. Accordingly, shares registered under such registration statement will be available for sale in the open market, unless such shares are subject to vesting restrictions with us or the lock-up restrictions described above. As of , 2019, we estimate that such registration statement on Form S-8 will cover approximately of shares of our common stock.

MATERIAL U.S. FEDERAL INCOME TAX CONSEQUENCES TO NON-U.S. HOLDERS

The following is a summary of the material U.S. federal income tax consequences to non-U.S. holders (as defined below) of the ownership and disposition of our common stock issued pursuant to this offering. This discussion is not a complete analysis of all potential U.S. federal income tax consequences relating thereto, does not address the potential application of the Medicare contribution tax on net investment income, and does not address any estate or gift tax consequences (other than those specifically set forth below) or any tax consequences arising under any state, local or foreign tax laws, or any other U.S. federal tax laws. This discussion is based on the Code, Treasury Regulations promulgated thereunder, judicial decisions and published rulings and administrative pronouncements of the IRS, all as in effect on the date of this prospectus. These authorities are subject to differing interpretations and may change, possibly retroactively, resulting in U.S. federal income tax consequences different from those discussed below. We have not requested a ruling from the IRS with respect to the statements made and the conclusions reached in the following summary, and there can be no assurance that the IRS or a court will agree with such statements and conclusions.

This discussion is limited to non-U.S. holders who purchase our common stock pursuant to this offering and who hold our common stock as a "capital asset" within the meaning of Section 1221 of the Code (generally, property held for investment). This discussion does not address all of the U.S. federal income tax consequences that may be relevant to an individual holder in light of such holder's particular circumstances. This discussion also does not consider any specific facts or circumstances that may be relevant to holders subject to special rules under the U.S. federal income tax laws, including:

- certain former citizens or long-term residents of the United States;
- partnerships or other pass-through entities (and investors therein);
- "controlled foreign corporations";
- "passive foreign investment companies";
- corporations that accumulate earnings to avoid U.S. federal income tax;
- banks, financial institutions, investment funds, insurance companies, brokers, dealers or traders in securities;
- tax-exempt organizations and governmental organizations;
- tax-qualified retirement plans;
- persons subject to the alternative minimum tax;
- persons subject to special tax accounting rules under Section 451(b) of the Code;
- persons that own or have owned, actually or constructively, more than 5% of our common stock;
- persons who have elected to mark securities to market; and
- persons holding our common stock as part of a hedging or conversion transaction or straddle, or a constructive sale, or other risk reduction strategy or integrated investment.

If an entity or arrangement that is classified as a partnership for U.S. federal income tax purposes holds our common stock, the U.S. federal income tax treatment of a partner in the partnership will generally depend on the status of the partner and the activities of the partnership. Partnerships holding our common stock and the partners in such partnerships are urged to consult their tax advisors about the particular U.S. federal income tax consequences to them of holding and disposing of our common stock.

PROSPECTIVE INVESTORS SHOULD CONSULT THEIR TAX ADVISORS REGARDING THE PARTICULAR U.S. FEDERAL INCOME TAX CONSEQUENCES TO THEM OF ACQUIRING, OWNING AND DISPOSING OF OUR COMMON STOCK, AS WELL AS ANY TAX CONSEQUENCES ARISING UNDER ANY STATE, LOCAL OR FOREIGN TAX LAWS AND ANY OTHER U.S. FEDERAL TAX LAWS. IN ADDITION, SIGNIFICANT CHANGES IN U.S. FEDERAL TAX LAWS WERE RECENTLY ENACTED. PROSPECTIVE INVESTORS SHOULD ALSO CONSULT WITH THEIR TAX ADVISORS WITH RESPECT TO SUCH CHANGES IN U.S. TAX LAW AS WELL AS POTENTIAL CONFORMING CHANGES IN STATE TAX LAWS.

Definition of Non-U.S. Holder

For purposes of this discussion, a non-U.S. holder is any beneficial owner of our common stock that is not a "U.S. person" or a partnership (including any entity or arrangement treated as a partnership) for U.S. federal income tax purposes. A U.S. person is any person that, for U.S. federal income tax purposes, is or is treated as any of the following:

- an individual who is a citizen or resident of the United States;
- a corporation (including any entity treated as a corporation for U.S. federal income tax purposes) created or organized under the laws of the United States, any state thereof or the District of Columbia;
- an estate, the income of which is subject to U.S. federal income tax regardless of its source; or
- a trust (1) whose administration is subject to the primary supervision of a U.S. court and which has one or more U.S. persons who have the authority to control all substantial decisions of the trust or (2) that has a valid election in effect under applicable Treasury Regulations to be treated as a U.S. person.

Distributions on Our Common Stock

If we distribute cash or other property on our common stock, such distributions will constitute dividends for U.S. federal income tax purposes to the extent paid from our current or accumulated earnings and profits, as determined under U.S. federal income tax principles. Amounts distributed in excess of our current and accumulated earnings and profits will constitute a return of capital and will first be applied against and reduce a holder's tax basis in our common stock, but not below zero. Any distribution in excess of basis will be treated as gain realized on the sale or other disposition of our common stock and will be treated as described in the "*Distributions on Our Common Stock—Gain On Disposition of Our Common Stock*" section below.

Subject to the discussion below regarding effectively connected income, backup withholding and FATCA (as defined below), dividends paid to a non-U.S. holder of our common stock generally will be subject to U.S. federal withholding tax at a rate of 30% of the gross amount of the dividends or such lower rate specified by an applicable income tax treaty. To receive the benefit of a reduced treaty rate, a non-U.S. holder must furnish us or our withholding agent with a valid IRS Form W-8BEN or IRS Form W-8BEN-E (or applicable form) certifying such non-U.S. holder's qualification for the reduced rate. This certification must be provided to us or our withholding agent before the payment of dividends and must be updated periodically. If the non-U.S. holder holds our common stock through a financial institution or other agent acting on the non-U.S. holder's behalf, the non-U.S. holder will be required to provide appropriate documentation to the agent, which then will be required to provide certification to us or our withholding agent, either directly or through other intermediaries.

If a non-U.S. holder holds our common stock in connection with the conduct of a trade or business in the United States, and dividends paid on our common stock are effectively connected with

such holder's U.S. trade or business (and are attributable to such holder's permanent establishment or fixed base in the United States if required by an applicable tax treaty), the non-U.S. holder will generally be exempt from U.S. federal withholding tax, provided that the non-U.S. holder furnishes a valid IRS Form W-8ECI (or applicable successor form) to the applicable withholding agent.

However, any such effectively connected dividends paid on our common stock generally will be subject to U.S. federal income tax on a net income basis at the regular U.S. federal income tax rates in the same manner as if such holder were a resident of the United States. A non-U.S. holder that is a foreign corporation also may be subject to an additional branch profits tax equal to 30% (or such lower rate specified by an applicable income tax treaty) of its effectively connected earnings and profits for the taxable year, as adjusted for certain items.

Non-U.S. holders that do not provide the required certification on a timely basis, but that qualify for a reduced treaty rate, may obtain a refund of any excess amounts withheld by timely filing an appropriate claim for refund with the IRS. Non-U.S. holders should consult their tax advisors regarding any applicable income tax treaties that may provide for different rules.

Gain on Disposition of Our Common Stock

Subject to the discussion below regarding backup withholding and FATCA, a non-U.S. holder generally will not be subject to U.S. federal income tax on any gain realized on the sale or other disposition of our common stock, unless:

- the gain is effectively connected with the non-U.S. holder's conduct of a trade or business in the United States and, if required by an applicable income tax treaty, is attributable to a permanent establishment or fixed base maintained by the non-U.S. holder in the United States;
- the non-U.S. holder is a nonresident alien individual present in the United States for 183 days or more during the taxable year of the disposition, and certain other requirements are met; or
- our common stock constitutes a "U.S. real property interest" by reason of our status as a U.S. real property holding corporation ("USRPHC"), for U.S. federal income tax purposes at any time within the shorter of the five-year period preceding the disposition or the non-U.S. holder's holding period for our common stock, and our common stock is not regularly traded on an established securities market during the calendar year in which the sale or other disposition occurs.

Determining whether we are a USRPHC depends on the fair market value of our U.S. real property interests relative to the fair market value of our other trade or business assets and our foreign real property interests. We believe we are not currently and we do not anticipate becoming a USRPHC for U.S. federal income tax purposes, although there can be no assurance we will not in the future become a USRPHC.

Gain described in the first bullet point above generally will be subject to U.S. federal income tax on a net income basis at the regular U.S. federal income tax rates in the same manner as if such holder were a resident of the United States. A non-U.S. holder that is a foreign corporation also may be subject to an additional branch profits tax equal to 30% (or such lower rate specified by an applicable income tax treaty) of its effectively connected earnings and profits for the taxable year, as adjusted for certain items. Gain described in the second bullet point above will be subject to U.S. federal income tax at a flat 30% rate (or such lower rate specified by an applicable income tax treaty), but may be offset by certain U.S.-source capital losses (even though the individual is not considered a resident of the United States), provided that the non-U.S. holder has timely filed U.S. federal income tax returns with respect to such losses. Gain described in the third bullet point above will generally be subject to U.S.

federal income tax in the same manner as gain that is effectively connected with the conduct of a U.S. trade or business (subject to any provisions under an applicable income tax treaty), except that the branch profits tax generally will not apply.

Non-U.S. holders should consult their tax advisors regarding any applicable income tax treaties that may provide for different rules.

U.S. Federal Estate Tax

The estates of nonresident alien individuals generally are subject to U.S. federal estate tax on property with a U.S. situs. Because we are a U.S. corporation, our common stock will be U.S. situs property and, therefore, will be included in the taxable estate of a nonresident alien decedent, unless an applicable estate tax treaty between the United States and the decedent's country of residence provides otherwise. The terms "resident" and "nonresident" are defined differently for U.S. federal estate tax purposes than for U.S. federal income tax purposes. Investors are urged to consult their own tax advisors regarding the U.S. federal estate tax consequences of the ownership or disposition of our common stock.

Information Reporting and Backup Withholding

Annual reports are required to be filed with the IRS and provided to each non-U.S. holder indicating the amount of dividends on our common stock paid to such holder and the amount of any tax withheld with respect to those dividends. These information reporting requirements apply even if no withholding was required because the dividends were effectively connected with the holder's conduct of a U.S. trade or business, or withholding was reduced or eliminated by an applicable income tax treaty. This information also may be made available under a specific treaty or agreement with the tax authorities in the country in which the non-U.S. holder resides or is established.

Backup withholding, currently at a 24% rate, generally will not apply to payments to a non-U.S. holder of dividends on or the gross proceeds of a disposition of, our common stock provided the non-U.S. holder furnishes the required certification for its non-U.S. status, such as by providing a valid IRS Form W-8BEN, IRS Form W-8BEN-E or IRS Form W-8ECI, or certain other requirements are met. Backup withholding may apply if the payor has actual knowledge, or reason to know, that the holder is a U.S. person who is not an exempt recipient.

Backup withholding is not an additional tax. If any amount is withheld under the backup withholding rules, the non-U.S. holder should consult with a U.S. tax advisor regarding the possibility of and procedure for obtaining a refund or a credit against the non-U.S. holder's U.S. federal income tax liability, if any.

Withholding on Foreign Entities

The Foreign Account Tax Compliance Act ("FATCA"), as reflected in Sections 1471 through 1474 of the Code), imposes a U.S. federal withholding tax of 30% on certain payments made to a "foreign financial institution" (as specially defined under these rules) unless such institution enters into an agreement with the U.S. government to withhold on certain payments and to collect and provide to the U.S. tax authorities substantial information regarding certain U.S. account holders of such institution (which includes certain equity and debt holders of such institution, as well as certain account holders that are foreign entities with U.S. owners) or an exemption applies. FATCA also generally will impose a U.S. federal withholding tax of 30% on certain payments made to a non-financial foreign entity

unless such entity provides the withholding agent a certification identifying certain direct and indirect U.S. owners of the entity or an exemption applies. An intergovernmental agreement between the United States and an applicable foreign country may modify these requirements. Under certain circumstances, a non-U.S. holder might be eligible for refunds or credits of such taxes. FATCA currently applies to dividends paid on our common stock. Subject to the recently released proposed Treasury Regulations described below, withholding under FATCA will also generally apply to gross proceeds from sales or other dispositions of our common stock after December 31, 2018. The U.S. Department of the Treasury recently released proposed regulations that, if finalized in their present form, would eliminate the federal withholding tax of 30% applicable to gross proceeds from sales or other dispositions of our common stock. In its preamble to such proposed regulations, the U.S. Treasury Department stated that taxpayers may generally rely on the proposed regulations until final regulations are issued.

Prospective investors are encouraged to consult with their own tax advisors regarding the possible implications of FATCA on their investment in our common stock.

UNDERWRITING

We and the underwriters named below intend to enter into an underwriting agreement with respect to the shares being offered. Subject to certain conditions, each underwriter has severally agreed to purchase the number of shares indicated in the following table. Goldman Sachs & Co. LLC, J.P. Morgan Securities LLC and Merrill, Lynch, Pierce, Fenner & Smith Incorporated are the representatives of the underwriters:

Name	Number of Shares
Goldman Sachs & Co. LLC	
J.P. Morgan Securities LLC	
Merrill Lynch, Pierce, Fenner & Smith Incorporated	
Cowen and Company, LLC	
Guggenheim Securities, LLC	
William Blair & Company, L.L.C.	
BTIG, LLC	
Total	

The underwriters are committed to take and pay for all of the shares being offered, if any are taken, other than the shares covered by the option described below unless and until this option is exercised.

The underwriters have an option to buy up to an additional shares from us to cover sales by the underwriters of a greater number of shares than the total number set forth in the table above. They may exercise that option for 30 days. If any shares are purchased pursuant to this option, the underwriters will severally purchase shares in approximately the same proportion as set forth in the table above.

The following table shows the per share and total underwriting discounts and commissions to be paid to the underwriters by us. Such amounts are shown assuming both no exercise and full exercise of the underwriters' option to purchase additional shares.

	No Exercise	Full Exercise
Per Share	$	$
Total		

Shares sold by the underwriters to the public will initially be offered at the initial public offering price set forth on the cover of this prospectus. Any shares sold by the underwriters to securities dealers may be sold at a discount of up to $ per share from the initial public offering price. After the initial offering of the shares of our common stock, the representatives may change the offering price and the other selling terms. The offering of the shares by the underwriters is subject to receipt and acceptance and subject to the underwriters' right to reject any order in whole or in part.

We and our officers, directors and holders of substantially all of our common stock and securities convertible into or exchangeable for our common stock have agreed with the underwriters, subject to certain exceptions, not to dispose of or hedge any of their common stock or securities convertible into or exchangeable for shares of our common stock during the period from the date of this prospectus continuing through the date 180 days after the date of this prospectus, except with the prior written consent of the representatives. This agreement does not apply to any existing employee benefit plans. See the "*Shares Eligible for Future Sale*" section of this prospectus for a discussion of certain transfer restrictions.

Prior to this offering, there has been no public market for shares of our common stock. The initial public offering price will be negotiated among us and the representatives. Among the factors we expect to consider in determining the initial public offering price of shares of our common stock, in addition to prevailing market conditions, will be our historical performance, estimates of the business potential and our earnings prospects, an assessment of our management and the consideration of the above factors in relation to market valuation of companies in related businesses.

We have applied to list our common stock on The Nasdaq Global Select Market under the symbol “ADPT.”

In connection with this offering, the underwriters may purchase and sell shares of our common stock in the open market. These transactions may include short sales, stabilizing transactions and purchases to cover positions created by short sales. Short sales involve the sale by the underwriters of a greater number of shares than they are required to purchase in the offering, and a short position represents the amount of such sales that have not been covered by subsequent purchases. A “covered short position” is a short position that is not greater than the amount of additional shares for which the underwriters’ option described above may be exercised. The underwriters may cover any covered short position by either exercising their option to purchase additional shares or purchasing shares in the open market. In determining the source of shares to cover the covered short position, the underwriters will consider, among other things, the price of shares available for purchase in the open market as compared to the price at which they may purchase additional shares pursuant to the option described above. “Naked” short sales are any short sales that create a short position greater than the amount of additional shares for which the option described above may be exercised. The underwriters must cover any such naked short position by purchasing shares in the open market. A naked short position is more likely to be created if the underwriters are concerned that there may be downward pressure on the price of the common stock in the open market after pricing that could adversely affect investors who purchase in the offering. Stabilizing transactions consist of various bids for or purchases of common stock made by the underwriters in the open market prior to the completion of the offering.

The underwriters may also impose a penalty bid. This occurs when a particular underwriter repays to the underwriters a portion of the underwriting discount received by it because the representatives have repurchased shares sold by or for the account of such underwriter in stabilizing or short covering transactions.

Purchases to cover a short position and stabilizing transactions, as well as other purchases by the underwriters for their own accounts, may have the effect of preventing or retarding a decline in the market price of our common stock, and together with the imposition of the penalty bid, may stabilize, maintain or otherwise affect the market price of our common stock. As a result, the price of our common stock may be higher than the price that otherwise might exist in the open market. The underwriters are not required to engage in these activities and may end any of these activities at any time. These transactions may be effected on The Nasdaq Global Select Market, in the over-the-counter market or otherwise.

We estimate that our share of the total expenses of this offering, excluding underwriting discounts and commissions, will be approximately $ million. We have agreed to reimburse the underwriters for certain of their expenses in an amount up to $.

We have agreed to indemnify the several underwriters against certain liabilities, including liabilities under the Securities Act.

The underwriters and their respective affiliates are full service financial institutions engaged in various activities, which may include sales and trading, commercial and investment banking, advisory,

investment management, investment research, principal investment, hedging, market making, brokerage and other financial and non-financial activities and services. Certain of the underwriters and their respective affiliates have provided, and may in the future provide, a variety of these services to the issuer and to persons and entities with relationships with the issuer, for which they received or will receive customary fees and expenses.

In the ordinary course of their various business activities, the underwriters and their respective affiliates, officers, directors and employees may purchase, sell or hold a broad array of investments and actively trade securities, derivatives, loans, commodities, currencies, credit default swaps and other financial instruments for their own account and for the accounts of their customers, and such investment and trading activities may involve or relate to assets, securities and instruments of the issuer (directly, as collateral securing other obligations or otherwise) and persons and entities with relationships with the issuer. The underwriters and their respective affiliates may also communicate independent investment recommendations, market color or trading ideas and publish or express independent research views in respect of such assets, securities or instruments and may at any time hold, or recommend to clients that they should acquire, long and short positions in such assets, securities and instruments.

European Economic Area

In relation to each Member State of the EEA which has implemented the Prospectus Directive (each, a "Relevant Member State") an offer to the public of our common stock may not be made in that Relevant Member State, except that an offer to the public in that Relevant Member State of our common stock may be made at any time under the following exemptions under the Prospectus Directive:

- To any legal entity which is a qualified investor as defined in the Prospectus Directive;
- To fewer than 150 natural or legal persons (other than qualified investors as defined in the Prospectus Directive), subject to obtaining the prior consent of the representatives for any such offer; or
- In any other circumstances falling within Article 3(2) of the Prospectus Directive;

provided that no such offer or shares of our common stock shall result in a requirement for the publication by us or any underwriter to publish a prospectus pursuant to Article 3 of the Prospectus Directive.

For the purposes of this provision, the expression an "offer to public" in relation to our common stock in any Relevant Member State means the communication in any form and by any means of sufficient information on the terms of the offer and our common stock to be offered so as to enable an investor to decide to purchase our common stock, as the same may be varied in that Relevant Member State by any measure implementing the Prospectus Directive in that Relevant Member State, and the expression "Prospectus Directive" means Directive 2003/71/EC (as amended), including by Directive 2010/73/EU and includes any relevant implementing measure in the Relevant Member State.

This EEA selling restriction is in addition to any other selling restrictions set out below.

United Kingdom

In the United Kingdom, this prospectus is only addressed to and directed at qualified investors who are (i) investment professionals falling within Article 19(5) of the Financial Services and Markets

Act 2000 (Financial Promotion) Order 2005 ("Order"); or (ii) high net worth entities and other persons to whom it may otherwise lawfully be communicated, falling within Article 49(2)(a) to (d) of the Order (all such persons together being referred to as "relevant persons"). Any investment or investment activity to which this prospectus relates is available only to relevant persons and will only be engaged in with relevant persons. Any person who is not a relevant person should not act or rely on this prospectus or any of its contents.

Canada

Shares of our common stock may be sold in Canada only to purchasers purchasing, or deemed to be purchasing, as principal that are accredited investors, as defined in National Instrument 45-106 Prospectus Exemptions or subsection 73.3(1) of the Securities Act (Ontario), and are permitted clients, as defined in National Instrument 31-103 Registration Requirements, Exemptions and Ongoing Registrant Obligations. Any resale of the shares must be made in accordance with an exemption form, or in a transaction not subject to, the prospectus requirements of applicable securities laws.

Securities legislation in certain provinces or territories of Canada may provide a purchaser with remedies for rescission or damages if this prospectus (including any amendment thereto) contains a misrepresentation, provided that the remedies for rescission or damages are exercised by the purchaser within the time limit prescribed by the securities legislation of the purchaser's province or territory. The purchaser should refer to any applicable provisions of the securities legislation of the purchaser's province or territory for particulars of these rights or consult with a legal advisor.

Pursuant to Section 3A.3 of National Instrument 33-105 Underwriting Conflicts (NI 33-105), the underwriters are not required to comply with the disclosure requirements of NI 33-105 regarding underwriter conflicts of interest in connection with this offering.

Hong Kong

Shares of our common stock may not be offered or sold in Hong Kong by means of any document other than (i) in circumstances which do not constitute an offer to the public within the meaning of the Companies (Winding Up and Miscellaneous Provisions) Ordinance (Cap. 32 of the Laws of Hong Kong) ("Companies (Winding Up and Miscellaneous Provisions) Ordinance"), or which do not constitute an invitation to the public within the meaning of the Securities and Futures Ordinance (Cap. 571 of the Laws of Hong Kong) ("Securities and Futures Ordinance"), or (ii) to "professional investors" as defined in the Securities and Futures Ordinance and any rules made thereunder, or (iii) in other circumstances which do not result in the document being a "prospectus" as defined in the Companies (Winding Up and Miscellaneous Provisions) Ordinance, and no advertisement, invitation or document relating to the shares may be issued or may be in the possession of any person for the purpose of issue (in each case whether in Hong Kong or elsewhere), which is directed at, or the contents of which are likely to be accessed or read by, the public in Hong Kong (except if permitted to do so under the securities laws of Hong Kong) other than with respect to shares which are or are intended to be disposed of only to persons outside Hong Kong or only to "professional investors" in Hong Kong as defined in the Securities and Futures Ordinance and any rules made thereunder.

Singapore

This prospectus has not been registered as a prospectus with the Monetary Authority of Singapore. Accordingly, this prospectus and any other document or material in connection with the offer or sale, or invitation for subscription or purchase, of shares of our common stock may not be

circulated or distributed, nor may the shares be offered or sold, or be made the subject of an invitation for subscription or purchase, whether directly or indirectly, to persons in Singapore other than (i) to an institutional investor (as defined under Section 4A of the Securities and Futures Act, Chapter 289 of Singapore ("SFA")) under Section 274 of the SFA, (ii) to a relevant person (as defined in Section 275(2) of the SFA) pursuant to Section 275(1) of the SFA, or any person pursuant to Section 275(1A) of the SFA, and in accordance with the conditions specified in Section 275 of the SFA or (iii) otherwise pursuant to, and in accordance with the conditions of, any other applicable provision of the SFA, in each case subject to conditions set forth in the SFA.

Where shares of our common stock are subscribed or purchased under Section 275 of the SFA by a relevant person which is a corporation (which is not an accredited investor (as defined in Section 4A of the SFA)) the sole business of which is to hold investments and the entire share capital of which is owned by one or more individuals, each of whom is an accredited investor, the securities (as defined in Section 239(1) of the SFA) of that corporation shall not be transferable for six months after that corporation has acquired the shares under Section 275 of the SFA except: (1) to an institutional investor under Section 274 of the SFA or to a relevant person (as defined in Section 275(2) of the SFA), (2) where such transfer arises from an offer in that corporation's securities pursuant to Section 275(1A) of the SFA, (3) where no consideration is or will be given for the transfer, (4) where the transfer is by operation of law, (5) as specified in Section 276(7) of the SFA or (6) as specified in Regulation 32 of the Securities and Futures (Offers of Investments) (Shares and Debentures) Regulations 2005 of Singapore, ("Regulation 32").

Where shares of our common stock are subscribed or purchased under Section 275 of the SFA by a relevant person which is a trust (where the trustee is not an accredited investor (as defined in Section 4A of the SFA)) whose sole purpose is to hold investments and each beneficiary of the trust is an accredited investor, the beneficiaries' rights and interest (howsoever described) in that trust shall not be transferable for six months after that trust has acquired the shares under Section 275 of the SFA except: (1) to an institutional investor under Section 274 of the SFA or to a relevant person (as defined in Section 275(2) of the SFA), (2) where such transfer arises from an offer that is made on terms that such rights or interest are acquired at a consideration of not less than S$200,000 (or its equivalent in a foreign currency) for each transaction (whether such amount is to be paid for in cash or by exchange of securities or other assets), (3) where no consideration is or will be given for the transfer, (4) where the transfer is by operation of law, (5) as specified in Section 276(7) of the SFA or (6) as specified in Regulation 32.

Japan

Shares of our common stock have not been and will not be registered under the Financial Instruments and Exchange Act of Japan (Act No. 25 of 1948, as amended) ("FIEA"). The shares may not be offered or sold, directly or indirectly, in Japan or to or for the benefit of any resident of Japan (including any person resident in Japan or any corporation or other entity organized under the laws of Japan) or to others for reoffering or resale, directly or indirectly, in Japan or to or for the benefit of any resident of Japan, except pursuant to an exemption from the registration requirements of the FIEA and otherwise in compliance with any relevant laws and regulations of Japan.

LEGAL MATTERS

The validity of the shares of common stock offered by this prospectus will be passed upon for us by DLA Piper LLP (US), Seattle, Washington. As of the date of this prospectus, partners of DLA Piper LLP (US) beneficially own an aggregate of less than 0.5% of our common stock. Fenwick & West LLP, Seattle, Washington is acting as counsel for the underwriters in connection with this offering.

EXPERTS

Ernst & Young LLP, independent registered public accounting firm, has audited our financial statements at December 31, 2017 and 2018, and for each of the two years in the period ended December 31, 2018, as set forth in their report. We've included our financial statements in the prospectus and elsewhere in the registration statement in reliance of Ernst & Young LLP's report, given on their authority as experts in accounting and auditing.

ADDITIONAL INFORMATION

We have filed with the SEC this registration statement on Form S-1 under the Securities Act with respect to the securities offered by this prospectus. This prospectus, which is a part of the registration statement, does not contain all of the information in the registration statement and the exhibits filed with the registration statement. For further information concerning us and the securities offered by this prospectus, please refer to the registration statement and to the exhibits filed therewith. Statements contained in this prospectus regarding the contents of any contract or other document that is filed as an exhibit to the registration statement are not necessarily complete, and each such statement is qualified in all respects by reference to the full text of such contract or other document filed as an exhibit to the registration statement.

Upon the closing of this offering, we will be subject to the informational requirements of the Exchange Act and will file annual, quarterly and current reports, proxy statements and other information with the SEC. You can read our SEC filings, including the registration statement, at the SEC's website at www.sec.gov. We also maintain a website at www.adaptivebiotech.com. Upon the closing of this offering, you may access, free of charge, our annual reports on Form 10-K, quarterly reports on Form 10-Q, current reports on Form 8-K and amendments to those reports filed or furnished pursuant to Section 13(a) or 15(d) of the Exchange Act as soon as reasonably practicable after such material is electronically filed with, or furnished to, the SEC.

ADAPTIVE BIOTECHNOLOGIES CORPORATION

INDEX TO FINANCIAL STATEMENTS

For the Years Ended December 31, 2017 and 2018

Report of Independent Registered Public Accounting Firm	F-2
Balance Sheets	F-3
Statements of Operations	F-4
Statements of Comprehensive Loss	F-5
Statements of Convertible Preferred Stock and Shareholders' (Deficit) Equity	F-6
Statements of Cash Flows	F-7
Notes to Financial Statements	F-8

Report of Independent Registered Public Accounting Firm

To the Shareholders and the Board of Directors of
Adaptive Biotechnologies Corporation

Opinion on the Financial Statements

We have audited the accompanying balance sheets of Adaptive Biotechnologies Corporation (the Company) as of December 31, 2017 and 2018, the related statements of operations, comprehensive loss, convertible preferred stock and shareholders' (deficit) equity, and cash flows, for the years then ended, and the related notes (collectively referred to as the "financial statements"). In our opinion, the financial statements present fairly, in all material respects, the financial position of the Company as of December 31, 2017 and 2018, and the results of its operations and its cash flows for the years then ended in conformity with U.S. generally accepted accounting principles.

Basis for Opinion

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

We conducted our audits in accordance with the standards of the PCAOB and in accordance with auditing standards generally accepted in the United States of America. Those standards require that we plan and perform the audit to obtain reasonable assurance about whether the financial statements are free of material misstatement, whether due to error or fraud.

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

/s/ Ernst & Young LLP

We have served as the Company's auditor since 2015.

Seattle, Washington
March 29, 2019

Adaptive Biotechnologies Corporation
Balance Sheets

(In thousands, except share and per share amounts)

	December 31,		Unaudited pro forma
	2017	2018	2018
Assets			
Current assets:			
Cash and cash equivalents	$ 85,305	$ 55,030	
Short-term marketable securities	106,845	109,988	
Accounts receivable, net	5,582	4,807	
Inventory	4,792	7,838	
Prepaid expenses and other current assets	2,723	3,055	
Total current assets	205,247	180,718	
Property and equipment, net	13,954	19,125	
Long-term marketable securities	8,905	—	
Restricted cash and other assets	86	247	
Intangible assets, net	15,325	13,626	
Goodwill	118,972	118,972	
Total assets	$ 362,489	$ 332,688	
Liabilities, convertible preferred stock and shareholders' (deficit) equity			
Current liabilities:			
Accounts payable	$ 1,964	$ 1,793	
Accrued liabilities	1,043	2,562	
Accrued compensation and benefits	3,062	4,641	
Current portion of deferred rent	886	1,109	
Current deferred revenue	14,048	12,695	
Total current liabilities	21,003	22,800	
Convertible preferred stock warrant liability	342	336	
Deferred rent liability, less current portion	4,394	6,102	
Deferred revenue, less current portion	—	704	
Other long-term liabilities	33	—	
Total liabilities	25,772	29,942	
Commitments and contingencies (Note 10)			
Convertible preferred stock: $0.0001 par value, 93,762,517 shares authorized at December 31, 2017 and December 31, 2018, respectively; 92,656,029 and 92,790,094 shares issued and outstanding at December 31, 2017 and 2018, respectively; aggregate liquidation preference of $572,057 and $572,866 at December 31, 2017 and December 31, 2018, respectively, no aggregate liquidation preference, no shares issued and outstanding at December 31, 2018 unaudited pro forma	561,333	560,858	—
Shareholders' (deficit) equity:			
Common stock: $0.0001 par value, 131,000,000 shares authorized at December 31, 2017 and 2018, respectively; 12,208,731 and 12,841,536 shares issued and outstanding at December 31, 2017 and 2018, respectively, 105,651,630 shares issued and outstanding at December 31, 2018 unaudited pro forma	1	1	10
Additional paid-in capital	24,972	37,902	599,096
Accumulated other comprehensive loss	(166)	(107)	(107)
Accumulated deficit	(249,423)	(295,908)	(295,908)
Total shareholders' (deficit) equity	(224,616)	(258,112)	303,091
Total liabilities, convertible preferred stock and shareholders' (deficit) equity	$ 362,489	$ 332,688	$

The accompanying notes are an integral part of these financial statements.

Adaptive Biotechnologies Corporation
Statements of Operations

(in thousands, except share and per share amounts)

	Year Ended December 31,	
	2017	2018
Revenue:		
Sequencing revenue	$ 22,759	$ 32,978
Development revenue	15,689	22,685
Total revenue	38,448	55,663
Operating expenses:		
Cost of revenue	15,680	19,668
Research and development	31,995	39,157
Sales and marketing	16,765	24,486
General and administrative	15,949	20,409
Amortization of intangible assets	1,694	1,699
Restructuring	840	—
Total operating expenses	82,923	105,419
Loss from operations	(44,475)	(49,756)
Interest and other income, net	1,644	3,309
Net loss	(42,831)	(46,447)
Fair value adjustment to Series E-1 convertible preferred stock options	135	102
Net loss attributable to common shareholders	$ (42,696)	$ (46,345)
Net loss per share attributable to common shareholders, basic and diluted	$ (3.50)	$ (3.67)
Weighted-average shares used in computing net loss per share attributable to common shareholders, basic and diluted	12,196,998	12,629,778
Unaudited pro forma net loss per share attributable to common shareholders, basic and diluted		$ (0.44)
Unaudited weighted-average shares used in computing pro forma net loss per share attributable to common shareholders, basic and diluted		105,470,520

The accompanying notes are an integral part of these financial statements.

Adaptive Biotechnologies Corporation
Statements of Comprehensive Loss

(in thousands)

	Year Ended December 31,	
	2017	2018
Net loss	$ (42,831)	$ (46,447)
Change in unrealized (loss) gain on investments	(84)	59
Comprehensive loss	$ (42,915)	$ (46,388)

The accompanying notes are an integral part of these financial statements.

Adaptive Biotechnologies Corporation
Statements of Convertible Preferred Stock and Shareholders' (Deficit) Equity

(in thousands, except share amounts)

	Convertible preferred stock		Common stock		Additional paid-In capital	Accumulated other comprehensive (loss) income	Accumulated deficit	Total shareholders' (deficit) equity
	Shares	Amount	Shares	Amount				
Balance as of December 31, 2016	87,797,854	$511,823	12,154,046	$ 1	$ 17,559	$ (82)	$ (207,212)	$ (189,734)
Adjustments to accumulated deficit for adoption of guidance on accounting for revenue recognition	—	—	—	—	—	—	485	485
Issuance of common stock for cash upon exercise of stock options	—	—	54,685	—	95	—	—	95
Issuance of Series F-1 convertible preferred stock for cash, net of issuance costs	4,686,649	49,827	—	—	—	—	—	—
Issuance of Series E-1 convertible preferred stock for cash upon exercise of Series E-1 convertible preferred stock options at fair value	171,526	127	—	—	—	—	—	—
Vested Series E-1 convertible preferred stock option forfeitures	—	(644)	—	—	398	—	246	644
Series E-1 convertible preferred stock option share-based compensation	—	—	—	—	89	—	—	89
Adjustment to redemption value for vested Series E-1 convertible preferred stock options	—	89	—	—	(89)	—	—	(89)
Change in redemption value for vested Series E-1 convertible preferred stock options	—	111	—	—	—	—	(111)	(111)
Common stock option share-based compensation	—	—	—	—	6,920	—	—	6,920
Other comprehensive loss	—	—	—	—	—	(84)	—	(84)
Net loss	—	—	—	—	—	—	(42,831)	(42,831)
Balance as of December 31, 2017	92,656,029	$561,333	12,208,731	$ 1	$ 24,972	$ (166)	$ (249,423)	$ (224,616)
Adjustments to accumulated deficit for adoption of guidance on accounting for share-based payment transactions	—	—	—	—	140	—	(140)	—
Issuance of common stock for cash upon exercise of stock options	—	—	632,805	—	1,168	—	—	1,168
Issuance of Series E-1 convertible preferred stock for cash upon exercise of Series E-1 convertible preferred stock options at fair value	134,065	100	—	—	—	—	—	—
Vested Series E-1 convertible preferred stock option forfeitures	—	(767)	—	—	476	—	291	767
Series E-1 convertible preferred stock option share-based compensation	—	—	—	—	3	—	—	3
Adjustment to redemption value for vested Series E-1 convertible preferred stock options	—	3	—	—	(3)	—	—	(3)
Change in redemption value for vested Series E-1 convertible preferred stock options	—	189	—	—	—	—	(189)	(189)
Common stock option share-based compensation	—	—	—	—	11,146	—	—	11,146
Other comprehensive gain	—	—	—	—	—	59	—	59
Net loss	—	—	—	—	—	—	(46,447)	(46,447)
Balance as of December 31, 2018	92,790,094	$560,858	12,841,536	$ 1	$ 37,902	$ (107)	$ (295,908)	$ (258,112)

The accompanying notes are an integral part of these financial statements.

Adaptive Biotechnologies Corporation
Statements of Cash Flows

(In thousands)

	Year Ended December 31, 2017	2018
Operating activities		
Net loss	$ (42,831)	$ (46,447)
Adjustments to reconcile net loss to net cash (used in) provided by operating activities:		
Depreciation expense	4,102	4,301
Share-based compensation expense	7,009	11,149
Intangible assets amortization	1,694	1,699
Investment amortization	342	(1,214)
Asset impairment	193	17
Loss (gain) on equipment disposals	125	(40)
Fair value adjustment of convertible preferred stock warrant	(23)	(6)
Other	6	5
Changes in operating assets and liabilities:		
Accounts receivable, net	(2,427)	775
Inventory	(2,697)	(3,046)
Prepaid expenses and other current assets	(327)	(318)
Accounts payable and accrued liabilities	(1,517)	2,185
Deferred rent	(1,058)	(488)
Deferred revenue	2,527	(649)
Other	24	(182)
Net cash used in operating activities	$ (34,858)	$ (32,259)
Investing activities		
Purchases of property and equipment	$ (2,421)	$ (6,318)
Proceeds from sales of equipment	207	19
Purchases of intangible assets	(85)	—
Purchases of marketable securities	(125,182)	(146,503)
Proceeds from sales and maturities of marketable securities	163,913	153,538
Net cash provided by investing activities	$ 36,432	$ 736
Financing activities		
Proceeds from issuance of convertible preferred stock, net of issuance costs	$ 49,827	$ —
Proceeds from exercise of stock options	222	1,268
Other	(15)	(20)
Net cash provided by financing activities	50,034	1,248
Net increase (decrease) in cash, cash equivalents and restricted cash	51,608	(30,275)
Cash, cash equivalents and restricted cash at beginning of year	33,758	85,366
Cash, cash equivalents and restricted cash at end of year	$ 85,366	$ 55,091
Noncash investing and financing activities		
Purchases of equipment, included in accounts payable and accrued liabilities	$ 41	$ 832
Landlord-funded leasehold improvements	$ —	$ 2,419

The accompanying notes are an integral part of these financial statements.

Adaptive Biotechnologies Corporation
Notes to Financial Statements

December 31, 2018

1. Organization and Description of Business

Adaptive Biotechnologies Corporation ("we," "us" or "our") is advancing the field of immune-driven medicine by harnessing the inherent biology of the adaptive immune system to transform the diagnosis and treatment of disease. We believe the adaptive immune system is nature's most finely tuned diagnostic and therapeutic for most diseases, but the inability to decode it has prevented the medical community from fully leveraging its capabilities. Our immune medicine platform is the foundation for our expanding suite of products and services. The cornerstone of our immune medicine platform and core immunosequencing product, immunoSEQ, serves as our underlying research and development engine and generates revenue from academic and biopharmaceutical customers. Our first clinical diagnostic product, clonoSEQ, is the first test authorized by the FDA for the detection and monitoring of minimal residual disease ("MRD") in patients with select blood cancers.

We were incorporated in the State of Washington on September 8, 2009 under the name Adaptive TCR Corporation. On December 21, 2011, we changed our name to Adaptive Biotechnologies Corporation. We are headquartered in Seattle, Washington.

2. Significant Accounting Policies

Basis of Presentation and Use of Estimates

The preparation of financial statements in conformity with U.S. generally accepted accounting principles ("U.S. GAAP") requires management to make certain estimates, judgments and assumptions that affect the reported amounts of assets and liabilities and the related disclosures at the date of the financial statements, as well as the reported amounts of revenues and expenses during the periods presented. We base our estimates on historical experience and other relevant assumptions that we believe to be reasonable under the circumstances. Estimates are used in several areas including, but not limited to, estimates of progress to date for certain performance obligations and transaction price for certain contracts with customers, share-based compensation including the fair value of stock, the provision for income taxes including related reserves, and goodwill among others. These estimates generally involve complex issues and require judgments, involve the analysis of historical results and prediction of future trends, can require extended periods of time to resolve and are subject to change from period to period. Actual results may differ materially from management's estimates.

Cash and Cash Equivalents

Cash and cash equivalents are stated at fair value. Cash equivalents include only securities having an original maturity of three months or less at the time of purchase. We limit our credit risk associated with cash and cash equivalents by placing our investments with banks that we believe are highly creditworthy and with highly rated money market funds. Cash and cash equivalents primarily consist of bank deposits and investments in money market funds.

Restricted Cash

We are required to maintain certain balances under operating lease arrangements for our facilities. We have a certificate of deposit with a financial institution issued in favor of the lessor for $0.1 million as of December 31, 2017 and 2018. This amount is recorded as restricted cash and other assets in the accompanying balance sheets due to the long-term nature of the underlying facility lease.

Adaptive Biotechnologies Corporation
Notes to Financial Statements

December 31, 2018

Investments in Marketable Securities

Marketable securities are classified as available-for-sale and primarily consist of U.S. government debt securities, U.S. government agency bonds, commercial paper and corporate bonds, and are reported at fair value. Unrealized holding gains and losses are reflected as a separate component of shareholders' (deficit) equity in accumulated other comprehensive loss until realized. Realized gains and losses on the sale of these securities are recognized in net income or loss. The cost of marketable securities sold is based on the specific identification method.

Concentrations of Risk

We are subject to a concentration of risk from a limited number of suppliers, or in some cases, single suppliers for some of our laboratory instruments and materials. This risk is managed by targeting a quantity of surplus stock.

Cash, cash equivalents and marketable securities are financial instruments that potentially subject us to concentrations of credit risk. We invest in money market funds, U.S. government debt securities, U.S. government agency bonds, commercial paper and corporate bonds with high-quality accredited financial institutions.

Significant customers are those which represent more than 10% of our total revenue or accounts receivable balance at each respective balance sheet date. Revenue from these customers reflects their purchase of our products and services and we do not believe their loss would have a material adverse effect on our business. For each significant customer, revenue as a percentage of revenue and accounts receivable as a percentage of accounts receivable were as follows:

	Revenue		Accounts Receivable	
	Year Ended December 31,		December 31,	
	2017	2018	2017	2018
Customer A	31%	18%	30%	*%
Customer B	*	14	15	15
Customer C	*	15	*	13

* less than 10%

Accounts Receivable

Accounts receivable consist of amounts due from customers for services performed. We review our accounts receivable regularly by analyzing the status of significant past due receivables to determine if any receivable will potentially be uncollectible and to estimate the amount of allowance for doubtful accounts necessary to reduce accounts receivable to its estimated net realizable value. Our allowance for doubtful accounts was $0.1 million as of December 31, 2017 and 2018.

Additionally, we had $1.4 million and $0.4 million of unbilled receivables as of December 31, 2017 and 2018, respectively. The unbilled receivables are amounts that will become due for which we have an unconditional right to consideration.

Adaptive Biotechnologies Corporation
Notes to Financial Statements

December 31, 2018

Inventory

Inventory consists of laboratory materials and supplies used in lab analysis. We capitalize inventory when purchased and record expense upon order fulfillment for servicing revenue or utilization in our research and development laboratories. Inventory is valued at the lower of cost or market on a first-in, first-out basis. We periodically perform obsolescence assessments and write off any inventory that is no longer usable.

Property and Equipment

Property and equipment consist of computer equipment, computer software, laboratory equipment, leasehold improvements and furniture and fixtures. Property and equipment are recorded at cost and depreciation is recognized using the straight-line method based on an estimated useful life. Maintenance and repairs are charged to expense as incurred, and costs of improvements are capitalized.

Useful lives assigned to property and equipment are as follows:

Laboratory equipment	3 to 7 years
Leasehold improvements	Shorter of estimated useful life or remaining lease term
Computer equipment and software	3 years
Furniture and office equipment	5 to 10 years

We review long-lived assets for impairment whenever events or circumstances indicate the carrying amount of an asset group may not be recoverable. Gains and losses from asset disposals and impairment losses are classified within the statements of operations in accordance with the use of the asset, except those gains and losses recognized in conjunction with restructuring activities, which are classified within restructuring expense. We recognized $0.3 million of impairment expense in research and development for obsolete equipment in 2017 and $0.2 million of losses from asset disposals, impairment and accelerated depreciation in restructuring. See Note 14, *Restructuring Charges*.

Goodwill

Goodwill represents the excess of the purchase price over the net amount of identifiable assets acquired and liabilities assumed in a business combination measured at fair value. We assess goodwill for impairment annually on October 1, or more frequently if events or changes in circumstances would more likely than not reduce the fair value of our single reporting unit below its carrying value. We evaluate goodwill for impairment by first assessing qualitative factors to determine whether it is more likely than not that the fair value of our reporting unit is less than its carrying amount. If we so determine, or if we choose to bypass the qualitative assessment, we perform a quantitative goodwill impairment test. Goodwill impairment exists when the estimated fair value of our one reporting unit is less than its carrying value. If impairment exists, the carrying value of the goodwill is reduced to fair value through an impairment charge recorded in our statements of operations. To date we have not recognized any impairment of goodwill.

Intangible Assets

Intangible assets acquired in a business combination are recognized separately from goodwill and are initially recognized at their fair value at the acquisition date (which is regarded as their cost).

Adaptive Biotechnologies Corporation
Notes to Financial Statements

December 31, 2018

Intangible assets may also result from the purchase of assets and intellectual property in a transaction that does not qualify as a business combination. Intangible assets are amortized over the estimated useful life of the asset on a straight-line basis which approximates the usage pattern. Intangible assets are reviewed for impairment at least annually or if indicators of potential impairment exist. We have not recognized any impairment losses on intangible assets.

Restructuring

We recognize a liability for costs associated with an exit or disposal activity under a restructuring project when the plan has been finalized. Employee termination benefits considered as post-employment benefits are accrued when the obligation is probable and estimable, such as benefits stipulated by human resource policies and practices or statutory requirements. One-time termination benefits are recognized at the date the employee is notified. If the employee must provide future service greater than 60 days, such benefits are recognized ratably over the future service period.

Asset impairments associated with a restructuring project are determined at the asset group level. An impairment may be recognized for assets that are to be abandoned or are to be sold for less than net book value. We may also recognize impairment on an asset group, which is held and used, when the carrying value is not recoverable and exceeds the asset group's fair value. If the sale of an asset group under a restructuring project results in proceeds that exceed the net book value of the asset group, the resulting gain is recognized within restructuring expense in the statements of operations.

Leases

We have lease agreements for our laboratory and office facilities. These leases are classified as operating leases. Rent expense is recognized on a straight-line basis over the term of the lease. Incentives granted under our facility leases, including rent holidays, are capitalized and are recognized as adjustments to rental expense on a straight-line basis over the term of the lease.

Fair Value of Financial Instruments

The Financial Accounting Standards Board ("FASB") has defined fair value as the exchange price that would be received for an asset or paid to transfer a liability, or an exit price, in the principal or most advantageous market for that asset or liability in an orderly transaction between market participants on the measurement date. The FASB established a fair value hierarchy that requires an entity to maximize the use of observable inputs, where available, and minimize the use of unobservable inputs when measuring fair value. The hierarchy defines three levels of inputs that may be used to measure fair value:

- *Level 1:* Quoted prices in active markets for identical assets or liabilities.
- *Level 2:* Observable inputs other than Level 1 prices, such as quoted prices for similar assets or liabilities, quoted prices in markets that are not active, or other inputs that are observable or can be corroborated by observable market data for substantially the full term of the assets or liabilities.
- *Level 3:* Unobservable inputs that are supported by little or no market activity and that are significant to the fair value of the assets or liabilities.

A financial instrument categorization within the valuation hierarchy is based upon the lowest level of input that is significant to the fair value measurement.

Adaptive Biotechnologies Corporation
Notes to Financial Statements

December 31, 2018

Our financial instruments consist of Level 1 and Level 2 assets, and Level 3 liabilities. In certain cases, where there is limited activity or less transparency around inputs to valuation, financial instruments are classified as Level 3 within the valuation hierarchy. The carrying amounts of certain financial instruments approximate fair value due to their short maturities.

We did not have any nonfinancial assets or liabilities that were measured or disclosed at fair value on a recurring basis as of December 31, 2017 or 2018.

Convertible Preferred Stock Warrant Liability

We have issued a freestanding warrant to a venture capital firm to purchase 56,875 shares of Series C convertible preferred stock with an exercise price of $2.64 in connection with a $5.0 million credit facility entered into in 2014. The fair value of this warrant is classified as a non-current liability in the accompanying balance sheets, since the underlying convertible preferred stock has been classified as temporary equity in the accompanying balance sheets instead of in shareholders' deficit in accordance with authoritative guidance for the classification and measurement of potentially redeemable securities. Upon certain change in control events that are outside of our control, including liquidation, sale or transfer of control, holders of the convertible preferred stock may cause its redemption. The warrant is subject to remeasurement at each balance sheet date, with changes in estimated fair value recognized as a component of interest and other income, net on the statements of operations. We recorded income of $23,000 and $6,000 during the years ended December 31, 2017 and 2018, respectively. We will continue to adjust the liability for changes in estimated fair value until the earlier of expiration of the warrant, exercise of the warrant or conversion of the warrant into equity upon the completion of a liquidation event, including the completion of an initial public offering.

Revenue Recognition

We recognize revenue in accordance with Accounting Standards Codification ("ASC") Topic 606 ("ASC 606"), *Revenue from Contracts with Customers.* Under ASC 606, for all revenue-generating contracts, we perform the following steps to determine the amount of revenue to be recognized: (i) identification of the contract or contracts; (ii) determination of whether the promised goods or services are performance obligations, including whether they are distinct in the context of the contract; (iii) measurement of the transaction price, including the constraint on variable consideration; (iv) allocation of the transaction price to the performance obligations based on estimated selling prices; and (v) recognition of revenue when (or as) we satisfy each performance obligation. The following is a summary of the application of the respective model to each of our revenue classifications.

Overview

Our revenue is generated from immunosequencing ("sequencing") products and services ("sequencing revenue") and from regulatory or development support services leveraging our immune medicine platform ("development revenue"). When revenue generating contracts have elements of both sequencing revenue and development revenue, we allocate revenue based on the nature of the performance obligation and the allocated transaction price.

Adaptive Biotechnologies Corporation
Notes to Financial Statements

December 31, 2018

Sequencing Revenue

Sequencing revenue reflects the amounts generated from providing sequencing services through immunoSEQ to research customers and from providing testing services through clonoSEQ to clinical and research customers.

For research customers, contracts typically include an amount billed in advance of services ("upfront"), and subsequent billings as sample results are delivered to the customer. Upfront amounts received are recorded as deferred revenue, which we recognize as revenue upon satisfaction of performance obligations. We have identified two typical performance obligations under the terms of our research service contracts: sequencing services and related data analysis. We recognize revenue for both identified performance obligations as sample results are delivered to the customer.

For other research customers who choose to purchase a research use only kit, the kits are sold on a price per kit basis with amounts payable upon delivery of the kit. Payments received are recorded as deferred revenue. For these customers we have identified one performance obligation: the delivery of sample results. We recognize revenue as the results are delivered to the customer based on a proportion of the estimated samples that can be reported on for each kit.

For clinical customers, we derive revenues from providing our clonoSEQ test report to ordering physicians, and we bill and receive payments from commercial third-party payors and medical institutions. In these transactions, we have identified one performance obligation: the delivery of a clonoSEQ report. As payment from the respective payors may vary based on the various reimbursement rates and patient responsibilities, we consider the transaction price to be variable and record an estimate of the transaction price, subject to the constraint for variable consideration, as revenue at the time of delivery. The estimate of transaction price is based on historical reimbursement rates with the various payors, which are monitored in subsequent periods and adjusted as necessary based on actual collection experience.

Development Revenue

We derive revenue by providing services through development agreements to biopharmaceutical customers who seek access to our immune medicine platform technologies. We generate revenues from the delivery of professional support activities pertaining to the use of our proprietary immunoSEQ and clonoSEQ services in the development of the respective customers' initiatives. The transaction price for these contracts may consist of a combination of non-refundable upfront fees, separately priced sequencing fees, progress based milestones and regulatory milestones. The development agreements may include single or multiple performance obligations depending on the contract. For certain contracts, we may perform services to support the biopharmaceutical customers' regulatory submission as part of their registrational trials. These services include regulatory support pertaining to our technology intended to be utilized as part of the submission, development of analytical plans for our sequencing data, participation on joint research committees and assistance in completing a regulatory submission. Generally, these services are not distinct within the context of the contract, and they are accounted for as a single performance obligation.

When sequencing services are separately priced customer options, we assess if a material right exists and, if not, the customer option to purchase additional sequencing services is not considered part of the contract. Except for any non-refundable upfront fees, the other forms of compensation

represent variable consideration. Variable consideration related to progress based and regulatory milestones is estimated using the most likely amount method where variable consideration is constrained until it is probable that a significant reversal of cumulative revenue recognized will not occur. Progress milestones such as first sample result delivered or final patient enrollment in a customer trial are customer dependent and are included in the transaction price when the respective milestone is probable of occurring. Milestone payments that are not within our customers' control, such as regulatory approvals, are not considered probable of being achieved until those approvals are received. Determining whether milestones are probable, relating to regulatory milestone payments, is an area that requires significant judgment. In making this assessment, we evaluate the scientific, clinical, regulatory and other risks that must be managed, and the level of effort and investment required to achieve the respective milestone.

The primary method used to estimate standalone selling price for performance obligations is the adjusted market assessment approach. Using this approach, we evaluate the market in which we sell our services and estimate the price that a customer in that market would be willing to pay for our services. We recognize revenue using either an input or output measure of progress that faithfully depicts performance on a contract, depending on the contract. The measure used is dependent on the nature of the service to be provided in each contract. Selecting the measure of progress and estimating progress to date requires significant judgment.

Contract Balances

In certain circumstances, billing may occur prior to services being performed. Upfront payments are recorded as deferred revenue (contract liabilities). We classify deferred revenue as current for sequencing revenue as we expect our performance obligations will be completed within the next twelve months, however, we do not control the timing of customer provided samples. For development services, we assess the performance obligations and recognize deferred revenue as current or non-current based upon forecasted delivery times which are customer coordinated. In certain circumstances, the customer project may be cancelled or terminated prior to the delivery of all related services covered by a customer's upfront payment. In these circumstances, we recognize revenue when sufficient evidence is obtained that a reversal of revenue is not probable.

Share-Based Compensation

Share-based compensation includes compensation expense for stock option grants to employees and non-employees. Share-based compensation expense for employees represents grant date fair value of employee share option grants and is recognized over the requisite service period of the awards (usually the vesting period) on a straight-line basis, net of actual forfeitures. Share-based compensation to non-employees is subject to periodic revaluation over their vesting terms. We estimate the fair value of stock option grants using the Black-Scholes option-pricing model.

Cost of Revenue

Cost of revenue includes the cost of materials, personnel-related expenses (comprised of salaries, benefits and share-based compensation), shipping and handling, equipment and allocated facility costs associated with processing samples and professional support for our sequencing revenue. Allocated facility costs include depreciation of laboratory equipment, allocated facility occupancy and information technology costs. Costs associated with processing samples are recorded as expense, regardless of the timing of revenue recognition.

Adaptive Biotechnologies Corporation
Notes to Financial Statements

December 31, 2018

Research and Development Expenses

Research and development expenses are comprised of laboratory materials costs, personnel-related expenses, allocated facility costs, information technology and contract service expenses. Research and development costs are expensed as incurred. Upfront payments for goods or services that will be used or rendered for future research and development activities are deferred and capitalized, then are recognized as an expense as the goods are consumed or the related services are performed.

Sales and Marketing Expenses

Sales and marketing expenses consist primarily of personnel-related expenses for commercial sales, account management, marketing, reimbursement, medical education and business development personnel that support commercialization of our platform products. In addition, these expenses include external costs such as advertising expenses, customer education and promotional expenses, market analysis expenses, conference fees, travel expenses and allocated facility costs.

Income Taxes

Income taxes are accounted for under the liability method. Deferred tax assets and liabilities are recognized for the future tax consequences attributable to the differences between the financial statement carrying amounts of existing assets and liabilities and their respective tax bases, and the operating loss and tax credit carryforwards. Valuation allowances are established when necessary to reduce deferred tax assets to the amount expected to be realized.

Deferred tax assets and liabilities are measured at the balance sheet date using the enacted tax rates expected to apply to taxable income in the years in which those temporary differences are expected to be recovered or settled. The effect on deferred tax assets and liabilities due to a change in tax rates is recognized in the period such tax rate changes are enacted. Our net deferred tax assets are fully offset by a valuation allowance, because of our history of losses.

We recognize interest and penalties related to income tax matters as a component of tax expense. We did not record any interest or penalties related to income tax during the years ended December 31, 2017 and 2018.

Unaudited Pro Forma Balance Sheet Information

The unaudited pro forma balance sheet information as of December 31, 2018 assumes (i) the automatic conversion of all of our outstanding shares of convertible preferred stock at December 31, 2018 into an aggregate of 92,790,094 shares of common stock upon the closing of this offering; (ii) the issuance of 20,000 shares of our common stock upon the exercise of an outstanding warrant to purchase our common stock, immediately prior to the closing of this offering that would otherwise expire; (iii) the conversion of an outstanding warrant to purchase our convertible preferred stock into a warrant to purchase 56,875 shares of our common stock upon the closing of this offering; and (iv) the filing and effectiveness of our amended and restated articles of incorporation upon the closing of this offering.

Adaptive Biotechnologies Corporation
Notes to Financial Statements

December 31, 2018

Net Loss Per Share Attributable to Common Shareholders

We calculate our basic and diluted net loss per share attributable to common shareholders in conformity with the two-class method required for companies with participating securities. We consider our convertible preferred stock to be participating securities. In the event a dividend is declared or paid on common stock, holders of convertible preferred stock are entitled to a share of such dividend in proportion to the holders of common stock on an as-if converted basis. Under the two-class method, basic net loss per share attributable to common shareholders is calculated by dividing the net loss attributable to common shareholders by the weighted-average number of shares of common stock outstanding for the period. Net loss attributable to common shareholders is determined by allocating undistributed earnings between common and preferred shareholders. The diluted net loss per share attributable to common shareholders is computed by giving effect to all potential dilutive common stock equivalents outstanding for the period determined using the treasury stock method. The net loss attributable to common shareholders was not allocated to the convertible preferred stock under the two-class method as the convertible preferred stock does not have a contractual obligation to share in our losses. For purposes of this calculation, convertible preferred stock, common stock warrants and stock options are considered common stock equivalents but have been excluded from the calculation of diluted net loss per share attributable to common shareholders as their effect is anti-dilutive.

Unaudited Pro Forma Net Loss Per Share Attributable to Common Shareholders

We have presented the unaudited pro forma basic and diluted net loss per share attributable to common shareholders for the year ended December 31, 2018, which shows the assumed effect of an initial public offering, including (i) the conversion of all convertible preferred stock into shares of common stock as if the conversion had occurred as of the later of the beginning of the period or the original date of issuance; and (ii) the issuance of 20,000 shares of common stock upon the assumed exercise of a common stock warrant prior to the completion of an initial public offering. The pro forma net loss per share attributable to common shareholders does not include proceeds to be received from nor does it include shares expected to be sold in the assumed initial public offering.

Segment Information

We have determined that our chief executive officer is the chief operating decision maker (“CODM”). The CODM reviews financial information presented on a regular basis at the entity level. Resource allocation decisions are made by the CODM based on the results at the entity level which is determined to be a single reporting unit. There are no segment managers who are held accountable by the CODM for operations, operating results or planning for levels or components below the entity. As such, we have concluded that we operate as one segment. We present disaggregated revenue from contracts with customers by type of service. See Note 3, *Revenue*.

Recent Accounting Pronouncements

In May 2014, the FASB issued Accounting Standards Update (“ASU”) No. 2014-09, *Revenue from Contracts with Customers*, and created ASC 606, and added ASC Subtopic 340-40, *Other Assets and Deferred Costs—Contracts with Customers*. The guidance in this update supersedes the revenue recognition requirements in ASC Topic 605, *Revenue Recognition*, and most industry-specific guidance. We adopted this standard on January 1, 2017, applying the modified retrospective method to all contracts that were not completed as of January 1, 2017. We recorded an increase in accounts

receivable of $0.4 million and a decrease in deferred revenue of $0.1 million as of January 1, 2017, with a corresponding adjustment to accumulated deficit. The impact of this adoption was primarily related to our clinical customers. Prior to adoption, we recognized revenue for these customers on a cash basis. Upon adoption, we recognize revenue at time of delivery using an estimate of the transaction price subject to the constraint for variable consideration.

In February 2016, the FASB issued ASU No. 2016-02, *Leases* (Topic 842), to increase transparency and comparability among organizations by recognizing lease assets and lease liabilities on the balance sheets and disclosing key information about leasing arrangements using a modified retrospective approach. This guidance is effective for us in fiscal years, and interim periods within those fiscal years, beginning after December 15, 2019. Although we are currently evaluating the impact that adopting this guidance will have on our financial statements, we currently believe the most significant changes will be related to the recognition of the right-of-use assets and related lease liabilities related to our operating leases on the balance sheets.

In March 2016, the FASB issued ASU No. 2016-09, *Compensation—Stock Compensation* (Topic 718), intended to simplify the accounting for share-based payment transactions, including the income tax consequences, classification of awards as either equity or liabilities, classification on the statements of cash flows, including allowing an entity-wide accounting policy election to either estimate the number of awards that are expected to vest or account for forfeitures as they occur. We adopted this standard as of January 1, 2018 and elected to account for forfeitures as they occur. We utilized a modified retrospective transition method, recorded the cumulative impact of applying this standard, and recognized a cumulative increase to additional paid-in capital and an increase to accumulated deficit of $0.1 million.

In January 2017, the FASB issued ASU No. 2017-04, *Intangibles—Goodwill and Other: Simplifying the Test for Goodwill Impairment*, to simplify the goodwill impairment test. Under the new guidance, goodwill impairment will be measured by the amount by which the carrying value of a reporting unit exceeds its fair value, without exceeding the carrying amount of goodwill allocated to that reporting unit. This guidance is effective January 1, 2022 and is required to be adopted on a prospective basis, with early adoption permitted. We adopted this standard as of January 1, 2018 and this guidance did not have any impact on our financial statements.

In August 2018, the FASB issued ASU No. 2018-15, *Intangibles—Goodwill and Other: Internal-Use Software*, to provide additional guidance on the accounting for costs of implementation activities performed in a cloud computing arrangement. This guidance is effective for fiscal years beginning after December 15, 2019 and early adoption of the amendments in this update are permitted. The adoption of this guidance is not expected to have a material impact on our financial statements.

Adaptive Biotechnologies Corporation
Notes to Financial Statements

December 31, 2018

3. Revenue

We disaggregate our revenue from contracts with customers by type of service, as we believe this best depicts how the nature, amount, timing, and uncertainty of our revenue and cash flows are affected by economic factors. The following table presents our revenue disaggregated by type of products and services (in thousands):

	December 31,	
	2017	2018
Sequencing revenue	$22,759	$32,978
Development revenue:		
Development support	15,689	12,685
Regulatory milestones	—	10,000
Total development revenue	15,689	22,685
Total revenue	$38,448	$55,663

Translational Development Agreements

On December 18, 2015, we entered into a translational development agreement with a biopharmaceutical customer for access to certain of our oncology immunosequencing research datasets, including full-time employee support, to accelerate the customers preclinical, nonclinical and clinical trial testing. Under the terms of the agreement we could be entitled to up to $40.0 million over a period of four years which does not include any separately negotiated research sequencing contracts. If the biopharmaceutical customer terminates the agreement prior to the end of the initial four-year research term for any reason other than a material uncured breach by us, then the biopharmaceutical partner has agreed to pay us $0.8 million.

We identified one performance obligation under this agreement, as the services were determined to be highly interrelated. We determined that any separately negotiated sequencing contracts are not performance obligations under the contract as the contract did not contain any material rights related to such sequencing contracts. For the identified performance obligation, we assessed the work to be performed over the duration of the contract and determined that it is a consistent level of support throughout the period, therefore revenue has been recognized straight line over the contract term.

Revenue recognized from this translational development agreement, excluding separately negotiated research sequencing contracts, was $10.0 million and $9.3 million for the years ended December 31, 2017 and 2018, respectively.

In 2017, we entered into an agreement with a customer to provide services to accelerate their research initiatives. We identified one performance obligation under the agreement, as the services were determined to be highly interrelated. We determined that any separately negotiated sequencing contracts are not performance obligations under the contract as the contract did not contain any material rights related to such sequencing contracts. Revenue recognized from this agreement, excluding sequencing revenue, was $0.6 million for each of the years ended December 31, 2017 and 2018.

Adaptive Biotechnologies Corporation
Notes to Financial Statements

December 31, 2018

MRD Development Agreements

In 2017 and 2018, we entered into agreements with biopharmaceutical customers to further develop and commercialize clonoSEQ and the biopharmaceutical customers' therapeutics. Under each of the agreements, we received or will receive non-refundable upfront payments and could receive substantial additional payments upon reaching certain progress milestones or achievement of certain regulatory milestones pertaining to the customers' therapeutic and our clonoSEQ test.

Under the contracts, we identify performance obligations, which may include: (i) obligations to provide services supporting the customer's regulatory submission activities as they relate to our clonoSEQ test; and (ii) sequencing services for customer-provided samples for their regulatory submissions. The transaction price allocated to the respective performance obligations is estimated using an adjusted market assessment approach for the regulatory support services and a standalone selling price for the estimated immunosequencing services. At contract inception we fully constrained any consideration related to the regulatory milestones, as the achievement of such milestones is subject to third-party regulatory approval and the customers' own submission decision-making. We recognize revenue relating to the sequencing services over time using an output method based on the proportion of sample results delivered relative to the total amount of sample results expected to be delivered and when expected to be a faithful depiction of progress. We use the same method to recognize the regulatory support services. When an output method based on the proportion of sample results delivered is not expected to be a faithful depiction of progress, we utilize an input method based on estimates of effort completed using a cost-based model.

In 2018, we earned $10.0 million in regulatory milestones upon the achievement of the regulatory milestones by us and our respective customers' therapeutics. All $10.0 million was recognized as revenue as we determined these amounts were consistent with our estimated standalone selling price and the respective performance obligations were complete. We recognized $5.1 million and $12.8 million in development revenue related to these contracts in 2017 and 2018, respectively.

As of December 31, 2018, in future periods we could receive up to an additional $99.5 million in milestone payments if certain regulatory approvals are obtained by our customers' therapeutics in connection with MRD data generated from our clonoSEQ test.

Genentech Collaboration Agreement

In December 2018, we entered into a collaboration with Genentech to leverage our capability to develop cellular therapies in oncology. Subsequent to receipt of regulatory approval in January 2019, we received an upfront payment of $300.0 million in February 2019 and may be eligible to receive more than $1.8 billion over time, including payments of up to $75.0 million upon the achievement of specified regulatory milestones, up to $300.0 million upon the achievement of specified development milestones, and up to $1.4 billion upon the achievement of specified commercial milestones. In addition, we are eligible to receive tiered royalties at a rate ranging from the mid-single digits to the mid-teens on aggregate worldwide net sales of products arising from the collaboration, subject to certain reductions, with aggregate minimum floors.

Adaptive Biotechnologies Corporation
Notes to Financial Statements

December 31, 2018

4. Fair Value Measurements

The following table sets forth the fair value of financial assets and liabilities that were measured at fair value on a recurring basis (in thousands):

	December 31, 2017			
	Level 1	Level 2	Level 3	Total
Financial assets:				
Money market funds	$68,034	$ —	$ —	$ 68,034
Commercial paper	—	22,360	—	22,360
U.S. government and agency securities	—	83,717	—	83,717
Corporate bonds	—	21,264	—	21,264
Total financial assets	$68,034	$127,341	$ —	$195,375
Financial liabilities:				
Convertible preferred stock warrant liability	$ —	$ —	$ 342	$ 342
Total financial liabilities	$ —	$ —	$ 342	$ 342

	December 31, 2018			
	Level 1	Level 2	Level 3	Total
Financial assets:				
Money market funds	$45,998	$ —	$ —	$ 45,998
Commercial paper	—	16,887	—	16,887
U.S. government and agency securities	—	85,623	—	85,623
Corporate bonds	—	7,478	—	7,478
Total financial assets	$45,998	$109,988	$ —	$155,986
Financial liabilities:				
Convertible preferred stock warrant liability	$ —	$ —	$ 336	$ 336
Total financial liabilities	$ —	$ —	$ 336	$ 336

Level 1 securities include highly liquid money market funds, which we measure the fair value based on quoted prices in active markets for identical assets or liabilities. Level 2 securities consist of U.S. government debt securities, U.S. government agency bonds, commercial paper and corporate bonds, and are valued based on recent trades of securities in inactive markets or based on quoted market prices of similar instruments and other significant inputs derived from or corroborated by observable market data. Level 3 liabilities that are measured at fair value on a recurring basis consist of convertible preferred stock warrant liability.

The fair value of the convertible preferred stock warrant liability is estimated using the Black-Scholes option-pricing model. Certain inputs were utilized in the option-pricing model as follows:

	December 31, 2017	December 31, 2018
Fair value estimate	$ 7.67	$ 8.27
Expected term (in years)	3.31	2.31
Risk-free interest rate	2.0%	2.5%
Expected volatility	61.5%	55.3%
Expected dividend yield	—	—

Adaptive Biotechnologies Corporation
Notes to Financial Statements

December 31, 2018

5. Investments

Available-for-sale investments consist of the following as of December 31, 2017 and 2018 (in thousands):

	December 31, 2017			
	Amortized cost	Unrealized gain	Unrealized loss	Estimated fair value
Short-term marketable securities:				
Commercial paper	$ 10,769	$ —	$ —	$ 10,769
U.S. government and agency securities	74,937	—	(125)	74,812
Corporate bonds	21,284	—	(20)	21,264
Total short-term marketable securities	$106,990	$ —	$ (145)	$106,845
Long-term marketable securities:				
U.S. government and agency securities	$ 8,926	$ —	$ (21)	$ 8,905
Total long-term marketable securities	$ 8,926	$ —	$ (21)	$ 8,905

	December 31, 2018			
	Amortized cost	Unrealized gain	Unrealized loss	Estimated fair value
Short-term marketable securities:				
Commercial paper	$ 16,887	$ —	$ —	$ 16,887
U.S. government and agency securities	85,722	—	(99)	85,623
Corporate bonds	7,486	—	(8)	7,478
Total short-term marketable securities	$110,095	$ —	$ (107)	$109,988

	December 31, 2018			
	Less than 12 months		12 months or greater	
	Fair value	Unrealized loss	Fair value	Unrealized loss
Short-term marketable securities:				
Corporate bonds	$ 7,478	$ (8)	$ —	$ —
U.S. government and agency securities	76,654	(85)	8,969	(14)
Total short-term marketable securities	$84,132	$ (93)	$8,969	$ (14)

We evaluated our securities for other-than-temporary impairment and considered the decline in market value for the securities to be primarily attributable to current economic and market conditions. It is not more likely than not that we will be required to sell the securities, and we do not intend to do so prior to the recovery of the amortized cost basis. Based on this analysis, these marketable securities were not considered to be other-than-temporarily impaired as of December 31, 2018.

All the corporate debt, U.S. government and agency securities, and commercial paper have an effective maturity date of less than one year.

Adaptive Biotechnologies Corporation
Notes to Financial Statements

December 31, 2018

6. Property and Equipment, Net

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

	December 31,	
	2017	2018
Laboratory equipment	$12,330	$ 14,009
Computer equipment	1,507	1,819
Furniture and equipment	971	1,300
Computer software	464	429
Construction in progress	376	3,942
Leasehold improvements	7,631	10,078
Property and equipment, at cost	23,279	31,577
Less accumulated depreciation	(9,325)	(12,452)
Property and equipment, net	$13,954	$ 19,125

Depreciation expense was $4.1 million and $4.3 million for the years ended December 31, 2017 and 2018, respectively.

7. Goodwill and Intangible Assets

Intangible assets subject to amortization as of the dates presented consist of the following (in thousands):

	Cost	Accumulated Amortization	Net
Acquired developed technology	$20,000	$ (4,969)	$15,031
Purchased intellectual property	325	(31)	294
Balance at December 31, 2017	$20,325	$ (5,000)	$15,325
Acquired developed technology	$20,000	$ (6,636)	$13,364
Purchased intellectual property	325	(63)	262
Balance at December 31, 2018	$20,325	$ (6,699)	$13,626

The developed technology was acquired in connection with our acquisition of Sequenta, Inc. in 2015. The remaining balance of the acquired technology and the purchased intellectual property is expected to be amortized over the next eight years in the amount of $1.7 million per year. There have been no changes in the carrying amount of goodwill since its recognition in 2015.

Adaptive Biotechnologies Corporation
Notes to Financial Statements

December 31, 2018

8. Accrued Liabilities

Accrued liabilities consist of the following (in thousands):

	December 31, 2017	December 31, 2018
Accrued legal and professional fees	$ 598	$1,634
Accrued royalties	22	31
Accrued travel and entertainment	44	73
Other vendor accruals	379	824
Total accrued liabilities	$1,043	$2,562

9. Deferred Revenue

Deferred revenue by revenue classification was as follows (in thousands):

	December 31, 2017	December 31, 2018
Deferred sequencing revenue	$11,747	$11,754
Deferred development revenue	2,301	1,645
Total deferred revenue	$14,048	$13,399

The opening balance of deferred revenue was $10.4 million as of January 1, 2017. In 2018, as a result of cancelled customer sequencing contracts, we recognized $3.4 million of sequencing revenue.

Changes in deferred revenue were as follows (in thousands):

	December 31, 2018
Balance as of January 1, 2018	$ 14,048
Deferral of revenue	9,727
Recognition of deferred revenue	(10,376)
Balance as of December 31, 2018	$ 13,399

10. Commitments and Contingencies

Operating Leases

We have entered into various non-cancelable lease agreements for our office and laboratory spaces.

In July 2011, we entered into a non-cancelable lease agreement with a minority shareholder for laboratory and office space in Seattle, Washington. The lease terms were subsequently amended multiple times and most recently in June 2016. The lease terminates in June 2023. The lease also requires us to pay additional amounts for operating and maintenance expenses.

Adaptive Biotechnologies Corporation
Notes to Financial Statements

December 31, 2018

In October 2016, we entered into an agreement to sublease certain laboratory and office space in South San Francisco, California. The lease commenced in October 2016 and terminates in March 2019. The lease requires us to pay additional amounts for operating and maintenance expenses.

In April 2018, we entered into a lease agreement to lease additional space in South San Francisco, California. The lease term is through March 2026 and provides for one five-year option. We will be responsible for our share of allocable operating expenses, tax expenses and utilities cost during the duration of the lease term. In connection with the lease, the landlord funded agreed-upon improvements prior to the lease commencement date of December 12, 2018. The landlord was solely responsible for the $2.4 million cost of such improvements, which we recognized as a leasehold improvement asset that depreciates beginning from the commencement date to the initial lease term, and a corresponding leasehold incentive obligation which is amortized over the life of the lease.

As of December 31, 2018, future minimum lease payments, exclusive of operating and maintenance costs, are as follows (in thousands):

2019	$ 3,561
2020	3,819
2021	3,917
2022	4,017
2023	2,295
Thereafter	2,315
Total future minimum lease payments	$19,924

Rent expenses, inclusive of operating and maintenance costs, were $3.7 million and $4.1 million for the years ended December 31, 2017 and 2018, respectively.

Legal Proceedings

We are subject to claims and assessments from time to time in the ordinary course of business. We will accrue a liability for such matters when it is probable that a liability has been incurred and the amount can be reasonably estimated. When only a range of possible loss can be established, the most probable amount in the range is accrued. If no amount within this range is a better estimate than any other amount within the range, the minimum amount in the range is accrued. We are not currently party to any material legal proceedings.

Indemnification Agreements

In the ordinary course of business, we may provide indemnification of varying scope and terms to vendors, lessors, customers and other parties with respect to certain matters including, but not limited to, losses arising out of breach of such agreements or from intellectual property infringement claims made by third parties. In addition, we have entered into indemnification agreements with members of its board of directors and certain of its executive officers that will require us to indemnify them against certain liabilities that may arise by reason of their status or service as directors or officers. The maximum potential amount of future payments that we could be required to make under these indemnification agreements is, in many cases, unlimited. We have not incurred any material costs as a result of such indemnifications and are not currently aware of any indemnification claims.

Adaptive Biotechnologies Corporation
Notes to Financial Statements

December 31, 2018

11. Convertible Preferred Stock

Convertible preferred stock at December 31, 2018 consists of the following (in thousands, except share data):

	Shares authorized	Shares issued and outstanding	Amount	Liquidation preference
Series A	4,550,000	4,550,000	$ 12,405	$ 4,550
Series B	5,645,706	5,645,706	16,017	9,669
Series C	4,804,227	4,747,352	14,425	12,521
Series D	19,269,117	19,269,117	106,905	106,999
Series E	15,524,350	15,524,350	93,698	93,750
Series E-1	17,407,441	16,605,244	72,568(1)	100,277
Series F	21,761,676	21,761,676	195,013	195,100
Series F-1	4,800,000	4,686,649	49,827	50,000
Total convertible preferred stock	93,762,517	92,790,094	$560,858	$572,866

(1) Includes vested Series E-1 convertible preferred stock options of $1.8 million which are not included in the shares issued and outstanding.

Conversion

Each share of convertible preferred stock is convertible at the option of the holder into one fully paid and non-assessable share of common stock. The initial conversion price per share is $1.0000, $1.7127, $2.6374, $5.5529, $6.0389, $6.0389, $8.9653 and $10.6686 per share for the Series A convertible preferred stock, Series B convertible preferred stock, Series C convertible preferred stock, Series D convertible preferred stock, Series E convertible preferred stock, Series E-1 convertible preferred stock, Series F convertible preferred stock and Series F-1 convertible preferred stock, respectively.

Shares of convertible preferred stock are automatically converted into shares of the common stock upon the closing of a public offering, provided that our gross proceeds are not less than $25.0 million. Shares of Series A convertible preferred stock, Series B convertible preferred stock and Series C convertible preferred stock are automatically converted into shares of the common stock upon the affirmative vote of the holders of a majority of such shares, voting together as a single class on an as-converted basis. Shares of Series D convertible preferred stock and Series E convertible preferred stock are automatically converted into shares of the common stock upon the affirmative vote of the holders of the majority of such shares voting together as a single class on an as-converted basis. Shares of Series E-1 convertible preferred stock are automatically converted into shares of common stock upon the affirmative vote of the holders of the majority of such shares on an as-converted basis. Shares of Series F convertible preferred stock and Series F-1 convertible preferred stock are automatically converted into shares of the common stock upon the affirmative vote of the holders of the majority of such shares, voting together as a single class on as-converted basis.

Dividends

The holders of convertible preferred stock shall be entitled to receive dividends, when and if declared by our Board of Directors, out of any assets legally available, prior and in preference to any

declaration or payment of any dividend on the common stock, equal to the greater of (a) in the case of the Series F-1 convertible preferred stock, $0.8535 per outstanding share per year from and after the date of first issuance of such share (subject to proportional adjustment in the event of a recapitalization), (b) in the case of the Series F convertible preferred stock, $0.7172 per outstanding share per year from and after the date of first issuance of such share (subject to proportional adjustment in the event of a recapitalization), (c) in the case of the Series E convertible preferred stock, $0.4831 per outstanding share per year from and after the date of first issuance of such share (subject to proportional adjustment in the event of a recapitalization) (d) in the case of the Series D convertible preferred stock, $0.4442 per outstanding share per year from and after the date of first issuance of such share (subject to proportional adjustment in the event of a recapitalization) and (e) in the case of all other junior convertible preferred stock, the dividend that would have been payable with respect to such share if it had first been converted to common stock.

Liquidation Preference

In the event of any liquidation event, the holders of Series F convertible preferred stock and Series F-1 convertible preferred stock shall be entitled to receive, on a *pari passu* basis, before any payment is made to the holders of the Series D convertible preferred stock and Series E convertible preferred stock or the common stock, an amount equal to the greater of (1) the applicable original issue price, plus any declared but unpaid dividends thereon or (2) such amount per share as would have been payable had each share been converted into common stock immediately prior to the liquidation event.

Upon completion of the distribution noted above, the holders of Series E convertible preferred stock and Series D convertible preferred stock shall be entitled to receive, on a *pari passu* basis, before any payment is made to the holders of the Series A convertible preferred stock, Series B convertible preferred stock, Series C convertible preferred stock or the common stock, an amount equal to the greater of (1) applicable the original issue price, plus any declared but unpaid dividends thereon or (2) such amount per share as would have been payable had each share been converted into common stock immediately prior to the liquidation event.

Upon completion of the distribution noted above, the holders of Series A convertible preferred stock, Series B convertible preferred stock, and Series C convertible preferred stock shall be entitled to receive, on a *pari passu* basis, before any payment is made to the holders of the Series E-1 convertible preferred stock or the common stock, an amount equal to the greater of (1) the applicable original issue price, plus any declared but unpaid dividends thereto, or (2) such amount per share as would have been payable had each share been converted into common stock immediately prior to the liquidation event.

Upon completion of the distribution noted above, our remaining assets available for distribution to shareholders shall be distributed with equal priority and pro rata among the holders of Series E-1 convertible preferred stock and common stock (not including the Series A convertible preferred stock, Series B convertible preferred stock, Series C convertible preferred stock, Series D convertible preferred stock, Series E convertible preferred stock, Series F convertible preferred stock and Series F-1 convertible preferred stock on an as-if converted basis).

Voting

Each holder of convertible preferred stock shall be entitled to vote on all matters submitted to a vote by shareholders and shall be entitled to that number of votes equal to the number of shares of

common stock into which such holder's shares of convertible preferred stock are convertible, at the record date. Except as otherwise expressed, the holders of shares of convertible preferred stock and common stock shall vote together as a single class on all matters.

Redemption

So long as 4.0 million shares of our Series D convertible preferred stock, Series E convertible preferred stock, Series F convertible preferred stock and Series F-1 convertible preferred stock ("Senior Preferred Stock") are outstanding, we cannot, without the consent of the majority of the holders of the Senior Preferred Stock, on an as-converted basis, purchase or redeem any other class or series of capital stock, including preferred stock.

Classification

We have classified convertible preferred stock as mezzanine equity in the balance sheets as the shares are contingently redeemable upon a deemed liquidation such as a change in control and in that event there is no guarantee that all shareholders would be entitled to receive the same form of consideration. No accretion was recorded during the years ended December 31, 2017 and 2018 as a deemed liquidation event was not considered probable.

Series E-1 Convertible Preferred Stock Options

Included in convertible preferred stock is $1.8 million for the redemption value of outstanding Series E-1 convertible preferred stock options that are vested as of December 31, 2018. Upon the closing of a public offering these convertible preferred stock options will convert on a one-for-one basis to options in common stock with no adjustments to exercise price.

12. Shareholders' Deficit

Common Stock

We are authorized to issue 131,000,000 shares of common stock. Our common stock has a par value of $0.0001, no preferences or privileges and is not redeemable. Holders of our common stock are entitled to one vote for each share of common stock held.

We have reserved shares of common stock for the following as of December 31, 2018:

Shares to be issued upon conversion of all series of convertible preferred stock	92,790,094
Shares to be issued upon exercise of outstanding common stock options	14,893,253
Shares available for future stock option grants	6,827,996
Shares to be issued upon exercise of outstanding Series E-1 convertible preferred stock options	264,677
Shares to be issued upon conversion of Series C convertible preferred stock in connection with warrant exercise	56,875
Shares to be issued upon conversion of common stock warrants	55,032
Shares of common stock reserved for future issuance	114,887,927

Common Stock Warrants

In connection with two transactions in 2012 and 2013, we granted warrants to purchase up to 55,032 shares of common stock. The warrants are exercisable at any time for a period of ten years from the date of issuance at an average exercise price of $0.37, except in the case of warrants to purchase 20,000 shares of common stock at an exercise price of $0.45 per share that may expire if unexercised prior to the closing of a public offering.

13. Share-Based Compensation

Adaptive 2009 Equity Incentive Plan

We adopted an equity incentive plan during 2009 ("2009 Plan") that provides for the issuance of incentive and nonqualified common stock options, and other share-based awards for employees, directors and consultants. Under the 2009 Plan, the option exercise price for incentive and nonqualified stock options may not be less than the fair market value of our common stock at the date of grant as determined by the Board of Directors. Options expire no later than ten years from the grant date, and vesting is established at the time of grant. As of December 31, 2018, we have authorized 21,721,249 shares of common stock for issuance under the 2009 Plan.

A summary of our option and restricted stock unit ("RSU") activity is as follows:

	Shares available for grant	Shares subject to outstanding options	Weighted-average exercise price per share	Aggregate intrinsic value (in thousands)
Outstanding at December 31, 2016	3,423,473	12,985,266	$ 3.46	$ 37,138
Authorized	—	—	—	
Options granted	(1,604,496)	1,604,496	6.27	
RSUs forfeited	880,487	(880,487)	—	
Forfeited	2,086,035	(2,086,035)	5.80	
Exercised	—	(54,685)	1.73	
Outstanding at December 31, 2017	4,785,499	11,568,555	3.70	32,970
Authorized	6,000,000	—	—	
Options granted	(4,764,625)	4,764,625	6.55	
Forfeited	807,122	(807,122)	5.54	
Exercised	—	(632,805)	1.85	
Outstanding at December 31, 2018	6,827,996	14,893,253	4.59	39,864

In 2016, we granted 880,487 RSUs. The vesting of the shares required the satisfaction of both a service and an event condition. In 2017, these RSUs were forfeited due to the employee's termination prior to the occurrence of either conditions.

Adaptive Biotechnologies Corporation
Notes to Financial Statements

December 31, 2018

The following table summarizes information about stock options outstanding and exercisable at December 31, 2018:

Exercise price	Options outstanding	Weighted-average remaining contractual life (years)	Options exercisable	Aggregate intrinsic value (in thousands)
$ 0.16	469,109	1.36	469,109	
0.33	1,428,959	2.90	1,428,959	
0.45	641,000	3.95	641,000	
0.84	1,115,225	5.05	1,115,225	
1.98	1,040,500	5.65	1,040,500	
4.07	409,194	6.22	395,005	
6.27	672,353	6.73	402,321	
6.32	4,431,538	6.71	3,623,123	
6.55	4,685,375	9.29	947,049	
	14,893,253	6.66	10,062,291	$ 36,089

The weighted-average exercise price for options exercisable as of December 31, 2018 was $3.68. The weighted-average grant date fair value of options granted was $4.00 and $4.15 during the years ended December 31, 2017 and 2018, respectively. The total intrinsic value of awards exercised was $0.3 million and $3.0 million during the years ended December 31, 2017 and 2018, respectively.

Sequenta, Inc. 2008 Stock Plan, as amended

In connection with our acquisition of Sequenta Inc. in January 2015, we assumed Sequenta's Equity Incentive Plan ("2008 Plan"), including all outstanding options and shares available for future issuance under the 2008 Plan, which are all exercisable for Series E-1 convertible preferred stock.

A summary of our Series E-1 convertible preferred stock option activity is as follows:

	Convertible preferred shares subject to outstanding options	Weighted-average exercise price per share	Aggregate intrinsic value (in thousands)
Outstanding at December 31, 2016	814,563	$ 0.56	$ 4,814
Options granted	—	—	
Forfeited	(121,898)	0.55	
Exercised	(171,526)	0.74	
Outstanding at December 31, 2017	521,139	0.50	3,195
Options granted	—	—	
Forfeited	(122,397)	0.36	
Exercised	(134,065)	0.75	
Outstanding at December 31, 2018	264,677	0.44	1,826

Adaptive Biotechnologies Corporation
Notes to Financial Statements

December 31, 2018

The following table summarizes information about convertible preferred stock options outstanding and exercisable at December 31, 2018:

Exercise price	Options outstanding	Weighted-average remaining contractual life (years)	Options exercisable	Aggregated intrinsic value (in thousands)
$ 0.10	104,652	0.63	104,652	
0.28	10,153	2.23	10,153	
0.55	74,473	4.08	74,473	
0.82	70,518	5.12	70,480	
0.92	4,881	5.37	4,881	
	264,677	2.94	264,639	$ 1,826

There were no preferred options granted during the years ended December 31, 2017 and 2018. The total intrinsic value of awards exercised was $1.0 million and $0.8 million during the years ended December 31, 2017 and 2018, respectively.

Fair value of options granted

The estimated fair value of options granted during 2017 and 2018 was estimated using the Black-Scholes option-pricing model with the following weighted-average assumptions for our 2009 Plan:

	Year Ended December 31,	
	2017	2018
Expected term (in years)	6.12	6.14
Risk-free interest rate	2.0%	2.7%
Expected volatility	70.2%	68.1%
Expected dividend yield	—	—

The determination of the fair value of stock options on the date of grant using a Black-Scholes option-pricing model is affected by the estimated fair value of our common stock, as well as assumptions regarding a number of variables that are complex, subjective and generally require significant judgment to determine. The valuation assumptions were determined as follows:

Fair value of common stock—The grant date fair value of our common stock has been determined by our Board of Directors with input from management. The grant date fair value of the common stock was determined using valuation methodologies which utilizes certain assumptions, including probability weighting of events, volatility, time to liquidation, a risk-free interest rate and an assumption for a discount for lack of marketability (Level 3 inputs). In determining the fair value of the common stock, the methodologies used to estimate the enterprise value were performed using methodologies, approaches and assumptions consistent with the American Institute of Certified Public Accountants Accounting Practice Aid, *Valuation of Privately-Held-Company Equity Securities Issued as Compensation*.

Expected term—The expected life of options granted to employees is determined using the “simplified” method, as illustrated in ASC 718, *Compensation—Stock Compensation*, as we do not

have sufficient exercise history to determine a better estimate of expected term. Under this approach, the expected term is presumed to be the average of the weighted-average vesting term and the contractual term of the option.

Risk-free interest rate—We utilize a risk-free interest rate in the option valuation model based on U.S. Treasury zero-coupon issues, with remaining terms similar to the expected term of the options.

Expected volatility—As we do not have any trading history for our common stock, the expected volatility is based on the historical volatility of our publicly traded industry peers utilizing a period of time consistent with our estimate of expected term.

Expected dividend yield—We do not anticipate paying any cash dividends in the foreseeable future and, therefore, use an expected dividend yield of zero in the option valuation model.

Share-based compensation expense of $7.0 million and $11.1 million was recognized during the years ended December 31, 2017 and 2018, respectively. The compensation costs related to stock options are included in the statements of operations as follows (in thousands):

	Year Ended December 31,	
	2017	2018
Cost of revenue	$ 237	$ 398
Research and development	2,375	2,896
Sales and marketing	1,344	2,891
General and administration	3,053	4,964
Total share-based compensation expense	$ 7,009	$ 11,149

There were no stock option modifications during the year ended December 31, 2017. During the year ended December 31, 2018, there was one option modification to extend the option exercise period which resulted in incremental stock compensation of $0.5 million. The total grant date fair value of the stock options that vested during the years ended December 31, 2017 and 2018, excluding the impact of modifications, approximated the share-based compensation expense recorded during the respective periods.

At December 31, 2018, unrecognized share-based compensation expense related to unvested stock options was $18.3 million that is expected to be recognized over a remaining weighted-average period of 2.72 years.

14. Restructuring Charges

On June 17, 2016, we announced that we were consolidating our South San Francisco, California laboratory operations into our Seattle, Washington location to recognize cost savings. The transition of activities was completed in April 2017.

Adaptive Biotechnologies Corporation
Notes to Financial Statements

December 31, 2018

The following table summarizes the activity within the restructuring related balance sheet accounts during the year ended December 31, 2017 (in thousands):

	One-time termination benefits	Asset impairments and net loss on sale or disposal	Other[1]	Total
Balance at December 31, 2016	$ 2,564	$ —	$ —	$ 2,564
Costs incurred and charged to expense	512	210	118	840
Cash payments	(3,076)	—	(118)	(3,194)
Non-cash items	—	(210)	—	(210)
Balance at December 31, 2017	$ —	$ —	$ —	$ —

(1) "Other" primarily reflects activities associated with the consolidation of our facilities and manufacturing operations, including contract termination costs.

15. Microsoft Collaboration Agreement

In December 2017, we entered into a collaboration agreement with Microsoft Corporation ("Microsoft Agreement") to computationally derive a comprehensive TCR antigen map for purposes of developing a universal diagnostic based on a single blood test.

Pursuant to the Microsoft Agreement, we provide Microsoft data and immunomics, diagnostic and bioinformatics expertise, at no charge to Microsoft, and Microsoft provides machine learning software and cloud services development support, at no charge, to develop immunomic artificial intelligence services. In addition, during the term of the Microsoft Agreement, we have agreed to exclusively use Microsoft's Azure cloud services at standard volume pricing with a minimum Azure consumption requirement of $12 million over the seven-year term of the agreement which we expect to meet. We have also agreed to host each diagnostic product developed as a direct result of the Microsoft Agreement on Azure throughout the term of the Microsoft Agreement and for a period of five years thereafter.

During the term of the Microsoft Agreement, each party has granted each other certain licenses to one another's intellectual property rights and have agreed to certain defined exclusivity obligations with respect to collaborations and projects that are substantially similar to the Microsoft Agreement. We retain all license rights to commercialize any immunological research, diagnostic, and therapeutic products and services that arise out of the collaboration and we have no financial commitments to Microsoft other than our commitments to purchase Microsoft's Azure cloud services. Both parties must make good faith and reasonable efforts to carry out the collaboration agreement but there are no contractual minimums or maximums of resource efforts aside from our commitments pertaining the purchase of the Azure cloud services.

Additionally, contemporaneously with entering into the Microsoft Agreement, Microsoft made a preferred stock investment of approximately $45.0 million as a part of our Series F-1 convertible preferred stock issuance. We determined that the preferred stock issuance and Azure commitments were made at terms consistent with market rates on the date of the collaboration. Both parties are responsible for their own costs incurred over the course of the collaboration and there is no other cash consideration provided by Microsoft to us or cash consideration payable by us to Microsoft aside from

our commitments to utilize Microsoft's Azure cloud services. For the year ended December 31, 2018, we recognized $0.5 million in research and development expense related to the cloud services provided to us by Microsoft.

16. Income Taxes

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

	December 31,	
	2017	2018
Deferred tax assets:		
Net operating losses	$ 47,840	$ 56,555
Tax credit carryforward	5,463	6,709
Non qualifying stock options	4,865	7,861
Other	3,774	4,523
Total deferred tax assets	61,942	75,648
Valuation allowance	(56,679)	(70,722)
Deferred tax assets, net of valuation allowance	5,263	4,926
Deferred tax liabilities:		
Tangible and intangible assets	(5,263)	(4,926)
Net deferred taxes	$ —	$ —

ASC Topic 740, *Income Taxes*, requires that the tax benefit of net operating losses, temporary differences and credit carryforwards be recorded as an asset to the extent that management assesses that realization is "more likely than not." Realization of the future tax benefits is dependent on our ability to generate sufficient taxable income within the carryforward period. Because of our history of operating losses, management believes that recognition of the deferred tax assets arising from the above-mentioned future tax benefits is currently not likely to be realized and, accordingly, has provided a valuation allowance. The valuation allowance decreased $9.7 million and increased by $14.0 million during the years ended December 31, 2017 and 2018, respectively.

On December 22, 2017, the Tax Cuts and Jobs Act of 2017 ("TCJA") was signed into law, making significant changes to the Internal Revenue Code, including a decrease in the federal corporate tax rate from 35% to 21%. Taxpayers are required to recognize the effect of tax law changes in the period of enactment. The re-measurement resulted in a total decrease in these net assets equal to $25.0 million, which was fully offset by a corresponding reduction in the valuation allowance. As of December 31, 2018, we completed our assessment of the impact of the changes due to the TCJA and the provisional amounts recorded are final.

Federal tax laws impose substantial restrictions on the utilization of net operating loss and credit carryforwards in the event of an ownership change, as defined in Section 382 of the Internal Revenue Code. Accordingly, our ability to utilize these carryforwards may be limited due to such ownership change. We have completed a Section 382 analysis for approximately $186.9 million of our federal

operating losses and there are no permanent limitations on the utilization of our federal net operating losses as of December 31, 2018. Net operating losses generated by Sequenta, Inc. of approximately $38.5 million prior to the our acquisition in January of 2015 were excluded from this analysis and maybe limited as we have not completed a Section 382 analysis. Under the newly enacted federal income tax law, federal net operating losses incurred in 2018 and in future years may be carried forward indefinitely, but the deductibility of such federal net operating losses is limited. Net operating losses generated prior to 2018 are eligible to carried forward up to 20 years. As of December 31, 2018, we had U.S. federal net operating losses of $47.3 million and U.S. federal tax credits of $6.0 million. The tax credit and net operating loss carryforwards will begin to expire in 2028.

The effective tax rate of our provision for income taxes differs from the federal statutory rate as follows:

	Year ended December 31,	
	2017	2018
Statutory rate	34.00%	21.00%
State tax	1.82	5.50
Stock compensation	(1.72)	0.47
Permanent items	(0.08)	0.48
Credits	2.69	2.68
TCJA change in federal rate	(58.36)	—
Other	(0.66)	0.16
Change in valuation allowance	22.31	(30.29)
Total	0.00%	0.00%

We recognize, in our financial statements, the effect of a tax position when it is more likely than not, based on the technical merits, that the position will be sustained upon examination. We had unrecognized tax benefits of approximately $1.3 million as of December 31, 2018. A reconciliation of the beginning and ending amounts of unrecognized tax benefits during the two years ended December 31, 2017 and 2018 are as follows (in thousands):

Balance at December 31, 2016	$ 844
Additions in 2017	187
Balance at December 31, 2017	1,031
Additions in 2018	229
Balance at December 31, 2018	$1,260

During the years ended December 31, 2017 and 2018, we recognized uncertain tax positions of $0.2 million related to a reduction of the research and development credit deferred tax asset. Unrecognized tax benefits may change during the next twelve months for items that arise in the ordinary course of business. We do not anticipate a material change to our unrecognized tax benefits over the next twelve months that would have an adverse effect on our operating results.

We recognize interest and penalties accrued on any unrecognized tax benefits as a component of income tax expense. We had no accrued interest or penalties related to uncertain tax positions as of December 31, 2017 and 2018.

We file federal and certain state income tax returns, which provide varying statutes of limitations on assessments. However, because of net operating loss carryforwards, substantially all tax years since inception remain open to federal and state tax examination.

17. Net Loss and Unaudited Pro Forma Net Loss Per Share Attributable to Common Shareholders

Net Loss Per Share

The following table sets forth the computation of the basic and diluted net loss per share attributable to common shareholders (In thousands, except shares and per share amounts):

	Year ended December 31,	
	2017	2018
Net loss	$ (42,831)	$ (46,447)
Fair value adjustments to redemption value for Series E-1 convertible preferred stock options	135	102
Net loss attributable to common shareholders, basic and diluted	$ (42,696)	$ (46,345)
Weighted-average shares used in computing net loss per share	12,196,998	12,629,778
Net loss per share attributable to common shareholders, basic and diluted	$ (3.50)	$ (3.67)

Since we were in a loss position for all periods presented, basic net loss per share attributable to common shareholders is the same as diluted net loss per share attributable to common shareholders, as the inclusion of all potential shares of common stock outstanding would have been anti-dilutive. The following weighted-average common stock equivalents were excluded from the calculation of diluted net loss per share attributable to common shareholders for the periods presented as they had an anti-dilutive effect:

	Year ended December 31,	
	2017	2018
Convertible preferred stock (on as if converted basis)	88,473,431	92,783,867
2009 Plan stock options issued and outstanding	12,022,454	14,368,063
2008 Plan stock options issued and outstanding	622,472	333,563
Common stock warrants	55,032	55,032
Convertible preferred stock warrants	56,875	56,875
Total	101,230,264	107,597,400

Adaptive Biotechnologies Corporation
Notes to Financial Statements

December 31, 2018

Unaudited Pro Forma Net Loss Per Share

The following table sets forth the computation of the unaudited pro forma basic and diluted net loss per share attributable to common shareholders (in thousands, except shares and per share amounts):

	Year Ended December 31, 2018
Numerator:	
Pro forma net loss attributable to common shareholders, basic and diluted	$ (46,477)
Denominator:	
Weighted-average shares used in computing net loss per share attributable to common shareholders, basic and diluted	12,629,778
Weighted-average shares of common stock issued upon assumed conversion of convertible preferred stock in an IPO	92,783,867
Weighted-average shares of common stock issued upon assumed conversion of convertible preferred stock warrants in an IPO	56,875
Weighted-average shares used in computing pro forma net loss per share attributable to common shareholders, basic and diluted	105,470,520
Pro forma net loss per share attributable to common shareholders, basic and diluted	$ (0.44)

18. Retirement Plan

We maintain a salary deferral 401(k) plan (“401(k) Plan”), covering employees who have met certain eligibility requirements. Employees may defer up to 100% of their compensation to the 401(k) Plan, subject to federal limits. We did not make any discretionary contributions during the years ended December 31, 2017 and 2018.

19. Subsequent Events

In January 2019, clonoSEQ received Medicare coverage aligned with the FDA label and National Comprehensive Cancer Network guidelines for longitudinal monitoring in certain blood cancers.

In the first quarter of 2019, the Board of Directors approved additional stock option grants under our 2009 Plan of 2,045,000 shares to certain employees and 105,000 shares to non-employee directors. All option grants were issued with option exercise prices of $7.27 per share and subject to continuing service vesting conditions.

Management has reviewed and evaluated material subsequent events from the balance sheet date of December 31, 2018, through the date the financial statements were available to be issued, March 29, 2019. Other than the matters noted above, no subsequent events have been identified for disclosure.

Shares

Adaptive Biotechnologies Corporation

Common Stock

Goldman Sachs & Co. LLC **J.P. Morgan** **BofA Merrill Lynch**

Cowen **Guggenheim Securities**

William Blair **BTIG**

Through and including , 2019 (the 25th day after the date of this prospectus), all dealers that effect transactions in these securities, whether or not participating in this offering, may be required to deliver a prospectus. This is in addition to the dealers' obligation to deliver a prospectus when acting as underwriters and with respect to their unsold allotments or subscriptions.

PART II

INFORMATION NOT REQUIRED IN PROSPECTUS

Item 13. Other Expenses of Issuance and Distribution

The following is a statement of the costs and expenses, other than the underwriting discounts and commissions, to be incurred by us in connection with the distribution of the securities registered under this registration statement. All amounts are estimated except the SEC registration fee, the FINRA filing fee and The Nasdaq Global Select Market listing fee.

Item	Amount
SEC Registration Fee	$ *
FINRA Filing Fee	*
The Nasdaq Global Select Market Listing Fee	*
Accounting Fees and Expenses	*
Legal Fees and Expenses	*
Transfer Agent Fees	*
Printing and Engraving Expenses	*
Miscellaneous	*
Total	$ *

* To be completed by amendment.

Item 14. Indemnification of Directors and Officers

RCW 23B.08.320 permits a Washington corporation to, through its articles of corporation, eliminate or limit the personal liability of a director to the corporation or its shareholders for monetary damages for conduct as a director, except for the following:

i. acts or omissions that involve intentional misconduct by a director or a knowing violation of law by a director;

ii. conduct violating RCW 23B.08.310 relating to unlawful distributions;

iii. any transaction from which the director will personally receive a benefit in money, property or services to which the director is not legally entitled; and

iv. any act or omission occurring prior to the date when the provision in the articles of incorporation eliminating or limiting liability becomes effective.

RCW 23B.08.510 authorizes a Washington corporation to indemnify an individual made a party to a proceeding because the individual is or was a director against liability incurred in the proceeding if:

i. the individual acted in good faith; and

ii. the individual reasonably believed (a) in the case of conduct in the individual's official capacity with the corporation, that the individual's conduct was in its best interests, and (b) in all other cases, that the individual's conduct was at least not opposed to its best interests; and

iii. in the case of any criminal proceeding, the individual had no reasonable cause to believe the individual's conduct was unlawful.

Notwithstanding the forgoing, a Washington corporation may not indemnify a director under RCW 23B.08.510 in connection with (a) a proceeding by or on behalf of the corporation in which the director

was adjudged liable to the corporation or (b) any other proceeding charging improper personal benefit to the director, in which the director was adjudged liable on the basis that personal benefit was improperly received by the director. Additionally, where a proceeding is by or on behalf of the corporation, the indemnification permitted under RCW 23B.08.510 is limited to reasonable expenses incurred in connection with the proceeding.

RCW 23B.08.520 mandates a Washington corporation to indemnify a director who was wholly successful, on the merits or otherwise, in the defense of any proceeding to which the director was a party because of being a director of the corporation against reasonable expenses incurred by the director in connection with the proceeding, unless such indemnification is limited in the corporation's articles of incorporation. Our amended and restated articles of incorporation which will be in effect upon the closing of this offering will not contain any such limitation.

RCW 23B.08.540 permits court-ordered indemnification, unless a corporation's articles of incorporation provides otherwise. Pursuant to this provision, in the absence of a contrary provision in a corporation's articles of incorporation, a director who is a party to a proceeding may apply for indemnification or advance of expenses to the court conducting the proceeding or to another court of competent jurisdiction, and such court may order indemnification or advance of expenses if it makes certain determinations.

Under RCW 23B.08.570, unless a corporation's articles of incorporation provide otherwise, an officer of a Washington corporation who is not a director is also entitled to mandatory indemnification under RCW 23B.08.520 and court-ordered indemnification under RCW 23B.08.540, each of which sections are summarized above, to the same extent as a director. Further, a Washington corporation may indemnify an officer, employee or agent of the corporation under RCW 23B.08.510, to the same extent as a director.

RCW 23B.08.580 permits a corporation to purchase and maintain insurance on behalf of any individual who is or was a director, officer, employee or agent of the corporation, or who while a director, officer, employee or agent of the corporation, is or was serving at the corporation's request as a director, officer, partner, trustee, employee or agent of another corporation, partnership, joint venture, trust, employee benefit plan or other enterprise, against liability asserted against or incurred by the individual in that capacity or arising from the individual's status as a director, officer, employee or agent, whether or not the corporation would have power to indemnify such individual against the same liability under RCW 23B.08.510 and 23B.08.520.

Our amended and restated articles of incorporation and our amended and restated bylaws which will be in effect upon the closing of this offering will provide that we will indemnify our directors and officers to the fullest extent permitted under Washington law.

We have entered into indemnification agreements with each of our current directors and executive officers, and may enter into indemnification agreements with future directors and executive officers, to provide such directors and officers, additional contractual assurances regarding the scope of the indemnification set forth in our amended and restated articles of incorporation and our amended and restated bylaws and to provide additional procedural protections.

We may also purchase and maintain liability insurance on behalf of our directors, officers, employees, and agents. We currently maintain a liability insurance policy pursuant to which our directors and officers may be indemnified against liability incurred as a result of serving in their capacities as directors and officers, subject to certain exclusions.

The underwriting agreement, to be filed as Exhibit 1.1 hereto, is expected to provide for indemnification by the underwriters of us and our officers and directors, and by us of the underwriters, against certain liabilities, including liabilities arising under the Securities Act.

Item 15. Recent Sales of Unregistered Securities

The following sets forth information regarding all unregistered securities we have sold since May 1, 2016.

(a) Sales of Preferred Stock

On December 11, 2017 we entered into a Series F-1 Preferred Stock Purchase Agreement, pursuant to which we issued and sold an aggregate of 4,686,649 shares of our Series F-1 convertible preferred stock at a price per share of $10.6686, for an aggregate purchase price of $49,999,984.

No underwriters were involved in the foregoing sales of securities. Unless otherwise stated, the sales of securities described above were deemed to be exempt from registration pursuant to Section 4(a)(2) of the Securities Act, including Regulation D and Rule 506 promulgated thereunder, as transactions by an issuer not involving a public offering. All of the purchasers in these transactions represented to us in connection with their purchase that they were acquiring the securities for investment and not distribution, that they could bear the risks of the investment and could hold the securities for an indefinite period of time. Such purchasers received written disclosures that the securities had not been registered under the Securities Act and that any resale must be made pursuant to a registration or an available exemption from such registration. All of the foregoing securities are deemed restricted securities for the purposes of the Securities Act.

(b) Grants and Exercises of Stock Options

In connection with our Sequenta Acquisition, we assumed stock options to purchase an aggregate of 1,574,045 shares of our Series E-1 convertible preferred stock, which, to the extent such options are outstanding as of the closing of this offering, will each be converted into options to purchase one share of our common stock, with exercise prices ranging from $0.10 to $0.92 per share, to employees, directors and consultants pursuant to our Sequenta Plan. During the period beginning May 1, 2016 and ending April 30, 2019, 567,282 shares of Series E-1 convertible preferred stock were issued upon the exercise of stock options pursuant to our Sequenta Plan, which will each be converted into one share of our common stock upon the closing of this offering.

During the period beginning May 1, 2016 and ending April 30, 2019, we granted stock options to purchase an aggregate of 10,181,202 shares of our common stock, with exercise prices ranging from $6.27 to $7.80 per share, to employees, directors and consultants pursuant to the 2009 Plan. During the period beginning May 1, 2016 and ending April 30, 2019, 1,057,076 shares of common stock were issued upon the exercise of stock options pursuant to the 2009 Plan.

The issuances of the securities described above were exempt from registration pursuant to Section 4(a)(2) of the Securities Act as transactions by an issuer not involving a public offering or Rule 701 promulgated under the Securities Act as transactions pursuant to compensatory benefit plans. The shares of common stock issued upon the exercise of options are deemed to be restricted securities for purposes of the Securities Act.

Item 16. Exhibits and Financial Statement Schedules

(a) Exhibits

Exhibit No.	Exhibit Index
1.1*	Form of Underwriting Agreement
3.1*	Amended and Restated Articles of Incorporation of the Registrant, as currently in effect
3.2*	Form of Amended and Restated Articles of Incorporation of the Registrant (to be effective upon the closing of this offering)
3.3**	Bylaws of the Registrant, as currently in effect
3.4*	Form of Amended and Restated Bylaws (to be effective upon the closing of this offering)
4.1*	Seventh Amended and Restated Investors' Rights Agreement among the Registrant and certain of its shareholders, dated , 2019
4.2	Specimen Stock Certificate evidencing shares of common stock
4.3**	Warrant to Purchase Stock, dated June 5, 2012, issued by the Registrant to Silicon Valley Bank
4.4**	Warrant to Purchase Common Stock, dated July 18, 2013, issued by the Registrant to Imdaptive, Inc.
4.5**	Warrant to Purchase Stock, dated April 21, 2014, issued by the Registrant to Alexandria Equities, LLC
5.1*	Opinion of DLA Piper LLP (US)
10.1†	Strategic Collaboration and License Agreement between Genentech, Inc. and the Registrant, dated December 19, 2018
10.2†	Strategic Collaboration Agreement between Microsoft Corporation and the Registrant, dated December 11, 2017
10.3†*	Master Terms & Conditions of Sale between Illumina, Inc. and the Registrant, dated , 2019
10.4†	Master Collaboration Agreement between Adaptimmune Limited and the Registrant, dated July 10, 2015
10.5*	Amended and Restated Side Letter Agreement among Viking Global Equities LP, Viking Global Equities II LP, VGE III Portfolio Ltd., Viking Long Fund Master Ltd. and the Registrant, dated , 2019
10.6**	Master Services Agreement between ZS Associates, Inc. and the Registrant, dated August 5, 2015, as amended by Amendment No. 1, dated April 24, 2017
10.7**	Adaptive Biotechnologies Corporation 2009 Equity Incentive Plan and form of award agreements thereunder
10.8*	Adaptive Biotechnologies Corporation 2019 Equity Incentive Plan and forms of award agreements thereunder
10.9	Form of Restated Non-Employee Director Change in Control Agreement between the Registrant and each of its non-employee directors, to be in effect upon the effectiveness of this Registration Statement
10.10**	Form of Indemnification Agreement between the Registrant and each of its directors and executive officers
10.11	Form of Amended and Restated Employment Agreement between the Registrant and certain of its executive officers, to be in effect upon the effectiveness of this Registration Statement
10.12**	Lease Agreement between ARE-Seattle No. 11, LLC and Adaptive TCR Corporation, dated July 21, 2011, as amended by Amendment No. 1, dated August 26, 2011, Amendment No. 2, dated June 30, 2014, Amendment No. 3, dated November 5, 2015, Amendment No. 4, dated December 23, 2015, and Amendment No. 5, dated June 6, 2016
10.13	Executive Severance Agreement between the Registrant and Chad Cohen, dated April 17, 2019

Exhibit No.	Exhibit Index
10.14	Executive Severance Agreement between the Registrant and Lance Baldo, MD, dated April 17, 2019
10.15	Executive Severance Agreement between the Registrant and Charles Sang, dated April 17, 2019
10.16*	Adaptive Biotechnologies Corporation 2019 Employee Stock Purchase Plan
10.17*	Adaptive Biotechnologies Corporation Non-Employee Director Compensation Policy
23.1*	Consent of Independent Registered Public Accounting Firm
23.2*	Consent of DLA Piper LLP (US) (included in Exhibit 5.1)
24.1*	Power of Attorney (included on the signature page hereto)

* To be filed by amendment.
** Previously submitted.
† Portions of this exhibit have been omitted pursuant to Item 601 of Regulation S-K promulgated under the Securities Act because the information is not material and would be competitively harmful if publicly disclosed.

(b) Financial statement schedules. Schedules not listed above have been omitted because the information required to be set forth therein is not applicable or is shown either in the financial statements or the notes thereto.

Item 17. Undertakings

The undersigned registrant hereby undertakes to provide to the underwriter at the closing specified in the underwriting agreement certificates in such denominations and registered in such names as required by the underwriter to permit prompt delivery to each purchaser.

The undersigned registrant hereby undertakes that:

(1) For purposes of determining any liability under the Securities Act, the information omitted from the form of prospectus filed as part of this registration statement in reliance upon Rule 430A and contained in a form of prospectus filed by the registrant pursuant to Rule 424(b) (1) or (4) or 497(h) under the Securities Act shall be deemed to be part of this registration statement as of the time it was declared effective.

(2) For the purpose of determining any liability under the Securities Act, each post-effective amendment that contains a form of prospectus shall be deemed to be a new registration statement relating to the securities offered therein, and the offering of such securities at that time shall be deemed to be the initial bona fide offering thereof.

Insofar as indemnification for liabilities arising under the Securities Act may be permitted to directors, officers and controlling persons of the registrant pursuant to the foregoing provisions, or otherwise, the registrant has been advised that in the opinion of the Securities and Exchange Commission such indemnification is against public policy as expressed in the Securities Act and is, therefore, unenforceable. In the event that a claim for indemnification against such liabilities (other than the payment by the registrant of expenses incurred or paid by a director, officer or controlling person of the registrant in the successful defense of any action, suit or proceeding) is asserted by such director, officer or controlling person in connection with the securities being registered, the registrant will, unless in the opinion of its counsel the matter has been settled by controlling precedent, submit to a court of appropriate jurisdiction the question whether such indemnification by it is against public policy as expressed in the Securities Act and will be governed by the final adjudication of such issue.

SIGNATURES

Pursuant to the requirements of the Securities Act of 1933, the registrant has duly caused this registration statement to be signed on its behalf by the undersigned, in the city of Seattle, State of Washington, on , 2019.

Adaptive Biotechnologies Corporation

By: _____
Chad Robins
Chief Executive Officer

POWER OF ATTORNEY

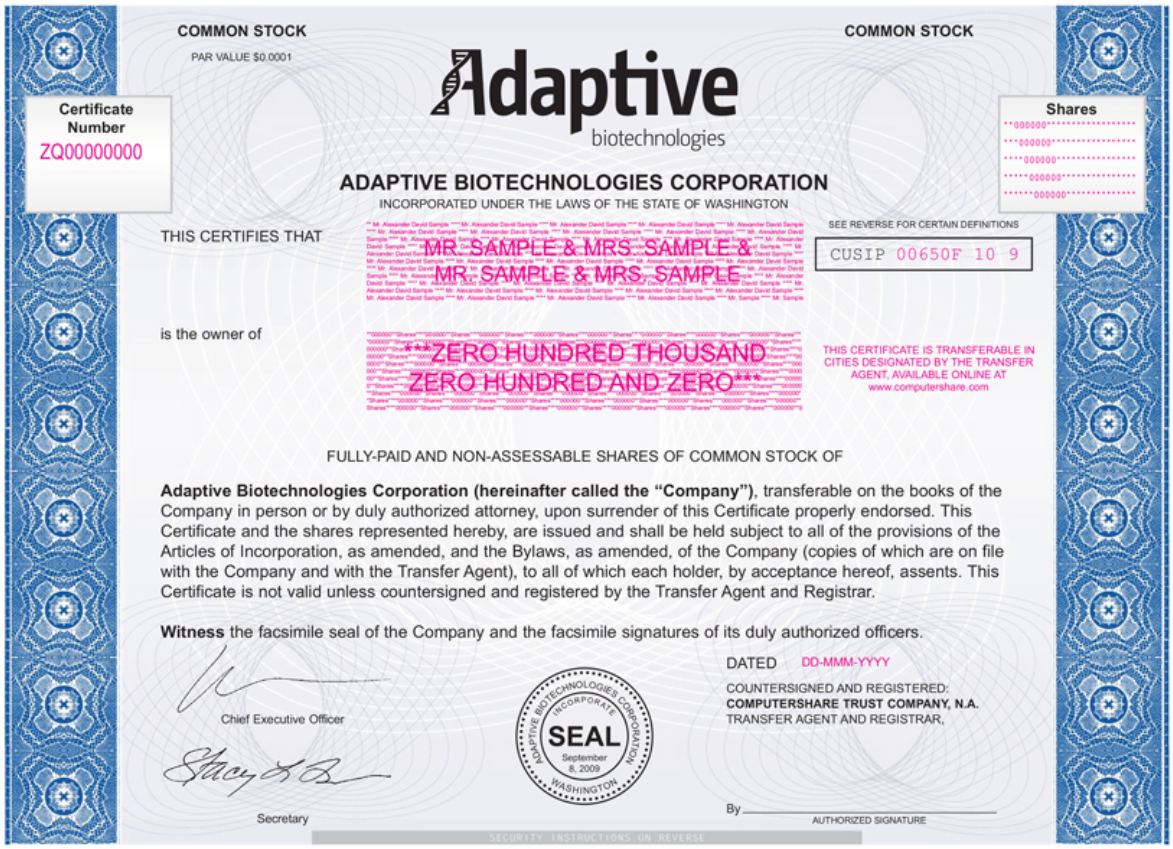
KNOW ALL PERSONS BY THESE PRESENTS, that each person whose individual signature appears below hereby authorizes and appoints Chad Robins and Chad Cohen, and each of them, with full power of substitution and resubstitution and full power to act without the other, as his true and lawful attorney-in-fact and agent to act in his name, place and stead and to execute in the name and on behalf of each person, individually and in each capacity stated below, and to file any and all amendments to this registration statement on Form S-1, and to file the same, with all exhibits thereto, and all other documents in connection therewith, with the Securities and Exchange Commission, granting unto said attorneys-in-fact and agents, and each of them, full power and authority to do and perform each and every act and thing, ratifying and confirming all that said attorneys-in-fact and agents or any of them or their or his substitute or substitutes may lawfully do or cause to be done by virtue thereof.

Pursuant to the requirements of the Securities Act of 1933, this registration statement has been signed below by the following persons in the capacities and on the dates indicated.

Signature	Title	Date
Chad Robins	Chief Executive Officer and Director *(Principal Executive Officer)*	, 2019
Chad Cohen	Chief Financial Officer *(Principal Financial and Accounting Officer)*	, 2019
Kevin Conroy	Director	, 2019
Eric Dobmeier	Director	, 2019
David Goel	Director	, 2019
Michelle Griffin	Director	, 2019
Robert Hershberg, PhD, MD	Director	, 2019

Signature	Title	Date
_____ Peter Neupert	Director	, 2019
_____ Michael Pellini, MD	Director	, 2019
_____ Andris Zoltners, PhD	Director	, 2019

ZQ|CERT#|COY|CLS|RGSTRY|ACCT#|TRANSTYPE|RUN#|TRANS#



COMMON STOCK

PAR VALUE $0.0001

COMMON STOCK

Certificate Number

ZQ00000000

Shares

000000

000000

****000000****

*****000000*****

******000000******

ADAPTIVE BIOTECHNOLOGIES CORPORATION

INCORPORATED UNDER THE LAWS OF THE STATE OF WASHINGTON

THIS CERTIFIES THAT

MR. SAMPLE & MRS. SAMPLE &
MR. SAMPLE & MRS. SAMPLE

SEE REVERSE FOR CERTAIN DEFINITIONS

CUSIP 00650F 10 9

is the owner of

***ZERO HUNDRED THOUSAND
ZERO HUNDRED AND ZERO***

THIS CERTIFICATE IS TRANSFERABLE IN CITIES DESIGNATED BY THE TRANSFER AGENT, AVAILABLE ONLINE AT www.computershare.com

FULLY-PAID AND NON-ASSESSABLE SHARES OF COMMON STOCK OF

Adaptive Biotechnologies Corporation (hereinafter called the "Company"), transferable on the books of the Company in person or by duly authorized attorney, upon surrender of this Certificate properly endorsed. This Certificate and the shares represented hereby, are issued and shall be held subject to all of the provisions of the Articles of Incorporation, as amended, and the Bylaws, as amended, of the Company (copies of which are on file with the Company and with the Transfer Agent), to all of which each holder, by acceptance hereof, assents. This Certificate is not valid unless countersigned and registered by the Transfer Agent and Registrar.

Witness the facsimile seal of the Company and the facsimile signatures of its duly authorized officers.

DATED DD-MMM-YYYY

Chief Executive Officer

ADAPTIVE BIOTECHNOLOGIES CORPORATION INCORPORATE SEAL September 8, 2009 WASHINGTON

COUNTERSIGNED AND REGISTERED:
COMPUTERSHARE TRUST COMPANY, N.A.
TRANSFER AGENT AND REGISTRAR,

Secretary

By _____
AUTHORIZED SIGNATURE

SECURITY INSTRUCTIONS ON REVERSE

1234567

Adaptive biotechnologies

PO BOX 43004, Providence, RI 02940-3004

MR A SAMPLE
DESIGNATION (IF ANY)
ADD 1
ADD 2
ADD 3
ADD 4

CUSIP/IDENTIFIER	XXXXXX XX X
Holder ID	XXXXXXXXXX
Insurance Value	1,000,000.00
Number of Shares	123456
DTC	12345678 12345678912345

Certificate Numbers	Num/No.	Denom.	Total
12345678901234567890	1	1	1
12345678901234567890	2	2	2
12345678901234567890	3	3	3
12345678901234567890	4	4	4
12345678901234567890	5	5	5
12345678901234567890	6	6	6
Total Transaction			7

ADAPTIVE BIOTECHNOLOGIES CORPORATION

THE COMPANY WILL FURNISH WITHOUT CHARGE TO EACH SHAREHOLDER WHO SO REQUESTS, A SUMMARY OF THE POWERS, DESIGNATIONS, PREFERENCES AND RELATIVE, PARTICIPATING, OPTIONAL OR OTHER SPECIAL RIGHTS OF EACH CLASS OF STOCK OF THE COMPANY AND THE QUALIFICATIONS, LIMITATIONS OR RESTRICTIONS OF SUCH PREFERENCES AND RIGHTS, AND THE VARIATIONS IN RIGHTS, PREFERENCES AND LIMITATIONS DETERMINED FOR EACH SERIES, WHICH ARE FIXED BY THE ARTICLES OF INCORPORATION OF THE COMPANY, AS AMENDED, AND THE RESOLUTIONS OF THE BOARD OF DIRECTORS OF THE COMPANY, AND THE AUTHORITY OF THE BOARD OF DIRECTORS TO DETERMINE VARIATIONS FOR FUTURE SERIES. SUCH REQUEST MAY BE MADE TO THE OFFICE OF THE SECRETARY OF THE COMPANY OR TO THE TRANSFER AGENT. THE BOARD OF DIRECTORS MAY REQUIRE THE OWNER OF A LOST OR DESTROYED STOCK CERTIFICATE, OR HIS LEGAL REPRESENTATIVES, TO GIVE THE COMPANY A BOND TO INDEMNIFY IT AND ITS TRANSFER AGENTS AND REGISTRARS AGAINST ANY CLAIM THAT MAY BE MADE AGAINST THEM ON ACCOUNT OF THE ALLEGED LOSS OR DESTRUCTION OF ANY SUCH CERTIFICATE.

The following abbreviations, when used in the inscription on the face of this certificate, shall be construed as though they were written out in full according to applicable laws or regulations:

TEN COM	- as tenants in common	UNIF GIFT MIN ACT	-.....(Cust).....Custodian.....(Minor).....
TEN ENT	- as tenants by the entireties		under Uniform Gifts to Minors Act.....(State).....
JT TEN	- as joint tenants with right of survivorship and not as tenants in common	UNIF TRF MIN ACT	-.....(Cust).....Custodian (until age.....) .....(Minor).....under Uniform Transfers to Minors Act.....(State).....

Additional abbreviations may also be used though not in the above list.

For value received,_____ hereby sell, assign and transfer unto

PLEASE INSERT SOCIAL SECURITY OR OTHER IDENTIFYING NUMBER OF ASSIGNEE

_____

(PLEASE PRINT OR TYPEWRITE NAME AND ADDRESS, INCLUDING POSTAL ZIP CODE, OF ASSIGNEE)

_____

_____

_____ Shares

of the common stock represented by the within Certificate, and do hereby irrevocably constitute and appoint

_____ Attorney

to transfer the said stock on the books of the within-named Company with full power of substitution in the premises.

Dated: _____ 20_____

Signature:_____

Signature:_____

Notice: The signature to this assignment must correspond with the name as written upon the face of the certificate, in every particular, without alteration or enlargement, or any change whatever.

Signature(s) Guaranteed: Medallion Guarantee Stamp

THE SIGNATURE(S) SHOULD BE GUARANTEED BY AN ELIGIBLE GUARANTOR INSTITUTION (Banks, Stockbrokers, Savings and Loan Associations and Credit Unions) WITH MEMBERSHIP IN AN APPROVED SIGNATURE GUARANTEE MEDALLION PROGRAM, PURSUANT TO S.E.C. RULE 17Ad-15.

SECURITY INSTRUCTIONS

THIS IS WATERMARKED PAPER. DO NOT ACCEPT WITHOUT NOTING WATERMARK. HOLD TO LIGHT TO VERIFY WATERMARK.

The IRS requires that the named transfer agent ("we") report the cost basis of certain shares or units acquired after January 1, 2011. If your shares or units are covered by the legislation, and you requested to sell or transfer the shares or units using a specific cost basis calculation method, then we have processed as you requested. If you did not specify a cost basis calculation method, then we have defaulted to the first in, first out (FIFO) method. Please consult your tax advisor if you need additional information about cost basis.

If you do not keep in contact with the issuer or do not have any activity in your account for the time period specified by state law, your property may become subject to state unclaimed property laws and transferred to the appropriate state.

1234567

Certain information has been excluded from this exhibit because it (i) is not material and (ii) would be competitively harmful if publicly disclosed.

CONFIDENTIAL **EXECUTION COPY**

STRATEGIC COLLABORATION AND LICENSE AGREEMENT

THIS STRATEGIC COLLABORATION AND LICENSE AGREEMENT ("**Agreement**") is made and entered into as of December 19, 2018 ("**Execution Date**"), by and between Adaptive Biotechnologies Corporation, a Washington corporation, having its principal place of business at 1551 Eastlake Ave E, Ste. 200 Seattle, Washington 98102 ("**Adaptive**") and Genentech, Inc., a Delaware corporation, having its principal place of business at 1 DNA Way, South San Francisco, California 94080 ("**GNE**"). GNE and Adaptive are sometimes referred to herein individually as a "**Party**" and collectively as the "**Parties**."

BACKGROUND

WHEREAS, Adaptive is a biotechnology company that is engaged in the discovery, identification and profiling of "**TCRs**" (defined below).

WHEREAS, GNE is a biopharmaceutical company that is engaged in the research, development, manufacture and sale of pharmaceutical products and therapies.

WHEREAS, the Parties desire to collaborate in the discovery, development, and commercialization of certain cellular therapy products using TCRs identified using Adaptive's proprietary platform for the treatment of cancer; and

WHEREAS, GNE desires to collaborate with Adaptive in the research and development of such TCRs and to obtain an exclusive license and other rights from Adaptive to develop and commercialize Licensed Products (defined below) for the treatment of cancer, and Adaptive agrees to engage in such collaborative efforts with GNE and to grant GNE certain licenses and other rights in exchange for certain agreed to upfront and other payments and other consideration, all as set forth herein.

NOW THEREFORE, for good and valuable consideration, the receipt and sufficiency of which is hereby acknowledged, GNE and Adaptive agree as follows:

ARTICLE 1
DEFINITIONS

Capitalized terms used in this Agreement, whether used in the singular or plural, shall have the meanings set forth below, unless otherwise specifically indicated herein.

1.1 "**Accounting Standard**" means, with respect to GNE, either: (a) International Financial Reporting Standards (IFRS); or (b) United States generally accepted accounting principles (GAAP), in either case, which standards or principles (as applicable) are currently used at the applicable time by, and as consistently applied by GNE.

1.2 "**Acquired Entity**" as defined in Section 8.1.6(c)(i).

1.3 "**Acquiring Affiliate**" as defined in Section 8.1.6(c)(ii).

1.4 "**Acquiring Affiliate Group**" as defined in Section 8.1.6(c)(iii).

1.5 "**Adaptive**" as defined in the Preamble.

1.6 "**Adaptive Core Patents**" as defined in Section 11.3.1.

1.7 "**Adaptive Core Platform IP**" as defined in Section 11.1.1.

1.8 "**Adaptive Platform**" means Adaptive's proprietary TruTCR discovery platform (including MIRA, immunoSEQ, pairSEQ, TCR profiling (including functional and safety profiling), TCR-Antigen mapping and correlation and associated informatics and proprietary algorithms), which is described further on the attached Exhibit 1.8, and all enhancements, modifications, improvements and updates thereto, including any enhancements, modifications, improvements and updates created after the Effective Date during the Term.

1.9 "**Adaptive Platform IP**" as defined in Section 11.1.1. [***].

1.10 "**Additional Reversion IP**" as defined in Section 16.6.2(b)(i).

1.11 "**Affiliate**" means any person that, directly or indirectly (through one or more intermediaries) controls, is controlled by, or is under common control with a Party. For purposes of this Section 1.11, "**control**" means: (a) the direct or indirect ownership of fifty percent (50%) or more of the voting stock or other voting interests or interest in the profits of the Party; or (b) the ability to otherwise control or direct the decisions of the board of directors or equivalent governing body thereof. Notwithstanding the foregoing, unless expressly specified otherwise, for the purposes of this Agreement, [***], shall not be considered an Affiliate of GNE unless and until GNE provides written notice to Adaptive specifying [***] as an Affiliate of GNE. Further notwithstanding anything to the contrary in this Section 1.11 or elsewhere in this Agreement, no licenses or rights are granted to Adaptive under any information, data, proprietary materials and/or other intellectual property rights whether or not patentable that are owned or controlled by [***]. Further notwithstanding anything to the contrary in this Section 1.11 or elsewhere in this Agreement, [***] shall not be considered an Affiliate of GNE, unless and until GNE so elects to include [***] as an Affiliate as provided in Section 8.5; it being understood, however that [***], shall be deemed an Affiliate of GNE.

1.12 "**Agreement**" as defined in the Preamble.

1.13 "**Alliance Manager**" as defined in Section 2.7.

1.14 "**Antigen**" means a peptide or protein (or any fragment or epitope thereof) against which the immune system may produce an adaptive immune response.

1.15 "**Approved Development Subcontractors**" as defined in Section 4.3.

1.16 "**Approved Subcontractors**" as defined in Section 3.4.

1.17 "**Biosimilar**" as defined in Section 9.4.5.

1.18 "**Cell Therapy**" means the administration of living cells to a patient for the treatment of a disease or condition, which cells' origin can, for example, be from the same individual (autologous source) or from another individual (allogeneic source).

1.19 "**Change of Control**" means, with respect to a Party: (a) that any Third Party acquires directly or indirectly the beneficial ownership of any voting securities of such Party, or if the percentage ownership of such Party in the voting securities of such Party is increased through stock redemption, cancellation or other recapitalization, and immediately after such acquisition or increase such Third Party is, directly or indirectly, the beneficial owner of outstanding voting securities representing more than fifty percent (50%) of the total voting power of all of the then outstanding voting securities of such Party; (b) a merger (whether by contract, by statute or by operation of law), consolidation, recapitalization or reorganization of such Party is consummated, other than any such transaction in which stockholders or equity holders of such Party immediately prior to such transaction beneficially own, directly or indirectly, at least fifty percent (50%) of the voting securities of the surviving entity (or its parent entity) immediately following such transaction; (c) that the stockholders or equity holders of such Party approve a plan of complete liquidation of such Party; or (d) the sale or disposition to a Third Party of all or substantially all of such Party's assets taken as a whole. For purposes of this definition, "beneficial ownership" shall have the meaning accorded in the U.S. Securities Exchange Act of 1934 and the rules of the U.S. SEC under this Agreement in effect as of the Execution Date. Notwithstanding the foregoing, (i) a transaction solely to change the domicile of a Party; (ii) the consummation of an initial public offering; or (iii) any merger or consolidation between a Party and one or more Affiliates shall not constitute a Change of Control.

1.20 "[***]" as defined in Section 1.11.

1.21 "[***]" as defined in Section 8.4.1.

1.22 "[***]" as defined in Section 8.4.2.

1.23 "**Clinical Trial**" means a phase I clinical trial, phase II clinical trial (including for avoidance of any doubt a phase Ib or phase IIb clinical trial) or Pivotal Clinical Trial or any other equivalent, combined or other trial in which any Licensed Product is administered to a human subject.

1.24 "**Collaboration Data**" means, collectively, all: (a) Know-How contained in any Shared Antigen Data Packages; (b) Private Antigen TCR Product Data; and (c) any data reflecting modifications or derivatives of any TCR Sequences contained in the Shared Antigen Data Packages or Private Antigen TCR Product Data created or developed by or on behalf of either Party under the Research Program or under the Development Program, as applicable.

1.25 "**Collaboration Field**" means Cell Therapy in oncology.

1.26 "**Combination**" as defined in Section 1.92.

1.27 "**Commercialization**" means marketing, promoting, detailing, distributing, importing, exporting, offering for sale or selling a product, including medical affairs activities, regulatory

activities directed to obtaining pricing and reimbursement approvals, price calculations and related reporting to governmental authorities, and interacting with Regulatory Authorities with respect to the foregoing. For clarity, as used in this Agreement, "Commercialization" includes manufacturing a product. When used as a verb, "**Commercialize**" means to engage in Commercialization activities.

1.28 "**Commercially Reasonable Efforts**" means those efforts ([***]), and the application and expenditure of such resources, applied and expended in a manner consistent with the exercise of prudent scientific and business judgment and business practices, as are customary for [***].

1.29 "**Committees**" as defined in Section 2.1.1.

1.30 "**Companion Diagnostic**" means any product that is developed for use with or otherwise in connection with a Licensed Product and that:

(a) identifies a person having a disease or condition, or a molecular genotype or phenotype that predisposes a person to such disease or condition, for which a Licensed Product could be used to treat and/or prevent such disease or condition;

(b) defines the prognosis or monitors the progress of a disease or condition in a person for which a Licensed Product could be used to treat and/or prevent such disease or condition;

(c) is used to select a therapeutic or prophylactic regimen, wherein at least one (1) potential therapeutic or prophylactic regimen involves a Licensed Product; and/or

(d) is used to confirm a Licensed Product's biological activity and/or to optimize dosing or the scheduled administration of a Licensed Product.

1.31 "**Compulsory Sublicense**" means a sublicense granted to a Third Party of the rights granted to GNE under ARTICLE 6, through the order, decree or grant of a governmental authority having competent jurisdiction in a given country, authorizing such Third Party to manufacture, use, sale, offer for sale, import or export a Licensed Product in such country in the Territory [***].

1.32 "**Compulsory Sublicensee**" means a Third Party that was granted a Compulsory Sublicense.

1.33 "**Confidential Information**" means proprietary Know-How (of whatever kind and in whatever form or medium, including copies thereof), tangible materials or other deliverables: (a) disclosed by or on behalf of a Party in connection with this Agreement, whether prior to or during the Term and whether disclosed orally, electronically, by observation or in writing; or (b) created by, or on behalf of, either Party and provided to the other Party, or created jointly by the Parties, in the course of this Agreement. For the avoidance of doubt, "Confidential Information" includes: (i) Know-How regarding such Party's research, development plans, Clinical Trial designs, preclinical and clinical data, technology, products, business information or objectives and other information of the type that is customarily considered to be confidential information by entities engaged in activities that are substantially similar to the activities being engaged in by the Parties pursuant to this Agreement; and (ii) any tangible materials or other deliverables provided by one Party to the other Party pursuant to ARTICLE 12.

1.34 "**Content**" as defined in Section 13.3.2.

1.35 "**Control**" or "**Controlled by**" means the rightful possession by a Party, as of the Effective Date or throughout the Term, of the ability to grant a license, sublicense or other right to exploit, as provided herein, without violating the terms of any agreement with any Third Party.

1.36 "**Covers**" (including variations such as "**Covered**", "**Covering**" and the like), means, with respect to a particular Patent in a particular country and in reference to a particular product (whether alone or in combination with one or more other ingredients) that the manufacture, use, sale, offer for sale or importation of such compound or product in a country is claimed by a Valid Claim of such Patent in that country.

1.37 "**Controlling Affiliate Program**" as defined in Section 8.1.6(c)(iv).

1.38 "**CPA Firm**" as defined in Section 10.7.2.

1.39 "**Create Act**" as defined in Section 11.2.4.

1.40 "**Deliverables**" as defined in Section 7.1.

1.41 "**Development**" or "**Develop**" means for a given product, any activity directed to obtaining or expanding Marketing Approval, including all preclinical and clinical drug or biologic product development activities, including: the conduct of Clinical Trials, cell line development, master cell bank generation, test method development and stability testing, toxicology, formulation and delivery system development, process development, pre-clinical and clinical supply, manufacturing scale-up, development-stage manufacturing, quality assurance/quality control procedure development and performance with respect to clinical materials, statistical analysis and report writing and clinical studies, regulatory affairs with respect to the foregoing. Development shall include, with respect to the Licensed Products, all activities conducted under a Development Plan. When used as a verb, "**Develop**" means to engage in Development.

1.42 "**Development Plan**" as defined in Section 4.2.

1.43 "**Development Plan Overview**" as defined in Section 4.2.

1.44 "**Development Program**" means the activities conducted by the Parties in connection with the Development of Licensed Products pursuant to ARTICLE 4, including under the Development Plan.

1.45 "**Disclosing Party**" as defined in Section 13.6(b).

1.46 "**Dispute**" as defined in Section 18.1.

1.47 "**Effective Date**" means the first (1st) business day immediately following the date on which the Parties have actual knowledge that all applicable waiting periods under the HSR Act with respect to the transactions contemplated under this Agreement have expired or have been terminated. Upon the request of either Party, the Parties shall memorialize the Effective Date, as defined in the immediately preceding sentence, in a written document for the record.

1.48 "**Enforcement**" as defined in Section 11.4.3.

1.49 "**EU**" means the member states of the European Union (including for clarity the United Kingdom even if, at the relevant time, the United Kingdom (or any part thereof) is not a member state of the European Union), or any successor entity thereto performing similar functions.

1.50 "**Excluded Expanded Use TCR**" as defined in Section 8.1.4.

1.51 "**Execution Date**" as defined in the Preamble.

1.52 "**Executives**" as defined in Section 2.9.

1.53 "**Existing Adaptive TCRs**" as defined in Section 3.3.

1.54 "**Expanded Therapeutic Field**" means all therapeutic uses in humans, excluding any use for: (a) diagnostic purposes (other than Companion Diagnostics); and (b) immune monitoring or (c) or services provided for immunological research.

1.55 "**Expanded Use TCR**" as defined in Section 8.1.4.

1.56 "**FDA**" means the United States Food and Drug Administration, or any successor entity thereto performing similar functions.

1.57 "**Field**" means (a) with respect to all Licensed Products, the treatment of any oncology Indication and (b) with respect to each Shared Antigen TCR Product or Private Antigen TCR Product which achieves First Commercial Sale of such product in the US, Japan or in a Major European Market for an oncology Indication, the Expanded Therapeutic Field from and after such First Commercial Sale; and (c) on a Shared Antigen TCR-by-Shared Antigen TCR basis or Private Antigen TCR-by-Private Antigen TCR basis, following the First Commercial Sale of any Shared Antigen TCR Product or Private Antigen TCR Product expressing such Shared Antigen TCR or Private Antigen TCR in the US, Japan or in a Major European Market for an oncology Indication, the Expanded Therapeutic Field.

1.58 "**First Commercial Sale**" means, with respect to a particular Licensed Product in a given country, the first bona fide commercial sale to a Third Party of such Licensed Product following Marketing Approval in such country by or under authority of the GNE Group. For clarity, if a Licensed Product achieves Marketing Approval in a second or third Indication in a given country (following achievement of a First Commercial Sale for any initial Indication in such country), the "First Commercial Sale" for such Licensed Product in such second or third Indication in such country (but not with respect to any other country) will be deemed to be achieved at the time of Marketing Approval for such second or third Indication in such country (including for the purposes of [***]). Sales or other dispositions under Compulsory Sublicenses, for Clinical Trial or other scientific testing purposes, as free samples, under named patient use, patient assistance, charitable purposes, early access or compassionate use programs, or similar uses, programs, or studies, shall not constitute a First Commercial Sale.

1.59 "**Global Function**" as defined in Section 8.4.3.

1.60 "**GNE**" as defined in the Preamble.

1.61 "**GNE Collaboration IP**" as defined in Section 11.1.2.

1.62 "**GNE Group**" as defined in Section 1.92.

1.63 "**GNE Other TCR Cell Therapy Program**" as defined in Section 8.2.1.

1.64 "**GNE TCR Technology**" as defined in Section 16.6.2(a)(i).

1.65 "**Good Laboratory Practices**" or "**cGLP**" means all applicable current standards for laboratory activities for pharmaceuticals, as set forth in the FDA's Good Laboratory Practice regulations as defined in 21 C.F.R. Part 58 and/or the Good Laboratory Practice principles of the Organization for Economic Co-Operation and Development, and such standards of good laboratory practice as are required by the EU and other organizations and governmental agencies in countries in which a Licensed Product is intended to be sold, to the extent such standards are not less stringent than US Good Laboratory Practice.

1.66 "**Governmental Required Consents**" means, with respect to a Party, compliance by such Party with, and filings by such Party under, the HSR Act.

1.67 "**HSR Act**" means the Hart-Scott-Rodino Antitrust Improvements Act of 1976, as amended from time to time, and any comparable applicable law in jurisdictions outside the US related to the approval of transactions similar to those contemplated under this Agreement.

1.68 "**HSR Clearance Date**" means the expiration or termination of all applicable waiting periods and requests for information (and any extensions thereof) under the HSR Act.

1.69 "**HSR Filing**" means: (a) filings by the Parties with the U.S. Federal Trade Commission and the Antitrust Division of the U.S. Department of Justice of a Notification and Report Form for Certain Mergers and Acquisitions (as that term is defined in the HSR Act) with respect to the matters set forth in this Agreement, together with all required documentary attachments thereto; or (b) equivalent filings with relevant foreign authorities.

1.70 "**IND**" means an investigational new drug application filed with the FDA pursuant to 21 CFR Part 312 before the commencement of Clinical Trials, or any comparable filing with any relevant regulatory authority in any other jurisdiction.

1.71 "**IND Acceptance**" means an IND that has been accepted by a Regulatory Authority.

1.72 "**Indemnitee**" defined in Section 15.2.

1.73 "**Indemnitor**" defined in Section 15.2.

1.74 "**Indication**" means the intended use of a Licensed Product for either therapeutic treatment or for the prevention of a distinct illness, sickness, interruption, cessation or disorder of a particular bodily function, system, tissue type or organ, or sign or symptom of any such items or conditions, regardless of the severity, frequency or route of any treatment, treatment regimen, dosage strength or patient class, for which any Marketing Approval is being sought and which will be referenced on any Licensed Product labelling in any country. [***].

1.75 "**Infringement**" as defined in Section 11.4.1.

1.76 "**Intellectual Property**" means Patents and Know-How.

1.77 "**Investor Information**" as defined in Section 13.3.1.

1.78 "**Investor Presentation(s)**" as defined in Section 13.3.1.

1.79 "**IPR**" as defined in Section 11.1.3.

1.80 "**IPWG**" as defined in Section 2.1.4.

1.81 "**JDC**" as defined in Section 2.1.1.

1.82 "**JPT**" as defined in Section 2.1.4.

1.83 "**JRC**" as defined in Section 2.1.1.

1.84 "**Know-How**" means all information, inventions (whether or not patentable), improvements, practices, formula, trade secrets, techniques, methods, procedures, knowledge, results, test data (including pharmacological, toxicological, pharmacokinetic and pre-clinical and clinical information and test data, related reports, structure-activity relationship data and statistical analysis), analytical and quality control data, protocols, processes, models, designs, TCR sequence information, and other information regarding discovery, Development, marketing, pricing, distribution, cost, sales and manufacturing. Know-How shall not include any Patents.

1.85 "**Licensed Product**" means: (a) a Shared Antigen TCR Product or a Private Antigen TCR Product, individually or collectively as the context may require; and (b) following [***], any biopharmaceutical composition(s), preparation(s) or formulation(s) that contains any Shared Antigen TCR or Private Antigen TCR expressed in the applicable Shared Antigen TCR Product or Private Antigen TCR Product for which such First Commercial Sale in an oncology Indication occurred.

1.86 "**Loss**" or "**Losses**" as defined in Section 15.1.

1.87 "**Major European Market**" means France, Germany, Spain, Italy or the United Kingdom.

1.88 "**Marketing Approval**" means all approvals, licenses, registrations or authorizations of any federal, state or local regulatory agency, department, bureau or other governmental entity, necessary for the manufacturing, use, storage, import, transport and sale of Licensed Products in a country or regulatory jurisdiction. For countries where governmental approval is required for pricing or reimbursement for the Licensed Product, "Marketing Approval" shall not be deemed to occur until such pricing or reimbursement approval is obtained.

1.89 "**Marketing Approval Application**" means BLA, sBLA, NDA, sNDA and any equivalent thereof in the United States or any other country or jurisdiction in the Territory. As used herein: "**BLA**" means a Biologics License Application and amendments thereto filed pursuant to the requirements of the FDA, as defined in 21 C.F.R. § 600 et seq., for FDA approval of a Licensed Product and "**sBLA**" means a supplemental BLA; and "**NDA**" means a New Drug Application and amendments thereto filed pursuant to the requirements of the FDA, as defined in 21 C.F.R. § 314 et seq., for FDA approval of a Licensed Product and "**sNDA**" means a supplemental NDA.

1.90 "**Materials**" as defined in Section 7.1.

1.91 "**Neoantigen**" means a mutated human Antigen arising in a tumor cell.

1.92 "**Net Sales**" means with respect to a Licensed Product the sum of:

(a) in the case of sales of such Licensed Product by GNE and its Affiliates (the "**GNE Group**"), an amount calculated by subtracting from the amount of Sales of such Licensed Product: (i) a lump sum deduction of [***] percent ([***]%) of Sales in lieu of those deductions which are not accounted for within the GNE Group on a Licensed Product-by-Licensed Product basis (*e.g.*, freight, postage charges, transportation insurance, packing materials for dispatch of goods, custom duties); (ii) uncollectible amounts on previously sold Licensed Product and credit card charges (including processing fees) that are applicable to such Licensed Product that not already taken as a gross-to-net deduction, if allowed, in accordance with the then currently used Accounting Standard in the calculation of Sales of such Licensed Product; and (iii) an allocation of any government mandated fees, taxes and other charges not already taken as a gross-to-net deduction, if allowed, in accordance with the then currently used Accounting Standard in the calculation of Sales of such Licensed Product, including, for example, any fees, taxes or other charges that become due in connection with any healthcare reform, change in government pricing or discounting schemes, or other action of a government or regulatory body.

(b) in the case of sales of such Licensed Product by any sublicensee (other than a GNE Affiliate, and subject to clause (c) below in respect of Compulsory Sublicensees), the "net sales" of such Licensed Product by such sublicensee, as such term is defined in the applicable agreement with such sublicensee, or, if such agreement does not use the term "net sales," the equivalent term used in such agreement that represents gross sales or gross invoiced amounts (as applicable), less expressly permitted deductions under such agreement, which such permitted deductions shall be in line with standard deductions in the industry and in accordance with applicable Accounting Standards.

(c) in the case of sales of such Licensed Product by any Compulsory Sublicensee, Net Sales means the gross royalty and other cash consideration paid to GNE or its Affiliate in consideration for such sublicense of such Licensed Product. For clarity, the [***] percent ([***]%) taken in clause (a) shall not apply to any amounts so received from any such Compulsory Sublicensee.

As used in this Section:

(i) **Sales among Affiliates and Sublicensees**. Sales between or among a Party, its Affiliates and/or their respective sublicensees shall be excluded from the computation of Net Sales, but Net Sales shall include the first Sale to a Third Party by any such Affiliates or sublicensees.

(ii) **Supply as Samples/Test Materials**. Notwithstanding anything to the contrary in the definition of Net Sales, the supply or other disposition Licensed Products: (i) as samples; (ii) for use in non-clinical or clinical studies; (iii) for use in any tests or studies reasonably necessary to comply with any applicable law, regulation or request by a regulatory or governmental authority; in each case ((i) through (iii)) as is reasonable and customary in the industry, shall not be included in the computation of Net Sales.

(iii) **Licensed Products Sold in Combinations**.

(A) In the event that a Licensed Product is sold in combination (in the same package, including as a co-formulation) with one or more other active ingredients, other than any Third Party TCR, which is addressed in Section 8.3, that are not the subject of this Agreement (for purposes of this Section 1.92, a "**Combination**"), the gross amount invoiced for such Licensed Product shall be calculated by [***].

(B) In the event that such other active ingredient(s) are not sold separately (but such Licensed Product is), the gross amount invoiced for such Licensed Product shall be calculated by multiplying the gross amount invoiced for such Combination by the fraction A/C, where "A" is the gross invoice amount for such Licensed Product, and "C" is the gross invoice amount for the Combination.

(C) In the event that such Licensed Product is not sold separately, the Net Sales for royalty calculations shall be determined by GNE in its reasonable discretion in accordance with its applicable Accounting Standard consistently applied.

(D) A Licensed Product which is sold as part of a combination therapy to be administered to a patient in connection with the administration of another active agent not subject to this Agreement (*e.g.*, a Licensed Product labelled for use in conjunction with a PD-1 inhibitor compound) shall not be deemed a Combination hereunder unless such Licensed Product and such other active agent are sold together for a single price. In addition, the administration to a patient of a Shared Antigen TCR Product as well as a Private Antigen TCR Product shall not be considered a Combination and instead Net Sales with respect thereto shall be calculated on each of such Shared Antigen TCR Product and Private Antigen TCR Product, to the extent each is sold separately, or shall be calculated based on the total price of the combined offering of such Shared Antigen TCR Product and Private Antigen TCR Product, if sold together for a single price.

1.93 "**Net Sales Report**" as defined in Section 10.2.

1.94 "**Non-Disclosing Party**" as defined in Section 13.6(b).

1.95 "**Non-Disclosure Agreement**" as defined in Section 12.6.

1.96 "**Opposition Proceeding**" as defined in Section 11.4.2.

1.97 "**Other TCR Cell Therapy**" means: (a) in the case of Adaptive, a Cell Therapy engineered to express a TCR which: [***]; and (b) in the case of GNE, a Cell Therapy engineered to express a TCR which: [***].

1.98 "**Outside TCR Product**" as defined in Section 8.2.1(c).

1.99 "**Party**" or "**Parties**" as defined in the Preamble.

1.100 "**Patent(s)**" means any and all patents and patent applications and any patents issuing therefrom or claiming priority to, worldwide, together with any extensions (including patent term extensions and supplementary protection certificates) and renewals thereof, reissues, reexaminations, substitutions, confirmation patents, registration patents, invention certificates, patents of addition, renewals, divisionals, continuations, and continuations-in-part of any of the foregoing.

1.101 "**Patient Sample**" means tissue, fluid, or cells collected from a patient, or components of the foregoing.

1.102 "**Permitted Third Party TCR Agreement**" as defined in Section 8.1.1.

1.103 "**Pivotal Clinical Trial**" means either (a) a human clinical trial, the principal purpose of which is to demonstrate clinically and statistically the efficacy and safety of a Licensed Product for one or more Indications in order to obtain Marketing Approval of such Licensed Product for such Indication(s), as further defined in 21 C.F.R. §312.21 or (b) a human clinical trial of a product on a sufficient number of subjects that, prior to commencement of the trial, satisfies both of the following ((i) and (ii)): (i) such trial is designed to establish that a Licensed Product has an acceptable safety and efficacy profile for its intended use, and to determine warnings, precautions, and adverse reactions that are associated with such Licensed Product in the dosage range to be prescribed, which trial is intended to support Marketing Approval of such product; and (ii) such trial is a registration trial sufficient to support the filing of Marketing Approval Application for such Licensed Product in the U.S., Japan, or a Major European Market, as evidenced by (A) an agreement with or statement from the FDA or the EMA on a 'Special Protocol Assessment' or equivalent, or (B) other guidance or minutes issued by the FDA or EMA, for such registration trial.

1.104 "[***] **Organization**" as defined in Section 8.4.4.

1.105 "[***] **TCR**" as defined in Section 8.4.5.

1.106 "[***] **TCR Program**" as defined in Section 8.4.6.

1.107 "**Prioritized TCR**" as defined in Section 3.3.

1.108 "**Private Antigen**" means any Antigen arising in a tumor cell that is identified by means of a de novo analysis of an individual Patient Sample from an oncology patient provided by or on behalf of GNE. [***].

1.109 "**Private Antigen TCR**" means a TCR that is identified using the Adaptive Platform, and any modifications or derivatives of such TCR, and is directed to a Private Antigen.

1.110 "**Private Antigen TCR Product**" means a Cell Therapy engineered to express at least one Private Antigen TCR. A Private Antigen TCR Product may also contain Shared Antigen TCRs in combination with at least one Private Antigen TCR.

1.111 "**Private Antigen TCR Product Data**" means all Know-How generated by or on behalf of Adaptive either: (a) under the TCR Sequencing Plan; or (b) arising from its performance under the TCR Sequence Supply Agreement, in each case of (a) or (b), in connection with Patient Samples from oncology patients provided by or on behalf of GNE.

1.112 "**Private Royalty Term**" as defined in Section 9.4.7(b).

1.113 "**Project Co-Leader**" as defined in Section 2.2.1.

1.114 **"Proposed Agreement**" as defined in Section 16.6.3(d).

1.115 "**Prosecution and Maintenance**" or "**Prosecute and Maintain**" as defined in Section 11.1.3.

1.116 "**Public Disclosure**" as defined in Section 13.3.1.

1.117 "**Recurring Private Antigen**" means a Private Antigen against which is directed a Private Antigen TCR that was contained in a Private Antigen TCR Product and that: (a) is identified as recurring and inducing an immune response on a sufficiently frequent basis in the patient population; (b) [***]; and (c) [***].

1.118 "**Regulatory Authority**" means the FDA (or any successor agency) or any equivalent agency thereof in jurisdictions outside of the US.

1.119 "**Regulatory Materials**" means any regulatory application, submission, notification, communication, correspondence, registration and other filings made to, received from or otherwise conducted with a Regulatory Authority in order to research, Develop, or Commercialize a TCR or Licensed Product in a particular country or jurisdiction. "Regulatory Materials" includes any Marketing Approval or Marketing Approval Application.

1.120 "**Release**" as defined in Section 13.1.

1.121 "**Requesting Party**" as defined in Section 13.3.2.

1.122 "**Required Filing(s)**" as defined in Section 13.3.1.

1.123 "**Research Plan**" as defined in Section 3.2.

1.124 "**Research Program**" means the activities relating to the identification and initial development of potential Licensed Products conducted by the Parties pursuant to ARTICLE 3, including those under the Research Plan.

1.125 "**Reversion TCR**" as defined in Section 16.6.2(a)(i).

1.126 "**Reversion TCR License**" as defined in Section 16.6.2(a)(iii).

1.127 "**Reviewing Party**" as defined in Section 13.3.2.

1.128 "[***]" as defined in Section 8.4.7.

1.129 "[***]" as defined in Section 8.4.8.

1.130 "**Rules**" as defined in Section 18.2.1.

1.131 "**Sales**" of a Licensed Product by any member of the GNE Group means, for any period, the amount stated in GNE's or the GNE Group's, as the case may be, "Sales" line of its externally published audited financial statements with respect to such Licensed Product for such period, which amount reflects the gross invoice price of such Licensed Product sold or otherwise disposed of (other than as may be excepted as set forth in the definition of Net Sales) by the GNE Group, reduced by gross-to-net deductions (to the extent applied consistently by the GNE Group with respect to sales of their respective other products; *provided* that such amount meets the definition of "sales" under applicable Accounting Standards) if not previously deducted from the amount invoiced, taken in accordance with the then currently used Accounting Standard. By way of example, the gross-to-net deductions taken in accordance with the applicable Accounting Standard as of the Effective Date are the following:

(a) credits, reserves or allowances granted for: (i) damaged, outdated, returned, rejected, withdrawn or recalled Licensed Product, wastage replacement, and short-shipments; (ii) billing errors; and (iii) indigent patient and similar programs (*e.g.*, price capitation);

(b) governmental price reductions and government mandated rebates;

(c) chargebacks, including those granted to wholesalers, buying groups and retailers;

(d) customer rebates including cash sales incentives for prompt payment, cash and volume discounts; and

(e) taxes, duties and any other governmental charges or levies imposed upon or measured by the import, export, use, manufacture or sale of a Licensed Product, but only to the extent not included in the invoice for such Licensed Product. Income or franchise taxes are excluded.

1.132 "**Screening Contract Manufacturer**" as defined in Exhibit 7.4.

1.133 "**Screening Technology**" as defined in Exhibit 7.4.

1.134 "**Screening Technology Transfer**" as defined in Exhibit 7.4.

1.135 "**Screening Technology Transfer Agreement**" as defined in Exhibit 7.4.

1.136 "**Shared Antigen Data Package**" as defined in Section 3.3.

1.137 "**Shared Antigen TCR**" means a TCR identified through the use of the Adaptive Platform (and any modifications or derivatives of such TCR) that, in each case, is directed to: (a) a Shared Neoantigen; or (b) a Tumor Associated Antigen.

1.138 "**Shared Antigen TCR Product**" means a Cell Therapy engineered to express [***] Shared Antigen TCR. A Shared Antigen TCR Product may also contain a combination of Shared Antigen TCRs directed to Shared Neoantigens, Recurring Private Antigens and/or Tumor Associated Antigens.

1.139 "**Shared Library**" means the library of TCR Sequences and their relationship to given Shared Neoantigens and/or Tumor Associated Antigens, which library consists of all Prioritized TCRs identified through the process described in Section 3.3. For clarity, the Shared Library may also include Prioritized TCRs identified through the process described in Section 3.3 that were originally identified as being directed to Recurring Private Antigens.

1.140 "**Shared Neoantigen**" means any Neoantigen that has been identified as recurrent across a patient population.

1.141 "**Shared Product Antigen Target**" as defined in Section 3.3.

1.142 "**Shared Royalty Term**" as defined in Section 9.4.7(a).

1.143 "**T-Cell**" means any of the lymphocytes that are derived from the human thymus and have the ability to recognize specific Antigens.

1.144 "**Target Turnaround Objective**" means in connection with the Private Antigen TCR Products, the completion by Adaptive of the processes described in Parts 2, 3, 4.1 and 4.2 (but not Part 4.3) of the TCR Sequencing Plan Requirements, as set forth in Exhibit 2.2.2(d), within the relevant Target Turnaround Time. [***].

1.145 "**Target Turnaround Time**" mean, with respect to the Private Antigen Product, and on a patient-by-patient basis, a time period of [***], commencing on the date that Adaptive receives from GNE the relevant list of tumor mutations from such patient (and related tumor (or gDNA extracted from tumor tissue) sample if GNE notifies Adaptive in writing that it is electing to complete the activities set out in Part 1.2 of Exhibit 2.2.2(d)).

1.146 "**TCR**" means a T-Cell receptor which is a heterodimer expressed on the membrane of a T-Cell that can recognize Antigen epitopes.

1.147 "**TCR Sequence Supply Agreements**" as defined in Section 7.3.4.

1.148 "**TCR Sequences**" as defined in Section 5.2.

1.149 "**TCR Sequencing Plan**" as defined in Section 2.2.2(d).

1.150 "**TCR Sequencing Plan Requirements**" as defined in Section 2.2.2(d).

1.151 "**TCR-Specific Platform IP**" as defined in Section 11.1.1.

1.152 "**Term**" as defined in Section 16.1.

1.153 "**Territory**" means all the countries of the world.

1.154 "**Third Party**" means any entity other than Adaptive or GNE or an Affiliate of either.

1.155 "**Third Party Claims**" as defined in Section 15.1.

1.156 "**Third Party Infringement Claim**" as defined in Section 11.5.1.

1.157 "**Third Party TCR**" as defined in Section 8.3.

1.158 "**Title 11**" as defined in Section 16.3.

1.159 "**TruTCR Criteria**" means the criteria set forth in Exhibit 1.159, and any improvements thereto made pursuant to the Research Plan that the Parties mutually agree to include in such criteria (which agreement shall not be subject to GNE's final decision making authority hereunder).

1.160 "**Tumor Associated Antigen**" means either (a) a wild-type human Antigen that is over-expressed or selectively expressed in a human tumor cell or (b) an Antigen arising from non-human proteins such as viral sequences that is expressed in a human tumor cell, in each case of (a) or (b), that is not a Neoantigen.

1.161 "**US**" means the United States of America and its territories and possessions.

1.162 "**Valid Claim**" means, with respect to a particular country, a claim contained in a TCR-Specific Platform IP Patent or a GNE Collaboration IP Patent, in each instance that is directed to the [***], of a TCR, including [***], and that is in either: (a) an issued and unexpired Patent in such country that has not been disclaimed, revoked, held unenforceable, unpatentable or invalid by a decision of a court or other governmental agency of competent jurisdiction, unappealable or unappealed within the time allowed for appeal, and that has not been admitted to be invalid or unenforceable through re-examination, re-issue, disclaimer or otherwise, or lost in an interference proceeding; or (b) a patent application in such country that has not been revoked, cancelled, withdrawn, held invalid, patentable, or finally abandoned and that has not been pending for more than [***] from the date of its earliest priority date.

1.163 "**VAT**" means, in the EU, value added tax calculated in accordance with Council Directive 2006/112/EC and, in a jurisdiction outside the EU, any equivalent tax.

1.164 "**Working Group(s)**" as defined in Section 2.1.4.

ARTICLE 2
GOVERNANCE

2.1 **Joint Research and Development Committees**.

2.1.1 **Formation and Composition**. As soon as reasonably practicable, Adaptive and GNE shall establish: (a) a joint research committee (the "**JRC**") to monitor and coordinate the activities under the Research Program, which the Parties shall form, in any event, within [***] days after the Effective Date; and (b) a joint development committee (the "**JDC**") to monitor and coordinate the activities under the Development Program; ((a) and (b), collectively, the "**Committees**"). The Committees shall each be composed of at least [***] but no more than [***] representatives designated by each Party (and [***] number of representatives). Representatives must be appropriate for the tasks then being undertaken and the stage of research or Development, in terms of their seniority, availability, function in their respective organizations, training and experience. Each Party shall designate one of its representatives as its primary JRC or JDC contact on the respective Committee. Each Party may replace its representatives from time to time by informing the other Party in writing (which may be by email); *provided*, that if a Party's representative is unable to attend a meeting, such Party may designate an alternate to attend such meeting by informing the other Party's representatives in writing (which may be by email) in advance and following submission of such written notification the alternate will be entitled to perform the functions of such representative. The Alliance Managers may attend meetings of the Committees but shall have no right to vote on any decisions of a Committee.

2.1.2 **JRC Responsibilities**. In addition to its overall responsibility for overseeing the Research Programs, the JRC shall, in particular:

(a) work with the Project Co-Leaders to coordinate all material research activities performed by each Party and monitor progress of the research activities of the Parties hereunder, including the review and discussion of progress reports delivered under Section 3.5.1;

(b) review and approve amendments to the Research Plan as proposed by the JPT;

(c) review and discuss the Shared Antigen Data Package delivered by Adaptive and the Know-How therein;

(d) review and discuss the Private Antigen TCR Product Data and data related to Recurring Private Antigens;

(e) review and approve the allocation of resources and efforts for the Research Program;

(f) determine the specific format and timeline for the transfer of any Deliverables in respect of the Research Program, as set forth in Section 7.1;

(g) discuss any potential Permitted Third Party TCR Agreements related to the Research Program under this Agreement, as appropriate, as set forth in Section 8.1;

(h) subject to ARTICLE 13, review and approve the research communication and publication strategy as developed by the JPT;

(i) work to resolve any disputes, controversy or claim related to the matters within the authority of the JRC, including resolving disputes arising within any Working Group of the JRC; and

(j) perform such other functions as appropriate to further the purposes of this Agreement as determined by the Parties.

2.1.3 **JDC Responsibilities**. In addition to its overall responsibility for overseeing the Development Program, the JDC shall, in particular:

(a) work with the Project Co-Leaders to coordinate all material Development activities performed by each Party and monitor progress of the Development activities of the Parties hereunder;

(b) review and approve amendments to the Development Plan as proposed by the JPT;

(c) review and approve the allocation of resources and efforts for the Development Programs;

(d) determine the specific format and timeline for the transfer of any Deliverables in respect of any Development Program, as set forth in Section 7.1;

(e) discuss any potential Permitted Third Party TCR Agreements related to any Development Program under this Agreement, as appropriate, as set forth in Section 8.1;

(f) subject to ARTICLE 13, review and approve the overall Development communication and publication strategy as developed by the JPT;

(g) work to resolve any disputes, controversy or claim related to the matters within the authority of the JDC, including resolving disputes arising within any Working Group of the JDC; and

(h) perform such other functions as appropriate to further the purposes of this Agreement as determined by the Parties.

2.1.4 **Working Groups**. From time to time, a Committee may also establish and delegate duties to directed teams on an "as-needed" basis to oversee particular projects or activities within the scope of such Committee's oversight and responsibility, and such teams shall be constituted and shall operate as the Committee determines ("**Working Group(s)**"). Each Working Group and its activities shall be subject to the oversight, review and approval of, and shall report to, the Committee that established such Working Group. In no event shall the authority of a Working Group exceed that specified for the appointing Committee set forth in this ARTICLE 2, and Working Groups are not authorized to amend the Research Plan or Development Plan. The Parties agree that promptly following the Effective Date, the Parties will establish: (a) a Joint Project

Team ("**JPT**") as a Working Group of both of the JDC and the JRC, to facilitate the Parties research and Development efforts across the collaboration contemplated under this Agreement, as set forth in additional detail in Section 2.2: and (b) a joint Working Group for Intellectual Property matters under the oversight of both of the JDC and the JRC ("**IPWG**") to control and direct certain Intellectual Property and Patent matters under the collaboration, as set forth in additional detail in Section 2.3.

2.2 **Joint Project Team**.

2.2.1 **Formation and Composition**. As soon as reasonably possible and in any event within [***] days after the Effective Date, the Parties shall establish the JPT as a Working Group of the JRC and JDC, which shall serve as the core team, with respect to the management and implementation of the Research Programs and Development Programs. The JPT shall be composed of a mutually agreed number of individual(s) from each Party ([***]) with the necessary scientific and technical expertise appropriate for the tasks then being undertaken and the stage of research or Development, in terms of their seniority, availability, function in their respective organizations, training and experience. For the JPT, each Party shall designate one of its representatives as its primary JPT contact (each, a "**Project Co-Leader**"). Each Party may replace its representatives from time to time by informing the other Party in writing (which may be by email); *provided*, that if a Party's representative is unable to attend a meeting, such Party may designate a knowledgeable alternate to attend such meeting and perform the functions of such representative. The JPT shall be subject to the oversight, review and approval of the JRC or JDC, as the case may be.

2.2.2 **JPT Responsibilities**. In addition to its overall responsibility for managing the Research Programs or Development Programs, the JPT shall, in particular:

(a) ensure that each Party keeps the JPT informed regarding all material activities performed by such Party under this Agreement that are within the purview of the JPT;

(b) prepare draft amendments (as needed) to the Research Plan or Development Plan, and submit draft amended Research Plan or Development Plan to the JRC or JDC for approval, as applicable;

(c) collaboratively review and evaluating results, publications or reports with relevance to the Collaboration Field, including identifying Antigens of interest to the collaboration;

(d) following the Effective Date, but no later than the filing of the first (1st) IND, agree upon a plan ("**TCR Sequencing Plan**") [***] set forth on the attached Exhibit 2.2.2(d) and obligations regarding quality assurance, capacity and throughput capabilities;

(e) prepare draft amendments (as needed) to the TCR Sequencing Plan, for approval by the JRC or JDC, as applicable, in connection with the Development Program and Commercialization;

(f) implement the Research Plan, Development Plan and TCR Sequencing Plan, and use commercially reasonable efforts to ensure that activities thereunder are performed in accordance with the approved timelines;

(g) develop a communication and publication plan for publications and public presentations related to Licensed Products and submit such plans to the JRC or JDC for approval, as applicable, and implement such approved plan;

(h) discuss and attempt to resolve any disputed matters related to the research collaboration and the scientific direction thereof (including manufacturing matters related thereto) before referring such matters to the JRC or JDC, as the case may be;

(i) discuss strategies for the coordination of the Parties' respective manufacturing efforts in order to reach the targeted end-to-end manufacturing times with a focus on pursuing those strategies that yield the highest value-add with respect to achievable efficiencies and consistent with the goals set forth in Section 7.3.3;

(j) coordinate timelines for incurring any manufacturing capital expenditures or personnel commitments reasonably necessary for manufacturing activities in relation to the Development and Commercialization of Licensed Products in the Collaboration Field, consistent with the goals set forth in Section 7.3.3, in relation to each Parties' expressed commitments to specific Development goals and completion of the activities constituting the Target Turnaround Objective within the Target Turnaround Time with respect to Shared Antigen TCR Products or Private Antigen TCR Products, as applicable;

(k) [***];

(l) develop plans and procedures for the transfer of any Materials or Know- How between the Parties, as set forth in Section 7.1; and

(m) perform such other functions as agreed to by the JRC or JDC or as specified in this Agreement.

2.3 **IPWG**.

2.3.1 **Formation and Composition**. As soon as reasonably possible and in any event within [***] days after the Effective Date, the Parties shall establish the IPWG as a Working Group, which IPWG shall consist of [***], unless otherwise agreed by the Parties. The IPWG shall provide a forum for the exchange of information between the Parties, and shall undertake a decision-making role with respect to the Intellectual Property matters arising under the collaboration, including with respect to the Prosecution and Maintenance of those Patents arising from the Research Programs and Development Programs and referenced in the definition of Valid Claim; *provided* that the Parties shall discuss such Prosecution and Maintenance with respect to the Adaptive Platform IP only as and to the extent such Adaptive Platform IP relates to the Licensed Products.

2.3.2 **IPWG Responsibilities**. In addition to its general overall responsibility for managing the Prosecution and Maintenance of Patents that cover TCR-Specific Platform IP arising under this Agreement, the IPWG shall discuss and determine:

(a) on a Patent application-by-Patent application basis, which Party is to take the lead in Prosecution and Maintenance of such Patents (or claims of such Patents), as set forth in additional detail in Section 11.3.2;

(b) on a Patent application-by-Patent application basis, which applications and claims should, in such applications, be Prosecuted and Maintained and which claims or applications, if any, should be abandoned;

(c) on a Patent application-by-Patent application basis, review and endeavor to settle any disagreement regarding which Party should own the relevant Patent application, based on the ownership principles set forth in Section 11.2.2;

(d) the relative strength of the current Patents included in the TCR-Specific Platform IP;

(e) cost effective strategies for the management of the Prosecution and Maintenance of Patents under the Agreement;

(f) strategies to terminate suspected or potential Infringement, that it considers in the best interest of both Parties, as set forth in Section 11.4.2; and

(g) strategies to defend against any Third Party Infringement Claim, that it considers in the best interest of both Parties and the Licensed Products, as set forth in Section 11.5.2.

2.4 **Meetings**.

2.4.1 **Committees and Working Groups**. Each Committee and Working Group shall meet at least [***] (unless otherwise agreed by the Parties) and at such other times as deemed appropriate by the respective Committee or Working Group, or as otherwise set forth in this ARTICLE 2. The presence of at least [***] shall constitute a quorum at a Committee or Working Group meeting. The Committees and Working Groups may meet in person or via teleconference or otherwise, in each case as agreed by the Committee or Working Group, *provided*, that for each Committee or Working Group at least [***] per calendar year shall be held in person, unless otherwise agreed by the Parties. For the avoidance of doubt, meetings of the JPT and IPWG are addressed in Section 2.4.2, and the JPT and IPWG shall not be considered Working Groups for the purposes of this Section 2.4.1.

2.4.2 **JPT and IPWG**. The JPT and IPWG shall meet at least [***] by audio or video teleconference or as otherwise agreed by the JPT or IPWG, as applicable.

2.4.3 **Meeting Agendas and Minutes**. Not later than [***] days after the Committees and the JPT and IPWG are formed, the JRC, JDC, JPT and IPWG shall each hold an organizational meeting by video or teleconference to establish their respective operating procedures, including establishment of agendas, and preparation and approvals of minutes as appropriate with respect to the role of such Committee or Working Group. Unless otherwise agreed, GNE's representatives on each Committee or Working Group shall be responsible for keeping minutes that record in writing all decisions made, action items assigned or completed, and other appropriate matters,

including preparing and circulating an agenda for each upcoming meeting of the relevant Committee or Working Group. Meeting minutes shall be sent to both Parties promptly after a meeting for review, comment and approval by each Party. A decision that is made at the Committee or a Working Group meeting shall be recorded in minutes, and decisions that are made by a Committee or Working Group outside of a meeting shall be documented in writing and be shown to be clearly agreed by all representatives of the Committee or Working Group as relevant.

2.4.4 **General**. Employees of each Party other than its Committee or Working Group representatives may attend meetings of the Committee or Working Group as non-voting participants, and, with the consent of the other Party, a Party's consultants and advisors involved in a Research Program or Development Program may attend meetings of the Committee or a Working Group as non-voting observers; *provided*, that such consultants and advisors are under obligations of confidentiality and non-use applicable to the Confidential Information of the other Party as required by ARTICLE 12 and each Party shall have the right to excuse the other Party's consultants and advisors from a meeting at any time. Each Party shall be responsible for all of its own expenses of participating in the Committee or any Working Group.

2.5 **Decision-Making**.

2.5.1 **JPT Disputes and Decision Making**. Each Party will discuss and attempt to resolve any potential or evolving disagreement related to the Research Program or Development Program (and not as between the Parties, which is subject to Section 18.1) through its respective Project Co-Leaders for a period of [***] business days before it is brought before the JPT for resolution. With respect to the decisions of matters brought before the JPT, [***] in all decisions, and the Parties shall attempt to make decisions by reaching unanimous agreement. If the JPT is unable to achieve a unanimous vote within [***] business days after the a matter is brought to vote before the JPT, or such longer period as the Project Co-Leaders agree, such matter shall be [***].

2.5.2 **Working Group Disputes and Decision Making**. Each Party shall use Commercially Reasonable Efforts to perform its responsibilities under any Working Group and provide reasonable support to the other Party in connection with the same. Unless otherwise agreed in connection with the formation of any Working Group (other than the JPT, which is addressed in Section 2.5.1), each Party will discuss and attempt to resolve any potential or evolving disagreement related to the subject matter of a given Working Group at the Working Group level prior to escalation to any Committee. With respect to the decisions of any Working Group (other than the JPT which is addressed in Section 2.5.1), [***] in all decisions, and the Parties shall attempt to make decisions by reaching unanimous agreement. If the relevant Working Group is unable to achieve a unanimous vote within [***] business days after the a matter is brought to vote before such Working Group then [***].

2.5.3 **Committee Disputes and Decision Making**. Each Party will discuss and attempt to resolve any potential or evolving disagreement related to the Research Program and/or Development Programs through the JPT, or the Parties' other activities under a given Working Group at the Working Group level, in accordance with Section 2.5.1 and Section 2.5.2, as applicable. For any matters that remain unresolved at the JPT or Working Group level and that are referred to the Committee for resolution, [***], and the Parties' representatives shall attempt to make decisions by reaching unanimous agreement. If the relevant Committee is unable to achieve a unanimous agreement within [***] business days after the matter is brought to vote before such Committee then [***].

2.6 **Dissolution**. Upon the earlier of expiration or termination of the last Research Program or Development Program, the JRC and JPT will have no further responsibilities or authority under this Agreement and the JPT and JRC will be deemed dissolved by the Parties. The JDC shall continue to exist until the First Commercial Sale of a Licensed Product in the U.S., Japan or any Major European Market at which time it shall automatically cease operations, unless earlier disbanded. Upon the mutual agreement of the Parties, any Committee or Working Group may be dissolved by the Parties. Following any dissolution of a Committee or Working Group, such Committee or Working Group will have no further responsibilities or authority under this Agreement; *provided* that the Parties will be directly responsible for any exchange of information, Know-How or reports for which the disbanded Committee or Working Group was responsible prior to such dissolution, unless otherwise agreed.

2.7 **Alliance Managers**. Promptly following the Effective Date, each Party shall designate an individual to act as the primary business contact and relationship manager for such Party for matters related to this Agreement (the "**Alliance Managers**"). The Alliance Managers shall: (a) serve as the primary contact points between the Parties for the purpose of providing the other Party with information on the progress of such Party's activities under this Agreement; (b) facilitate the flow of information and collaboration between the Parties; and (c) act as advocates for the collaboration as a whole. The Alliance Managers may also bring any matter to the attention of any Committee or Working Group if such Alliance Manager reasonably believes that such matter warrants such attention and shall assist in the resolution of potential and pending issues and potential disputes in relation to the Agreement or the Parties' activities under the Research Programs and Development Programs, as applicable, in a timely manner to enable the Committees and the Parties to reach consensus and avert escalation of such issues or potential disputes. Either Party may replace its Alliance Manager at any time by informing the other Party's Alliance Manager in writing (which may be by email). Each Party shall ensure that its Alliance Manager is capable of performing the obligations required of an Alliance Manager under this Agreement and, absent agreement of the Parties, no Alliance Manager shall be eligible to serve as a Party's representative on any Committee or Working Group.

2.8 **Limitations on Authority**. Each Party shall retain the rights, powers, and discretion granted to it under this Agreement, and no such rights, powers, or discretion shall be delegated to or vested in a Committee unless such delegation or vesting of rights is expressly provided for in this Agreement or the Parties expressly so agree in writing. No Committee shall have the power to amend, modify or waive compliance with this Agreement, which may only be amended or modified, or compliance with which may only be waived, as provided in Section 19.6.

2.9 **Escalation**. If, notwithstanding the Alliance Managers' assistance, the [***] is unable to resolve any dispute referred to such Committee within [***] business days after the date such dispute is first referred to such Committee or otherwise arises at the Committee level, or within such longer period as the Parties may agree, either Party may elect to submit such issue to the CEO for Adaptive (or a person in an equivalent position at Adaptive), and a vice president of research or development for GNE (or their respective designees). These executives (or their appointed designees) are referred to collectively as the "**Executives**."

2.10 **Final Resolution**. In the event that the Executives are unable to resolve a given issue referred to them in accordance with Section 2.9 within [***] business days after the dispute is first referred to the Executives, then: [***] shall have final decision making authority, including selecting which Antigens will be screened by Adaptive using the Adaptive Platform under the Research Plan, selecting Prioritized TCRs for inclusion in Licensed Products and selecting Recurring Private Antigens for further evaluation under this Agreement; *provided*, that: [***]. Neither the JDC, JRC, Working Group nor either Party shall have the authority to amend or modify, or waive its own compliance with, this Agreement.

2.11 **Decision-Making Exceptions**. Notwithstanding the foregoing provisions of this ARTICLE 2, (a) if GNE reasonably and in good faith believes that there is a material safety issue with respect to a Licensed Product being used in a given Clinical Trial that is being conducted hereunder, then GNE shall have the right to suspend such Clinical Trial until such safety issue is reasonably resolved; or (b) if a Party reasonably and in good faith believes that a change to any Research Plan or Development Plan is required in order for either Party to ensure compliance with applicable laws, rules and regulations (or to satisfy a specific governmental authority request), then such Party shall notify the other Party thereof in writing, including a reasonably detailed description of such changes and requirements to comply with applicable laws, and such changes shall thereafter be deemed to an amendment to the then-current plan; *provided*, that the determination as to whether such changes are required to comply with applicable laws, rules and regulations or satisfy a governmental authority request shall be subject to ARTICLE 18.

ARTICLE 3
RESEARCH PROGRAM

3.1 **General**. The Parties shall conduct the Research Program in accordance with the Research Plan. Each Party shall comply with all applicable laws, rules and regulations (and in the case of Adaptive, cGLP) in the conduct of the Research Program. Each Party shall, in performing its obligations under the Research Program, assign responsibilities to those portions of its organization that have the appropriate resources, expertise and responsibility for such obligations. Each Party shall be responsible for its own costs associated with the activities it conducts under the Research Program.

3.2 **Research Program and Research Plan.** The Parties shall conduct and collaborate with respect to the Research Program, which will focus on: (a) expanding Adaptive's existing collection of Shared Antigen TCRs and identifying TCRs that will be included in the Shared Library and that may thereby be suitable for inclusion in Shared Antigen TCR Products; and (b) optimizing the discovery, identification and validation process for identifying Private Antigen TCRs, including in respect of clauses (a) and (b) timelines, scope, allocations of responsibilities, tasks and deliverables, as applicable. The Parties shall collaborate to agree upon a plan for the activities under the Research Program (the "**Research Plan**"). An initial draft of the Research Plan is attached to this Agreement as Exhibit 3.2. The JRC may amend in writing the Research Plan from time to time; *provided* that if the Parties are unable to agree upon any such amendment, the decision-making rules set forth in Sections 2.9 through 2.11 shall apply. During the period of any dispute regarding an amendment to the Research Plan, the Parties shall continue to perform activities in accordance with the most current mutually agreed version of the Research Plan.

3.3 **Shared Library and Prioritized TCRs**. In connection with the research related to Shared Antigen TCR Products, (a) GNE may request that Adaptive evaluate certain Shared Neoantigens or Tumor Associated Antigens; or (b) the Parties may agree through the JPT upon certain Shared Neoantigens or Tumor Associated Antigens that they wish to evaluate, in each case in order to generate Shared Antigen TCRs that are suitable to be designated as a Prioritized TCR, and potentially included in a Shared Antigen TCR Product, or (c) GNE may select (or Adaptive may propose through the JPT) for evaluation any Shared Neoantigens or Tumor Associated Antigens for which Adaptive has generated, as of the Effective Date, TCRs which are directed to such Antigen (such TCRs, the "**Existing Adaptive TCRs**", and each such Shared Neoantigen or Tumor Associated Antigen in (a), (b) or (c), a "**Shared Product Antigen Target**"). Following such selection, request or agreement, Adaptive, in accordance with the Research Plan, shall conduct the further activities set forth in the Research Plan to (i) identify TCRs directed to each such Shared Product Antigen Target, and (ii) to further evaluate and analyze such TCRs (including any Existing Adaptive TCRs that have not yet been determined to meet the criteria for a Prioritized TCR), using its TruTCR Criteria and the additional screening and selection assays that are part of the Adaptive Platform and described in the Research Plan, to identify a subset of such TCRs that are suitable to progress as a therapeutic product (such subset of TCRs, the "**Prioritized TCRs**") and that will be included in the Shared Library. Following the completion of such activities with respect to each Shared Product Antigen Target (including any Shared Product Antigen Target that generated Existing Adaptive TCRs that have already met the criteria to be designated as Prioritized TCRs), Adaptive will provide GNE, through the JPT, with a data package, which will include: (A) a listing of and detailed information and data relating to the Prioritized TCRs for such Shared Product Antigen Target (for clarity, all of which are included in the Shared Library), including the results of the testing and analyses (*e.g.* functional and safety screens, Antigen targets, etc.) that form the basis on which each of the Prioritized TCRs has been selected; and (B) a list of the Tumor Associated Antigens and Shared Neoantigens against which no TCRs meeting the TruTCR Criteria were identified (*i.e.* that did not generate any Prioritized TCR) and the information set forth on Part 2 of Exhibit 1.159 with respect to each such Shared Product Antigen Target (each such data package for each evaluated Shared Product Antigen Target, a "**Shared Antigen Data Package**"). During a period of [***] days following delivery of a Shared Antigen Data Package, or such longer period as the Parties may agree, [***].

3.4 **Subcontractors**. GNE may subcontract portions of its work under the Research Program to Affiliates or Third Parties; *provided*, that such subcontract is consistent with the terms and conditions of this Agreement. Adaptive may subcontract portions of its work under the Research Program (including those quantities to be supplied under the Research Program, as further specified in the Research Plan) to Affiliates and to the Third Parties listed on Exhibit 3.4 (as such list may be amended from time to time by mutual agreement) ("**Approved Subcontractors**"); *provided*, that in each case such subcontract is consistent with the terms and conditions of this Agreement. Except for Approved Subcontractors, Adaptive may not subcontract any portion of its work under the Research Program to any Third Party without GNE's prior written consent to the identity of such Third Party, such consent not to be unreasonably withheld, and *provided* that Adaptive shall not be required to get GNE's consent to the terms of any subcontract that is consistent with the terms and conditions of this Agreement. The subcontracting Party shall remain responsible (at its cost) for and shall ensure that each subcontractor complies with the terms and conditions of this Agreement.

3.5 **Reports; Records; and Inspections**.

3.5.1 **Progress Reports**. Each Party shall keep the other Party informed of its activities under the Research Program, and shall provide to the other Party's representatives on the JRC, regular summary updates at each meeting. If reasonably necessary for a Party to perform its work under the Research Program, that Party may request that the other Party provide more detailed information and data regarding the updates it earlier provided, and the other Party shall promptly provide the requesting Party with information and data as is reasonably available and reasonably necessary to conduct the Research Program, and such other information as the Parties agree. Neither Party is required to generate additional data or prepare additional reports to comply with the foregoing obligation. Subject to Section 12.2, all such reports, information and data provided by a Party shall be considered the providing Party's Confidential Information.

3.5.2 **Research Records**. Each Party shall maintain records of the Research Program (or cause such records to be maintained) in sufficient detail and in good scientific manner as will properly reflect all work done and results achieved by or on behalf of such Party in the performance of the Research Program. All laboratory notebooks shall be maintained for no less than the term of any Patent issuing therefrom. All other records shall be maintained by each Party during the Term. All such records of a Party shall be considered such Party's Confidential Information.

3.6 **Research Efforts**. The Parties shall use Commercially Reasonable Efforts to conduct their respective tasks under the Research Program.

ARTICLE 4
DEVELOPMENT PROGRAM

4.1 **General**. Following identification of Shared Antigen TCRs or Private Antigen TCRs through the Research Program, the Parties shall conduct the Development Program in accordance with the Development Plan. Each Party shall comply with all applicable laws, rules and regulations (and in the case of Adaptive, cGLP). Each Party shall, in performing its obligations under the Development Program, assign responsibilities to those portions of its organization that have the appropriate resources, expertise and responsibility for such obligations. Each Party shall be responsible for its own costs associated with the activities it conducts under the Development Program.

4.2 **Development Program and Development Plan**. Within [***] days after the Effective Date (or such alternative date as mutually agreed), the Parties shall draft and agree upon a Development plan directed to the Development of both Shared Antigen TCR Products and Private Antigen TCR Products, including manufacturing thereof in connection with such Development ("**Development Plan**"). The JDC may subsequently draft and agree upon additional development plans with respect to an individual Licensed Product or related Licensed Products. The JDC may amend in writing any Development Plans from time to time; *provided* that if the Parties are unable to agree upon any such amendment, the decision-making rules set forth in Sections 2.9 through 2.11 shall apply. During the period of any dispute regarding an amendment to the Development Plan, the Parties shall continue to perform activities in accordance with the most current mutually agreed version of the Development Plan. The Development Plan shall include:
(a) activities directed to the Development of Shared Antigen TCR Products following the identification of

Prioritized TCRs in accordance with Section 3.3; (b) activities directed to the Development of the Private Antigen TCR Product; (c) certain baseline immune monitoring work provided by Adaptive [***], as well as any additional immune monitoring work reasonably requested by GNE and agreed by Adaptive, [***], and shall be based upon the "Development Plan Overview" set forth on the attached Exhibit 4.2. GNE shall be responsible under the Development Program for selecting which Shared Antigen TCR Products and Private Antigen TCR Products shall enter into Clinical Trials.

4.3 **Subcontractors**. GNE may subcontract portions of its work under the Development Program to Affiliates or Third Parties; *provided*, that such subcontract is consistent with the terms and conditions of this Agreement. Adaptive may subcontract portions of its work under the Development Program (including those quantities to be supplied under the Development Program, as further specified in the Development Plan) to Affiliates and to the Third Parties listed on Exhibit 4.3 (as such list may be amended from time to time by mutual agreement) ("**Approved Development Subcontractors**"); *provided*, that in each case such subcontract is consistent with the terms and conditions of this Agreement. Except for Approved Development Subcontractors, Adaptive may not subcontract any portion of its work under the Development Program to any Third Parties without GNE's prior written consent to the identity of such Third Party, such consent not to be unreasonably withheld, and *provided* that Adaptive shall not be required to get GNE's consent to the terms of any subcontract that is consistent with the terms and conditions of this Agreement. The subcontracting Party shall remain responsible (at its cost) for and shall ensure that each subcontractor complies with the terms and conditions of this Agreement.

4.4 **Reports; Records; and Inspections**.

4.4.1 **Progress Reports**. Each Party shall keep the other Party informed of its activities under the Development Program, and shall provide to the other Party's representatives on the JDC regular summary updates at each meeting. If reasonably necessary for a Party to perform its work under the Development Program, that Party may request that the other Party provide more detailed information and data regarding the updates it earlier provided, and the other Party shall promptly provide the requesting Party with information and data as is reasonably available and reasonably necessary to conduct the Development Program, and such other information as the Parties agree. Neither Party is required to generate additional data or prepare additional reports to comply with the foregoing obligation. Subject to Section 12.2, all such reports, information and data provided by a Party shall be considered the providing Party's Confidential Information.

4.4.2 **Development Records**. Each Party shall maintain records of the Development Program (or cause such records to be maintained) in sufficient detail and in good scientific manner as will properly reflect all work done and results achieved by or on behalf of such Party in the performance of the Development Program. All laboratory notebooks shall be maintained for no less than the term of any Patent issuing therefrom. All other records shall be maintained by each Party during the Term. All such records of a Party shall be considered such Party's Confidential Information.

4.5 **Regulatory**. GNE shall be responsible for preparing and submitting regulatory documentation for Licensed Products. Adaptive shall support GNE, as may be reasonably necessary, in preparing and submitting, obtaining such regulatory documentation, and in the activities in support thereof, including providing information, documents or other materials required by applicable law for inclusion in or in support of regulatory documentation, in each case in accordance with the terms and conditions of this Agreement and the Development Plan.

4.6 **Development Efforts**. The Parties shall use Commercially Reasonable Efforts to conduct their respective tasks under the Development Program and to comply with the Development Plan Overview.

ARTICLE 5
COMMERCIALIZATION

5.1 **General**. Except as expressly set forth in Section 5.2, GNE shall have the sole right and authority to Commercialize the Licensed Products in the Territory. GNE shall conduct all Commercialization activities in compliance with all applicable laws, rules and regulations.

5.2 **Licensed Products**. Following Marketing Approval of each Licensed Product, GNE or its Affiliate shall be solely responsible for and control all Commercialization activities with respect to such Licensed Product; *provided*, that Adaptive shall continue to be responsible for the identification of the full sequences of Private Antigen TCRs, Shared Antigen TCRs (individually and collectively, "**TCR Sequences**") for each individual patient in accordance with the TCR Sequencing Plan, and providing the TCR Sequences to GNE and its Affiliates for the manufacture of the such Licensed Product.

5.3 **Commercialization Efforts**. GNE shall use Commercially Reasonable Efforts to seek Marketing Approval for, and Commercialize, at least one Licensed Product.

ARTICLE 6
LICENSES

6.1 **License to GNE**.

6.1.1 **License Grants**. Subject to the terms and conditions of this Agreement, including each Party's exclusivity obligations pursuant to ARTICLE 8, Adaptive hereby grants to GNE:

(a) a transferable, worldwide, license to use and practice all TCR-Specific Platform IP, to Develop and Commercialize Licensed Products and related Companion Diagnostics in the Field, which license shall be exclusive as to Licensed Products, and non-exclusive as to Companion Diagnostics, in each case, subject to Adaptive retaining the right to perform all activities it is required to conduct under the Research Program or Development Program or otherwise under this Agreement in connection with the Development and Commercialization of Licensed Products;

(b) a non-transferable (subject to Section 19.3), worldwide, perpetual, irrevocable, non-exclusive license to use and practice all data and information within each Shared Antigen Data Package and any other Know-How disclosed by Adaptive to GNE under the Agreement (but not, in each case, any such Know-How that is included in the Adaptive Core Platform IP) in connection with research and development activities conducted by GNE in any fields of use, *provided* that Adaptive's retained non-exclusive rights to use the data and information within the Shared Antigen Data Packages are subject to its exclusivity obligations under ARTICLE 8; and

(c) a non-transferable (subject to Section 19.3), worldwide, perpetual, irrevocable, non-exclusive license to use all Private Antigen TCR Product Data in connection with research and development activities conducted by GNE in any field of use, *provided* that Adaptive's retained non-exclusive rights to use such Private Antigen TCR Product Data are subject to Adaptive's exclusivity obligations under ARTICLE 8. For clarity, it is understood that Adaptive retains the right to use the Private Antigen TCR Product Data: (i) for research and development purposes in all fields, including to make improvements to the Adaptive Platform and the Screening Technology, subject to Adaptive's exclusivity obligations under ARTICLE 8; and (ii) in connection with the development and commercialization of products that are not therapeutic products (including diagnostic, prophylactic vaccine and immunological research products) and services.

(d) a royalty-free, non-transferable (subject to Section 19.3), sublicensable, perpetual, worldwide, irrevocable, non-exclusive license under any Adaptive Platform IP described in clauses (b) and (c) of Section 11.1.1 that is conceived, discovered, developed or otherwise made (i) solely by or on behalf of GNE or its Affiliates, or (ii) jointly by or on behalf of GNE or its Affiliates, on the one hand, and Adaptive or its Affiliates, on the other hand, in each case of (i) and (ii), in any fields of use other than (A) services for immunological research, (B) diagnostic services or products (other than Companion Diagnostics), and (C) immune monitoring (other than as contemplated under this Agreement).

(e) For clarity, with the exception of the license granted in Section 6.1.1(d), no license is granted to GNE pursuant to this Section 6.1.1, to use or practice any Adaptive Core Platform IP.

6.1.2 **Sublicenses.** GNE shall have the right to sublicense the rights granted under Section 6.1.1 to its Affiliates or Third Parties, *provided* that such sublicense is consistent with the terms and conditions of this Agreement, and provided further that GNE shall remain responsible for such Affiliate's or Third Party's compliance with all obligations under this Agreement applicable to such Affiliate or Third Party. For clarity, no grant of any sublicense to a Third Party or an Affiliate shall relieve GNE of its obligations hereunder.

6.1.3 **Subcontracting**. GNE shall have the unrestricted right to enter into subcontracts with Third Parties and Affiliates acting by or for the benefit of GNE with respect to the activities authorized under this Agreement; *provided*, that in each instance such subcontract is consistent with the terms and conditions of this Agreement.

6.2 **License to Adaptive**.

6.2.1 **License Grants**. Subject to the terms and conditions of this Agreement, including each Party's exclusivity obligations pursuant to ARTICLE 8, GNE hereby grants to Adaptive:

(a) a royalty-free, non-transferable (subject to Section 19.3), non-sublicenseable (except to any Approved Subcontractors if necessary), non-exclusive license under the GNE Collaboration IP to the extent necessary for Adaptive to conduct the activities it is required to conduct under the Research Program, Development Program and Commercialization activities under the TCR Sequencing Plan, including, to identify and evaluate Shared Antigen TCRs and Private Antigen TCRs; and

(b) a royalty-free, non-transferable (subject to Section 19.3), sublicenseable, perpetual, worldwide, irrevocable, non-exclusive license under the GNE Collaboration IP and any other Know-How disclosed by GNE to Adaptive under the Agreement (but not, in each case, any such Intellectual Property relating to the manufacture (including gene-editing, expression, production methods, formulations and process development) of TCRs or Licensed Products) for research and development purposes, including to make improvements to the Adaptive Platform and to use such improved Adaptive Platform for all purposes, subject to Adaptive's obligations under this Agreement, including ARTICLE 8.

(c) a royalty-free, non-transferable (subject to Section 19.3), sublicenseable, perpetual, worldwide, irrevocable, non-exclusive license under any GNE Collaboration IP (excluding any GNE Collaboration IP relating to the manufacture (including gene-editing, expression, production methods, formulations and process development) of TCRs or Licensed Products) that is conceived, discovered, developed or otherwise made (i) solely by or on behalf of Adaptive or its Affiliates, or (ii) jointly by or on behalf of Adaptive or its Affiliates, on the one hand, and GNE or its Affiliates, on the other hand, in each case of (i) and (ii), for any and all purposes outside of the Collaboration Field, subject to Adaptive's obligations under this Agreement.

6.2.2 **Sublicenses.** Adaptive shall have the right to sublicense the rights granted under Section 6.2.1(b) and (c) to its Affiliates or Third Parties, *provided* that such sublicense is consistent with the terms and conditions of this Agreement, and provided further that Adaptive shall remain responsible for such Affiliate's or Third Party's compliance with all obligations under this Agreement applicable to such Affiliate or Third Party. For clarity, no grant of any sublicense to a Third Party or an Affiliate shall relieve Adaptive of its obligations hereunder.

6.3 **No Additional Licenses**. Except as expressly provided in this Agreement, nothing in this Agreement shall grant either Party any right, title or interest in and to the Know-How, Patents or other intellectual property rights of the other Party (either expressly or by implication or estoppel).

ARTICLE 7
MANUFACTURING, SUPPLY AND TECHNOLOGY TRANSFER

7.1 **Materials**. Each Party shall use Commercially Reasonable Efforts to provide the other Party with the tangible materials ("**Materials**") and other deliverables specified under the Research Plan and Development Plans, including any IND-enabling packages or data prepared by Adaptive before or after the Effective Date including, as applicable, any Shared Antigen Data Package or Private Antigen TCR Product Data (collectively, along with the Materials, the "**Deliverables**"). The JRC and JDC (as applicable) shall determine the specific format and timeline for the transfer of such Deliverables.

7.2 **Rights of Use**. With respect to the Materials and Deliverables provided by one Party to another Party pursuant to Section 7.1, each Party shall have the right to use such Materials for the

activities under the Research Program or Development Program, and for those Commercialization activities for which it is responsible, and to exercise the rights granted to such Party pursuant to ARTICLE 6. Subject to the foregoing, all such Deliverables: (a) shall be used by a Party only in accordance with the terms and conditions of this Agreement; (b) shall not be used or delivered by a Party to or for the benefit of any Third Party except as expressly provided for in this Agreement or in a manner consistent with its licensed or retained rights; and (c) shall be used by a Party in compliance with all applicable laws, rules and regulations.

7.3 **Manufacturing and Supply**.

7.3.1 **Generally**. GNE shall be solely responsible for clinical and commercial supply, and manufacturing, of the Licensed Products in the Territory, subject to Adaptive's rights in the following sentence. Adaptive shall be solely responsible for supplying TCR Sequences under this Agreement, including data created or developed in connection with generating and evaluating TCR Sequences, in accordance with the TCR Sequencing Plan (as may be amended pursuant to Section 2.2.2(e)) for both the Development Program and for Commercialization activities. Each Party shall conduct all its respective manufacturing and supply activities in compliance with all applicable laws, rules and regulations. Each Party shall, in performing its respective obligations, assign responsibilities to those portions of its organization that have the appropriate resources, expertise and responsibility for such obligations. Each Party shall be responsible for its own costs associated with its respective manufacturing and supply activities it conducts under this Agreement, including for clarity, all costs associated with activities undertaken under this ARTICLE 7.

7.3.2 **Regulatory Filings.** GNE shall own and control all regulatory filings and Marketing Approvals for the Licensed Products, including for the end-to-end manufacturing process for the Licensed Products. Adaptive shall cooperate with, and provide all information and documentation reasonably requested by, GNE to support activities necessary to obtain and maintain Marketing Approvals for the Licensed Products. Adaptive shall notify and provide copies to GNE of all communication received from Regulatory Authorities relating to the activities (*e.g.*, the screening and identification of TCR Sequences) undertaken by or on behalf of Adaptive under this Agreement, and shall consider in good faith any comments timely provided by GNE in response to such communication or in preparation for any meetings with Regulatory Authorities related thereto.

7.3.3 **Adaptive Platform Improvements.** Adaptive shall be responsible for implementing changes in respect of the Screening Technology for the Adaptive Platform as follows: (a) [***] (i) where such changes are required by a Regulatory Authority for the Licensed Products, within a reasonable time following notification of such requirement; and (ii) in connection with any improvements required to optimize the Adaptive Platform for Development and/or Commercialization of Licensed Products in order to (A) complete the activities constituting the Target Turnaround Objective within the Target Turnaround Time; and/or (B) meet the throughput capacity necessary in order to meet the requirements for Clinical Trials and Commercialization, in each case of (A) and (B), in order that such improvements can be operational for Development and Commercialization of Licensed Products at a time to be mutually agreed by the Parties through the JPT; and (b) [***], for any changes or improvements to the Screening Technology not covered by (a), including any such improvements necessary to further reduce the number of days to complete

the activities constituting the Target Turnaround Objective (*i.e.* following changes already implemented by Adaptive under subclause (a)(ii)(A) above), as requested by GNE and following discussion at the JPT with respect to timing and implementation of such changes. The Parties acknowledge and agree that one of the goals of Development for the Private Antigen TCR Products is to reduce the time to completion by Adaptive of the processes described in Parts 2, 3, 4.1 and 4.2 of the TCR Sequencing Plan Requirements to [***] days from the date that tumor tissue or other sample is received from GNE in accordance with Part 1.2 of Exhibit 2.2.2(d).

7.3.4 **Supply Agreement.** GNE and Adaptive shall negotiate in good faith and enter into a supply agreement and quality agreement applicable to the use of the Adaptive Platform for the provision of TCR Sequences in connection with the Development Program and Commercialization activities consistent with this Agreement and the TCR Sequencing Plan Requirements (the "**TCR Sequence Supply Agreements**"), which TCR Sequence Supply Agreements shall provide: (a) for the supply of TCR Sequences in connection with the activities performed by Adaptive under the TCR Sequencing Plan; (b) a mechanism by which the Parties would work together in good faith for an agreed period of time to resolve actual or potential issues or failures arising in connection with the identification and supply of TCR Sequences prior to GNE having a right to require transfer of any Screening Technology under any TCR Sequence Supply Agreement, taking into account each Party's role in the end-to-end manufacturing timelines required for the effective Development and Commercialization of Licensed Products; and (c) other terms customary in the pharmaceutical industry to agreements of this nature, including reasonable inspection and audit rights for GNE and any Regulatory Authority to the extent required in connection with regulatory filings for the Licensed Products.

7.4 **Technology Transfer**. If Adaptive elects to engage a contract manufacturer to supply TCR Sequences in accordance with and as defined under the TCR Sequence Supply Agreement, then such contract manufacturer shall be an Approved Subcontractor (or otherwise approved by GNE) and Adaptive shall be responsible for all costs associated with the supply of the TCR Sequences by such contract manufacturer. Notwithstanding the preceding sentence, in connection with the supply of TCR Sequences for the Private Antigen TCR Products, if: (a) Adaptive notifies GNE in writing that it is unwilling for whatever reason or that it is or expects to be unable to perform the activities set out in the TCR Sequencing Plan and/or in the timelines set forth therein; or (b) Adaptive materially defaults on its obligations to supply TCR Sequences in accordance with and as defined under the TCR Sequence Supply Agreement, then in either instance upon GNE's election and written notice to Adaptive, [***] in connection with Adaptive's failure to perform such activities or material breach of such obligations, Adaptive will disclose and transfer to GNE, or a contract manufacturer mutually agreed by GNE and Adaptive, all Screening Technology, including licenses under applicable Intellectual Property, solely as necessary to enable GNE or such contract manufacturer to conduct those processes and techniques within the Adaptive Platform that are necessary for the identification of TCR Sequences (including creation or development of data in connection therewith) based upon Patient Samples, and supply to GNE of the Private Antigen TCR Product Data related thereto, for GNE's use in the manufacture of Licensed Products; *provided*, that such transfer shall be subject to the terms and conditions of Exhibit 7.4. Without limiting the foregoing, each Party will use reasonable efforts to facilitate the transfer and enablement of such Screening Technology. If Adaptive performs such technology transfer, Section 9.4.4 shall apply following such transfer.

ARTICLE 8
EXCLUSIVITY

8.1 **Adaptive**.

8.1.1 **Other TCR Cell Therapies**. During the Term and without modifying any exclusive licenses granted under ARTICLE 6, Adaptive shall not, and shall cause its Affiliates (subject to Section 8.1.4) not to, directly or indirectly, itself or through any license or collaboration with a Third Party, Develop or Commercialize any Other TCR Cell Therapy in the Collaboration Field. Notwithstanding the foregoing, with respect only to Tumor Associated Antigens, if and to the extent Adaptive or GNE believes in good faith that the collaboration under this Agreement may be enhanced by Adaptive entering into an agreement with a Third Party for the Development and Commercialization (non-exclusively) of an Other TCR Cell Therapy that is directed to one or more Tumor Associated Antigens (including those Tumor Associated Antigens that may be the targets of any Licensed Products), such Party shall discuss such potential arrangement in the JRC and/or JDC, as appropriate, and if the Parties mutually agree in writing, Adaptive shall have the right to negotiate and, subject to GNE's review and approval of any such agreement, enter into such agreement with such Third Party (any such permitted agreement, a "**Permitted Third Party TCR Agreement**"), and the Parties shall share the proceeds of any such Permitted Third Party TCR Agreement such that [***]% of such proceeds are allocated to Adaptive and [***]% of such proceeds are allocated to GNE.

8.1.2 **Prioritized TCRs**. During the Term, Adaptive shall not, and shall cause its Affiliates (subject to Section 8.1.5) not to, directly or indirectly, itself or through any license or collaboration with a Third Party, Develop or Commercialize any therapeutic product or service (whether as a part of any Cell Therapy, or other modality) that contains any Prioritized TCR that is directed to a cancer-specific Antigen, for any therapeutic use for any Indication. For clarity, during the Term, Adaptive and its Affiliates shall have the right to Develop or Commercialize (i) any diagnostic, immunological research or monitoring product that contains any Prioritized TCR, whether or not such diagnostic, or immunological research or monitoring product or service is directed to (or includes any component directed to) a cancer-specific Antigen; and (ii) any product that contains or utilizes any Prioritized TCR that is directed to an Antigen that is not a cancer-specific Antigen, for any therapeutic use for any Indication outside of any oncology Indication.

8.1.3 **Private Antigen TCRs**. During the Term, Adaptive shall not, and shall cause its Affiliates (subject to Section 8.1.5) not to, directly or indirectly, itself or through any license or collaboration with a Third Party, Develop or Commercialize any therapeutic product (whether as a part of any Cell Therapy, or other modality) containing any TCR that was administered to any patient as part of a Private Antigen TCR Product, for any therapeutic use for any oncology Indication. For clarity, during the Term, Adaptive and its Affiliates shall have the right to Develop or Commercialize: (a) any diagnostic or immunological research or monitoring product containing any TCR that was administered to any patient as part of a Private Antigen TCR Product, whether or not such diagnostic, immunological research or monitoring product is directed to (or includes any component directed to) a cancer-specific Antigen; and (b) any product containing any TCR that was administered to any patient as part of a Private Antigen TCR Product for any therapeutic use for any Indication outside of oncology.

8.1.4 **Expanded Use TCRs.** With respect to any Recurring Private Antigen, and without limiting Section 8.1.3, if as a result of Adaptive's screening, analysis and evaluation of such Recurring Private Antigen, Adaptive notifies GNE that it has generated one or more Prioritized TCRs directed to such Recurring Private Antigen (which may, for clarity have the same TCR Sequence as a TCR previously administered to a patient who received a Private Antigen TCR Product) (each of such Prioritized TCRs, an "**Expanded Use TCR**"), then Adaptive shall be obligated thereafter under Section 8.1.2, rather than Section 8.1.3 with respect to such Expanded Use TCR, *provided* however that the provisions of Section 8.1.2 shall not be applied retroactively to any TCR that Adaptive or its Affiliates performed any of the activities (itself or by granting any rights to any Third Party) permitted under Section 8.1.3(a) or (b) with respect thereto prior to its designation as an Expanded Use TCR (an "**Excluded Expanded Use TCR**"), and such Excluded Expanded Use TCR shall nonetheless continue thereafter to be subject to the obligations under Section 8.1.3, and not those under Section 8.1.2.

8.1.5 **Negative Covenant re Activities in the Expanded Field.** During the Term with respect to a specific Licensed Product for which an IND has been filed, Adaptive shall not, and shall cause its Affiliates not to, following such IND filing, directly or indirectly, itself or through any license or collaboration with a Third Party, Develop or Commercialize any Prioritized TCR contained in such IND for such Licensed Product for any use in the Expanded Therapeutic Field (whether or not such Prioritized TCR is directed to a cancer-specific Antigen).

8.1.6 **Effect on Affiliates.**

(a) In the event that there is a Change of Control where Adaptive is the Acquired Entity, then for purposes of this Section 8.1, "Adaptive" shall mean Adaptive Biotechnologies Corporation and its Affiliates existing immediately prior to the Change of Control transaction.

(b) In the event that there is a Change of Control where Adaptive is the Acquired Entity, the obligations of Sections 8.1.1, 8.1.2, 8.1.3 and 8.1.4 shall not apply to any Controlling Affiliate Program that exists as of the effective time of such Change of Control; provided that: (i) Adaptive and the Acquiring Affiliate Group establish internal processes, policies, procedures and systems to segregate proprietary or confidential information relating to any such Controlling Affiliate Program from any Confidential Information or Collaboration Data related to any Licensed Products, or related to the results of the Research Program or Development Program; (ii) the Acquiring Affiliate Group does not practice or use the Screening Technology, or any Adaptive Platform IP, Collaboration Data or Confidential Information of GNE or its Affiliates (or its or their sublicensees) in the course of the conduct of such Controlling Affiliate Program; and (iii) no personnel who were employees or individual contractors of Adaptive prior to the Change of Control transaction conduct any activities under such Controlling Affiliate Program. The foregoing requirements and restrictions shall not apply in the event such Acquiring Affiliate divests such Controlling Affiliate Program to a Third Party.

(c) **Certain Definitions**. As used herein:

(i) "**Acquired Entity**" means a Party undergoing a Change of Control.

(ii) "**Acquiring Affiliate**" means, with respect to an Acquired Entity undergoing a Change of Control transaction, an entity that (a) acquires control (as defined in the definition of Affiliate) of such Party after the Effective Date and (b) was a Third Party at the time of such acquisition.

(iii) "**Acquiring Affiliate Group**" means an Acquiring Affiliate and its affiliates existing immediately prior to or after the effective date of any Change of Control of the Acquired Entity, and specifically excludes Adaptive and its Affiliates existing immediately prior to the effective date of such Change of Control transaction.

(iv) "**Controlling Affiliate Program**" means, with respect to any Acquiring Affiliate, a program of activities conducted by or on behalf of such Acquiring Affiliate or other member of the Acquiring Affiliate Group involving the research, Development and/or Commercialization of any therapeutic Cell Therapy engineered to express any TCR which is (A) identified either by such Acquiring Affiliate or its affiliates, or any Third Party collaborator, without access to or use of the Screening Technology or Adaptive Platform IP and (B) directed against any Neoantigen or Tumor Associated Antigen.

8.2 **GNE**.

8.2.1 GNE retains the right (for itself, for its Affiliates or with a Third Party) to Develop and Commercialize any Other TCR Cell Therapy (such activities, a "**GNE Other TCR Cell Therapy Program**"); *provided*, that:

(a) GNE establishes or has in place internal processes, policies, procedures and systems to [***];

(b) GNE shall not and it shall cause its Affiliates not to, disclose to any Third Party (other than a Third Party working on behalf or for the benefit of GNE under this Agreement), or use itself or with such Third Party, [***] or other Confidential Information provided by Adaptive to GNE under this Agreement in the conduct of any such GNE Other TCR Cell Therapy Program; and

(c) to the extent that a product or Cell Therapy Commercialized by GNE or any of its Affiliates or Third Party sublicensee incorporates a TCR (including any modifications thereto) which is: [***].

8.3 **Use of Third Party TCRs and** [***] **Acquired TCRs**. GNE shall have all right to incorporate into any Shared Antigen TCR Product or any Private Antigen TCR Product any TCR (including any modifications thereto) which either (i) was generated under any GNE Other TCR Cell Therapy Program or (ii) was in-licensed from any Third Party, including from the [***], or (iii) any [***] Acquired TCR (any such TCR described in (i)-(iii), a "**Third Party TCR**"), in which event the royalties and other payments owed on any such Shared Antigen TCR Product or Private Antigen TCR Product shall nonetheless be as set out in ARTICLE 9, and in no cases will such product be deemed a "Third Party" product for purposes of a "Combination" in the calculation of royalties owed thereon.

8.4 [***]. Notwithstanding anything to the contrary in this Agreement, no Cell Therapy product incorporating either a [***] TCR or [***] Acquired TCR shall be deemed a Licensed Product or an Outside TCR Product unless such [***] TCR or [***] Acquired TCR is incorporated into any Shared Antigen TCR Product or any Private Antigen TCR Product in accordance with Section 8.3, and no royalty and no milestone payment shall be paid to Adaptive under this Agreement with respect to any such [***] TCR or any [***] Acquired TCR, except as and to the extent provided in Section 8.5. For clarity, nothing in this Agreement shall limit in any way the [***]:

8.4.1 "[***] **Acquired TCR**" means a TCR acquired or in-licensed from a Third Party by [***] or its Affiliates (which are understood to exclude GNE or [***]).

8.4.2 "[***]" means a research and development program that is directed towards research and development of a Cell Therapy product incorporating a TCR and that is conducted and funded, as among [***], GNE and its Affiliates, solely under the control of the [***]. For clarity, a [***] TCR Program may include research and development on TCRs and technology in-licensed or acquired by [***] from Third Parties and collaborations conducted by [***] with Third Parties.

8.4.3 "[***]" means the functional groups within GNE and its Affiliates that are responsible for research, development and commercialization of product candidates that originate from research, preclinical development and early clinical development programs conducted by [***] or GNE's Research and Early Development Organization. For clarity, research, development and commercialization activities of [***] activities expressly exclude [***]

8.4.4 "[***]" means the [***] (or its equivalent, if reorganized, unless it becomes part of GNE's Research and Early Development organization (or its equivalent) as a result of such reorganization) of [***], as further discussed in Section 8.5.

8.4.5 "[***] **TCR**" means a TCR that was researched and/or developed pursuant to a [***] TCR Program without utilizing Adaptive-generated TCR Sequences, Adaptive-generated TCR libraries or other Confidential Information of Adaptive (including GNE Collaboration IP) and for which the [***] has responsibility for further research, development and commercialization.

8.4.6 "[***] **TCR Program**" means a research and development program that is directed towards research and development of a Cell Therapy product incorporating a TCR and that is conducted and funded, as between GNE and its Affiliates, solely under the control of the [***]. For clarity, the [***] TCR Program may include research and development on TCRs and technology in-licensed or acquired by [***] from Third Parties and collaborations conducted by [***] with Third Parties.

8.4.7 "[***]" means [***].

8.4.8 "[***] **Acquired TCR**" means a TCR acquired or in-licensed from a Third Party by [***] or its Affiliates (other than GNE).

8.5 **Adding** [***] **as an Affiliate; Merging R&D Organizations**. Notwithstanding that, as of the Effective Date, [***] is not an Affiliate of GNE for purposes of this Agreement, if GNE provides notice to Adaptive: (a) electing to add [***] as an Affiliate under this Agreement; or (b) that [***] has been merged with and into or has become part of GNE's Research and Early Development organization (or its equivalent) as a result of a reorganization of [***], then [***].

ARTICLE 9
FINANCIAL TERMS

9.1 **Initial License Fee**. In consideration of the rights granted by Adaptive to GNE under ARTICLE 6 to the Adaptive Platform IP, GNE shall pay to Adaptive a one-time-license-fee in the amount of Three Hundred Million US Dollars ($300,000,000). Such payment shall be made within [***] days of the Effective Date and shall be non-refundable and non-creditable.

9.2 **Development and Commercial Event Payments**.

9.2.1 **Shared Antigen TCR Product Events**. Subject to the terms of Section 9.2.3 and Section 9.2.4, GNE will pay Adaptive the following one-time event payments upon the first Shared Antigen TCR Product achieving the following events:

Shared Antigen TCR Product Event	Event Payment (US$)		
	[***]	[***]	[***]
(a) [***]	[***]	[***]	[***]
(b) [***]	[***]	[***]	[***]
(c) [***]	[***]	[***]	[***]
(d) [***]	[***]	[***]	[***]
(e) [***]	[***]	[***]	[***]
Total Potential Event Payments:	[***]	[***]	[***]

[***].

9.2.2 **Private Antigen TCR Product Events**. Subject to the terms of Section 9.2.3 and Section 9.2.4, GNE will pay Adaptive the following one-time event payments upon the first Private Antigen TCR Product achieving the following events:

Private Antigen TCR Product Event	Event Payment (US$)		
	[***]	[***]	[***]
(a) [***]	[***]	[***]	[***]
[***]	[***]	[***]	[***]
[***]	[***]	[***]	[***]
[***]	[***]	[***]	[***]
[***]	[***]	[***]	[***]
Total Potential Event Payments:	[***]	[***]	[***]

[***].

9.2.3 **Certain Terms**. It is understood and agreed that the following terms shall apply to the events achieved under Section 9.2.1 and Section 9.2.2.

(a) Event payments under Section 9.2.1 shall be due [***].

(b) For the avoidance of doubt, GNE's (including any sublicensees hereunder) cumulative obligation under Section 9.2.1 with respect to the: [***].

(c) For the avoidance of doubt, GNE's (including any sublicensees hereunder) cumulative obligation under Section 9.2.2 with respect to the: [***].

(d) If a milestone event in a given column of the tables in Section 9.2.1 or Section 9.2.2, is achieved by [***], as applicable, and GNE elects to cease Development and Commercialization of such Licensed Product, such that it does not achieve any later milestone events, then such later milestone events in the applicable column may be achieved by [***], as applicable, and later milestone events (and associated payments) in the second and third columns, respectively, would remain available for possible achievement by a [***], subject to the terms of this Section 9.2.

(e) For the milestone event payments specified in Section 9.2.1(a) and/or Section 9.2.2(a), there shall be one payment made for [***]; *provided that*, the preceding limitation does not limit the [***].

(f) If, for any reason: (i) a particular event specified in Section 9.2.1(b), (c), (d) or (e) is achieved without the event in Section 9.2.1(a) and/or 9.2.1(b) having been achieved, then upon the achievement of such subsequent event, the event payment applicable to such achieved event and the event payment(s) applicable to the preceding unachieved event(s) in Section 9.2.1(a) and/or 9.2.1(b), as applicable, shall be due and payable; or (ii) a particular event specified in Section 9.2.2(b), (c), (d) or (e) is achieved without the event in Section 9.2.2(a) and/or 9.2.2(b) having been achieved, then upon the achievement of such subsequent event, the event payment applicable to such achieved event and the event payment(s) applicable to the preceding unachieved event(s) in Section 9.2.2(a) and/or 9.2.2(b), as applicable, shall be due and payable.

9.2.4 **Notice of Achievement; Timing of Payment.** With respect to each event referred to in Section 9.2.1(a) and Section 9.2.2(a), GNE (or its sublicensee, if applicable) shall inform Adaptive within [***] days of the achievement of such event. With respect to each event referred

to in Sections 9.2.1(b) through (e) or Sections 9.2.2(b) through (e), GNE (or its sublicensee, if applicable) shall inform Adaptive within [***] days of the achievement of such event. GNE shall pay Adaptive the respective accrued and payable event payment within [***] days of receipt of an invoice from Adaptive with respect thereto.

9.3 **Net Sales Event Payments**.

9.3.1 **Shared Antigen TCR Product Net Sales Events**. Subject to the terms of Section 9.3.3, GNE shall pay Adaptive the following one-time event payments upon aggregate annual Net Sales of all Shared Antigen TCR Products achieving the following Commercialization events:

Net Sales Event for Shared Antigen TCR Products	**Event Payment (in US dollars)**
(a) [***]:	$ [***]
(b) [***]	$ [***]
(c) [***]	$ [***]
Total Potential Net Sales Event Payments for Shared Antigen TCR Products:	**$** [***]

It is understood and agreed that the event payments under this Section 9.3.1 shall be due only once. For the avoidance of doubt, GNE's (including any sublicensees hereunder) cumulative obligation under this Section 9.3.1 shall in no event exceed [***].

9.3.2 **Private Antigen TCR Product Net Sales Events**. Subject to the terms of Section 9.3.3, GNE shall pay Adaptive the following one-time event payments upon aggregate annual Net Sales of all Private Antigen TCR Products achieving the following Commercialization events:

Net Sales Event for All Private Antigen TCR Products	**Event Payment (in US dollars)**
(a) [***]:	$ [***]
(b) [***]:	$ [***]
(c) [***]:	$ [***]
Total Potential Net Sales Event Payments for all Private Antigen TCR Products:	**$** [***]

It is understood and agreed that the event payments under this Section 9.3.2 shall be due only once. For the avoidance of doubt, GNE's (including any sublicensees hereunder) cumulative obligation under this Section 9.3.2 shall in no event exceed [***].

9.3.3 **Notice of Achievement; Payment**. With respect to each event listed in Section 9.3.1 and Section 9.3.2, GNE shall inform Adaptive following the achievement of such event within [***] days after the quarter for which such event occurs. On or after Adaptive's receipt of such notice of achievement, Adaptive shall submit a written invoice to GNE for the corresponding event payment. Each such invoice shall specify the applicable milestone event, and, unless otherwise requested by GNE in writing Adaptive shall send such invoices to GNE at the address for GNE in the introduction to this Agreement, to the attention of Finance Manager. GNE shall pay Adaptive the respective accrued and payable event payment within [***] days of receipt of an invoice from Adaptive with respect thereto.

9.4 **Royalty Payments for Licensed Products**.

9.4.1 **Shared Antigen TCR Products**. Subject to the terms of Section 9.4.3 through Section 9.4.8, GNE shall pay Adaptive the following royalties on annual aggregate worldwide Net Sales of Shared Antigen TCR Products by GNE (or its sublicensee hereunder) during the Shared Royalty Term:

Annual Worldwide Net Sales (in US Dollars)	Royalty Rate Percentage
Up to [***]:	[***]%
Portion equal to or greater than [***] and less than [***]:	[***]%
Portion equal to or greater than [***] and less than [***]:	[***]%
Portion greater than [***]:	[***]%

9.4.2 **Private Antigen TCR Products**. Subject to the terms of Section 9.4.3 through Section 9.4.8, GNE shall pay Adaptive the following royalties on annual aggregate worldwide Net Sales of Private Antigen TCR Products by GNE (or its sublicensee hereunder) during the Private Royalty Term:

Annual Worldwide Net Sales (in US Dollars)	Royalty Rate Percentage
Up to [***]:	[***]%
Portion equal to or greater than [***] and less than [***]:	[***]%
Portion equal to or greater than [***] and less than [***]:	[***]%
Portion greater than [***]	[***]%

9.4.3 **Third Party Payments**.

(a) Adaptive. Adaptive shall have the obligation to make payments owed under written agreements entered into by Adaptive with Third Parties, as of the Effective Date or during the Term.

(b) GNE.

(i) Shared Antigen TCR Products. If, after the Effective Date, GNE (or an Affiliate or sublicensee) obtains a right or license under any Intellectual Property (which license includes one or more Patents) of a Third Party, where the practice of the Intellectual Property is [***] for the making, using, selling, offering for sale, or importing of a Shared Antigen TCR Product in a given country, then GNE may offset against the royalties due and payable by GNE to Adaptive with respect to such Shared Antigen TCR Product under Section 9.4.1 in such country, up to [***] of the amount of payments paid by GNE (or an Affiliate or sublicensee) to such Third Party, subject to Section 9.4.3(b)(iii) for such right or license (including the license to any know-how included in such Patent license); *provided*, that in no event shall such reductions reduce the royalty percentage rate payable to Adaptive on Net Sales of such Shared Antigen TCR Product in such country by more than [***] of what would otherwise be owed by GNE to Adaptive under Section 9.4.1. For clarity, any such amounts that would otherwise be offset if not for such minimum royalty percentage shall be applied to the subsequent royalty payment periods until such amount is fully offset, subject to the [***] floor in each such subsequent royalty payment period.

(ii) Private Antigen TCR Products. If, after the Effective Date, GNE (or an Affiliate or sublicensee) obtains a right or license under any Intellectual Property (which license includes one or more Patents) of a Third Party, where the practice of the Intellectual Property is [***] for the making, using, selling, offering for sale, or importing of a Private Antigen TCR Product in a given country, then GNE may offset against the royalties due and payable by GNE to Adaptive with respect to such Private Antigen TCR Product under Section 9.4.2 in such country, up to [***] of the amount of payments paid by GNE (or an Affiliate or sublicensee) to such Third Party, subject to Section 9.4.3(b)(iii), for such right or license (including the license to any know-how included in such Patent license); *provided*, that in no event shall such reductions reduce the royalty percentage rate payable to Adaptive on Net Sales of any such Private Antigen TCR Product in such country be below the greater of: (A) [***] ([***]%) of the applicable rates set forth in Section 9.4.2; or (B) [***] percent ([***]%); *provided further* that if the Parties effect a Screening Technology Transfer to GNE or to a Screening Contract Manufacturer under a Screening Technology Transfer Agreement in accordance with Section 7.4, then in no event shall such reductions further reduce the royalty percentage rate payable to Adaptive on Net Sales of any such Private Antigen TCR Product in such country below [***] percent ([***]%). For clarity, any such amounts that would otherwise be offset if not for such minimum royalty percentage shall be applied to the subsequent royalty payment periods until such amount is fully offset, subject to the applicable floor in each such subsequent royalty payment period.

(iii) Allocation of Payments for Third Party Patents. If GNE acquires rights or obtains a license under Third Party Patents where the payments for such acquisition of rights or under such Third Party license are subject to the permitted offset right under Sections 9.4.3(b)(i) or 9.4.3(b)(ii), and such Third Party Patents [***], then GNE shall [***].

9.4.4 **Third Party Technology Transfer Offsets**. Notwithstanding anything in this Agreement to the contrary, if the Parties effect a Screening Technology Transfer to GNE or to a Screening Contract Manufacturer under a Screening Technology Transfer Agreement in accordance with Section 7.4(a) or (b), then GNE may deduct from any royalty payments to Adaptive hereunder with respect to Private Antigen TCR Products: (A) (1) any fees paid by or on behalf of GNE to such Screening Contract Manufacturer for the manufacture and supply of such TCR Sequences (including for data created or developed in connection with generating the TCR Sequences), up to a maximum amount per patient of [***] percent ([***]%) of Adaptive's fully-burdened direct costs to generate the TCR Sequence for each patient as of the date of the Screening Technology Transfer; (2) any out-of-pocket costs and expenses incurred by GNE in connection with the Screening Technology Transfer; and (3) [***] *less* (B) an amount equal to [***] percent ([***]%) of any capital expenditures made by Adaptive in connection with and allocable to the manufacture and supply of TCR Sequences under this Agreement or the TCR Sequence Supply Agreement during the [***] months prior to the date upon which the Parties effect a Screening Technology Transfer to GNE or to a Screening Contract Manufacturer under a Screening Technology Transfer Agreement in accordance with Section 7.4(a) or (b). For clarity, any such amounts that would otherwise be deducted if not for such cap on deduction shall be applied to the subsequent royalty payment periods until such amount is fully deducted, subject to the applicable floor in each such subsequent royalty payment period.

9.4.5 **Biosimilar Products**.

(a) If following the first commercial sale of a Biosimilar in a country, Net Sales of a Shared Antigen TCR Product in such country in a given [***] month period fall by [***] percent ([***]%) from the Net Sales in the calendar year immediately preceding the calendar year in which such launch of the Biosimilar occurred, the royalties due and payable by GNE under Section 9.4.1 for all such Shared Antigen TCR Product shall be reduced by [***] percent ([***]%) in such country.

(b) As used herein, "**Biosimilar**" means, with respect to a given Shared Antigen TCR Product, any drug, biological product or Cell Therapy that: (i) is subject to review under an abbreviated approval pathway as a biosimilar, follow-on biologic or generic biological product, as those terms are commonly understood under the FD&C Act, 21 C.F.R. §§ 210, 211 and 600 et seq. and under the PHS Act, 21 C.F.R. §§ 600-610 and related rules and regulations, or the corresponding or similar laws, rules and regulations of any other jurisdiction; (ii) is approved as "biobetter", in each case of clauses (i) and (ii), of the relevant Shared Antigen TCR Product(s); or (iii) is subject to review under an abbreviated approval pathway as a "Cellular Therapy" (or substantially similar nomenclature therefor) in reliance on or by reference to the Marketing Approval for the relevant Shared Antigen TCR Product, in the event Regulatory Authorities promulgate such rules and regulations under the FD&C Act, or the corresponding or similar laws, rules and regulations of any other jurisdiction; *provided*, that in each instance under clauses (i)-(iii), which Biosimilar is sold by a Third Party that is not a licensee or sublicensee of GNE (or any of its Affiliates) and that has not otherwise been authorized, directly or indirectly, by GNE (or any of its Affiliates) to market and sell such product.

9.4.6 **Single Royalty Payment of Royalties on Sequential or Concurrent Administration**. No more than one royalty payment shall be due under this Section 9.4 with respect to a sale of a particular Licensed Product. Notwithstanding the foregoing, the Parties acknowledge and agree that a treatment regimen may contain both Shared Antigen TCR Products and Private Antigen TCR Products that are administered concurrently or sequentially (and that sequential administration may be separated by varying periods of time, depending on the Indication and the treatment regimen), and that such treatment regimen may result in such Licensed Products being invoiced and/or reimbursed in a given country either as two separate Licensed Products, or as a single or unitary price for a treatment regimen that includes both a Shared Antigen TCR Product and a Private Antigen TCR Product. For the avoidance of doubt:

(a) if a treatment regimen contains both Shared Antigen TCR Products and Private Antigen TCR Products administered concurrently or sequentially, and such treatment regimen is sold and invoiced as if it were a single Licensed Product (*i.e.* unitary pricing covering all Licensed Products in such treatment regimen), the royalty rate percentage and royalty payment for such Licensed Product or treatment regimen shall be calculated as a Private Antigen TCR Product under Section 9.4.2;

(b) if a treatment regimen contains both Shared Antigen TCR Products and Private Antigen TCR Products administered concurrently or sequentially, and each Licensed Product included in such treatment regimen is invoiced and/or reimbursed separately, then the royalty rate percentage and royalty payment shall be the rate applicable to the relevant type of Licensed Product at the time of invoice, under Section 9.4.1 or Section 9.4.2, as applicable;

(c) a Licensed Product that includes a Third Party TCR shall be treated for royalty purposes as if such Third Party TCR had been generated by the Parties under this Agreement, and shall in no event be treated as a Combination solely on the basis of the inclusion of a Third Party TCR. For clarity, if such Third Party TCR is included in a Shared Antigen TCR Product, Section 9.4.1 shall apply, and if such Third Party TCR is included in a Private Antigen TCR Product, Section 9.4.2 shall apply;

(d) a Shared Antigen TCR Product or Private Antigen TCR Product may contain multiple TCRs in the applicable Cell Therapy administered concurrently or sequentially, which shall be treated as a single Licensed Product, subject to Section 9.4.6(a) or Section 9.4.6(b), if applicable; and

(e) multiple royalties shall not be payable because the sale of a particular Licensed Product is Covered by more than one (1) Valid Claim in the country in which such Licensed Product is sold.

9.4.7 **Royalty Term**.

(a) The royalty obligations set forth in Section 9.4.1 will commence on a country-by-country basis upon the First Commercial Sale of any Shared Antigen TCR Product in the relevant country, and expire on a country-by-country basis upon: (i) the later of the

expiration of the last to expire Patent containing a Valid Claim that covers the sale of such Licensed Product in such country; and (ii) [***] years (such period, the "**Shared Royalty Term**"). For clarity, (A) if such last Valid Claim in a particular country expires prior to the [***] anniversary of the date of First Commercial Sale of such Shared Antigen TCR Product in such country, royalties shall continue to be payable on the sales of such Licensed Product in such country pursuant to Section 9.4.1 at the rates set forth therein until the [***] anniversary of the date of First Commercial Sale of such Shared Antigen TCR Product in such country; and (B) if no Valid Claim exists in such country at any time, royalties shall continue to be payable on the sales of such Shared Antigen TCR Product in such country pursuant to Section 9.4.1 at the rates set forth therein until the [***] anniversary of the date of First Commercial Sale of such Licensed Product in such country.

(b) The royalty obligations set forth in Section 9.4.2 will commence on a country-by-country basis upon the First Commercial Sale of any Private Antigen TCR Product in the relevant country, and expire on the [***] anniversary of the date of First Commercial Sale of the first Private Antigen TCR Product in such country (such period, the "**Private Royalty Term**").

9.4.8 **Rights Following Expiration of Royalty Term**. Upon expiry of its payment obligation hereunder with respect to a Licensed Product in a country, the licenses in Section 6.1 shall be fully paid-up on a non-exclusive basis in respect of that Licensed Product in that country; *provided*, that the foregoing shall not be interpreted to require Adaptive to continue to conduct Commercialization activities under the TCR Sequencing Plan (*i.e.*, to continue to provide TCR Sequences) with respect to the Private Antigen TCR Product. In addition, with respect to the Private Antigen TCR Product, at GNE's request on or about [***] months prior to the anticipated expiration of the Shared Royalty Term for such product in the United States (or if a Private Antigen TCR Product never achieves First Commercial Sale in the United States, then on or about [***] months prior to the anticipated expiration of the Private Royalty Term in the first country in the Major European Markets or Japan in which First Commercial Sale was achieved), the Parties shall meet and confer, and discuss in good faith a possible extension or other arrangement with respect to the sourcing of sequencing activities with respect to the TCR Sequences for the Private Antigen.

ARTICLE 10
PAYMENT TERMS; REPORTS; AUDITS

10.1 **Timing of Royalty Payment**. **Timing of Sales-Related Payments**. All payments of royalties under Section 9.4 and sales milestones under Section 9.3 shall be made within [***] days following the end of each calendar quarter in which the sale was made.

10.2 **Royalty Report**. For each calendar quarter for which GNE has an obligation to make royalty payments, such payments shall be accompanied by a report that specifies for such calendar quarter the following information ("**Net Sales Report**"):

(i) [***];

(ii) [***]; and

(iii) the total royalties due to Adaptive.

If GNE is reporting Net Sales for more than one Licensed Product, the foregoing information shall be reported on a Licensed Product-by-Licensed Product basis.

10.3 **Mode of Payment**. All payments hereunder shall be made in immediately available funds to the account listed below (or such other account as Adaptive shall designate before such payment is due):

Pay to:	[***]
For credit of:	Adaptive Biotechnologies
Corporation Routing & Transit #: [***]	
SWIFT code:	[***]
Credit to Account #:	[***]
By Order of:	Genentech, Inc.

10.4 **Currency of Payments**. All payments under this Agreement shall be made in United States dollars, unless otherwise expressly provided in this Agreement. Net Sales outside of the United States shall be first determined in the currency in which they are earned and shall then be converted into an amount in United States dollars as follows: (a) with respect to sales by or on behalf of GNE, using GNE's customary and usual conversion procedures, consistently applied; and (b) with respect to sales by or on behalf of a given sublicensee, using the conversion procedures applicable to payments by such sublicensee to GNE for such sales.

10.5 **Blocked Currency**. If, at any time, legal restrictions prevent GNE (or a sublicensee) from remitting part or all of royalty payments when due with respect to any country in the Territory where Licensed Products are sold, GNE shall continue to provide Net Sales Reports for such royalty payments, and such royalty payments shall continue to accrue in such country, but GNE shall not be obligated to make such royalty payments until such time as payment may be made through reasonable, lawful means or methods that may be available, as GNE shall determine.

10.6 **Taxes**. Each Party shall comply with applicable laws and regulations regarding filing and reporting for income tax purposes. Neither Party shall treat their relationship under this Agreement as a pass through entity for tax purposes. All payments made under this Agreement shall be made free and clear of any and all taxes, duties, levies, fees or other charges, except for withholding taxes and VAT. GNE shall be entitled to deduct from payments made to Adaptive under this Agreement the amount of any withholding taxes required to be withheld, to the extent paid to the appropriate governmental authority on behalf of Adaptive (and not refunded or reimbursed). GNE shall deliver to Adaptive, upon request, proof of payment of all such withholding taxes. GNE shall provide reasonable assistance to Adaptive in seeking any benefits available to Adaptive with respect to government tax withholdings by any relevant law, regulation or double tax treaty. All payments made under this Agreement shall be exclusive of VAT (if applicable) and such VAT shall be paid promptly on receipt of a valid VAT invoice.

10.7 **Records; Inspection**.

10.7.1 **Records**. GNE agrees to keep, for [***] years from the year of creation, records of all sales of Licensed Products for each reporting period in which royalty payments are due, showing sales of Licensed Products for GNE and applicable deductions in sufficient detail to enable the report provided under Section 10.2 to be verified.

10.7.2 **Audits**. Adaptive shall have the right to request that such report be verified by an independent, certified and internationally recognized public accounting firm selected by Adaptive and acceptable to GNE (the "**CPA Firm**"). Such right to request a verified report shall: (a) be limited to the three-year period during which GNE is required to maintain the same; (b) not be exercised more than once in any calendar year; and (c) not be exercised more frequently than once with respect to records covering any specific period of time. Subject to Section 10.7.3, GNE shall, upon timely request and at least [***] business days advance notice from Adaptive and at a mutually agreeable time during its regular business hours, make its records available for inspection by such CPA Firm at such place or places where such records are customarily kept, solely to verify the accuracy of the reports provided under Section 10.2 and related payments due under this Agreement. The CPA Firm shall only state factual findings in the audit reports. The CPA Firm shall share all draft audit reports with GNE before the draft audit report is shared with Adaptive and before the final document is issued. The final audit report shall be shared with GNE at the same time that it is shared with Adaptive.

10.7.3 **Confidentiality**. Prior to any audit under Section 10.7.2, the CPA Firm shall enter into a written confidentiality agreement with GNE that: (a) limits the CPA Firm's use of the GNE's records to the verification purpose described in Section 10.7.2; (b) limits the information that the CPA Firm may disclose to the Adaptive to the numerical summary of payments due and paid; and (c) prohibits the disclosure of any information contained in such records to any Third Party for any purpose. The Parties agree that all information subject to review under Section 10.7.2 and/or provided by the CPA Firm to Adaptive is GNE's Confidential Information, and Adaptive shall not use any such information for any purpose that is not germane to Section 10.7.2.

10.7.4 **Underpayment; Overpayment**. After reviewing the CPA Firm's audit report, GNE shall promptly pay any uncontested, understated amounts due to Adaptive, with interest calculated in accordance with Section 10.7.5, from the date that such payments would have been owed to Adaptive. Any overpayment made by GNE shall be fully creditable against amounts payable in the subsequent payment period or if such payment period no longer exists or if the available credit in the above subsequent payment period is not sufficient to recoup the overpayment, Adaptive shall reimburse any such overpayment within [***] days. Any audit under Section 10.7.2 shall be at Adaptive's expense; *provided*, that GNE shall reimburse reasonable audit fees for a given audit if the results of such audit reveal that GNE underpaid Adaptive with respect to royalty payments by [***] percent ([***]%) or more for the audited period and such audited period includes at least [***] consecutive calendar quarters.

10.7.5 **Interest on Late Payments.** Any undisputed payments to be made hereunder that are not paid on or before the date such payments are due under this Agreement will bear interest at a rate per annum equal to the lesser of (a) the rate announced by Bank of America (or its successor) as its prime rate in effect on the date that such payment would have been first due plus [***]% or (b) the maximum rate permissible under applicable laws.

ARTICLE 11
INTELLECTUAL PROPERTY; OWNERSHIP

11.1 **Definitions**. As used in this ARTICLE 11:

11.1.1 "**Adaptive Platform IP**" means: (a) any Intellectual Property relating to the Adaptive Platform (including Intellectual Property associated with Adaptive's methods for identifying, sequencing and/or pairing Antigen-specific TCRs) owned or Controlled by Adaptive as of the Effective Date; (b) any improvements, updates and/or modifications to the Intellectual Property described in subclause (a) discovered, conceived, or reduced to practice solely by or on behalf of Adaptive or GNE, or jointly by the Parties, in the course of the activities performed under the Research Program or Development Program or otherwise under this Agreement, or otherwise by or on behalf of Adaptive (whether owned or Controlled) after the Effective Date and outside this Agreement; (c) all data, analyses and information used to generate Collaboration Data (and TCR Sequences included therein); (d) all derivatives, analyses, or modifications arising from the use of the Collaboration Data (and TCR Sequences included therein) that are generated by Adaptive outside of the Research Plan or Development Plans, and all Intellectual Property in any of the foregoing (the Intellectual Property in subclauses (a) through (d) collectively, the "**Adaptive Core Platform IP**"); (e) all Collaboration Data (including all TCR Sequences included in any Shared Antigen Data Packages and Private Antigen TCR Product Data); and (f) any subsequent improvements or modifications to the TCR Sequences in subclause (e) that are generated in whole or in part by Adaptive in performing the activities under the Research Plan or Development Plan, and all Intellectual Property in any of the foregoing (the Intellectual Property in subclauses (e) and (f), the "**TCR-Specific Platform IP**").

11.1.2 "**GNE Collaboration IP**" means any Intellectual Property (other than Adaptive Platform IP) that is discovered, conceived, or reduced to practice solely by or on behalf of Adaptive or GNE, or jointly by the Parties, in the course of the activities performed under the Research Program or Development Program. Notwithstanding the foregoing, GNE Collaboration IP expressly excludes any Intellectual Property: (a) discovered, developed, conceived or reduced to practice pursuant to the [***]; or (b) in-licensed or acquired by [***] or any of its Affiliates (other than GNE).

11.1.3 "**Prosecution and Maintenance**" or "**Prosecute and Maintain**", with respect to a particular Patent, means all activities associated with the preparation, filing (including any election under the Unitary Patent Convention), prosecution and maintenance of such Patent (and patent application(s) derived from such Patent), as well as re-examinations, reissues, applications for patent term adjustments and extensions, supplementary protection certificates and the like with respect to that Patent, together with the conduct of interferences, derivation proceedings, the defense of oppositions, defense of *Inter Partes* Review ("**IPR**") and other similar proceedings with respect to that Patent.

11.2 **Disclosure; Ownership; Inventorship; Assignment and Cooperation**.

11.2.1 **Disclosure**. During the Term, each Party shall promptly disclose to the other Party any GNE Collaboration IP or Adaptive Platform IP discovered, conceived, or reduced to practice by or for the disclosing Party in the course of the activities performed by or for such Party in connection with this Agreement. Inventorship shall be determined according to US law.

11.2.2 **Ownership**. As between the Parties, (a) Adaptive shall solely own the Adaptive Platform IP and subject to Section 6.1 and Section 8.1, Adaptive retains all rights to use the Adaptive Platform IP; and (b) GNE shall solely own GNE Collaboration IP and subject to Section 6.2 and Section 8.2, GNE retains all rights to use the GNE Collaboration IP.

11.2.3 **Assignment; Cooperation**. The assignments necessary to accomplish the ownership provisions set forth in this ARTICLE 11 are hereby made, and each Party shall execute such further documentation as may be necessary or appropriate, and provide reasonable assistance and cooperation, to implement the provisions of this ARTICLE 11. Each Party shall require all of its employees, Affiliates and any Third Parties working pursuant to this Agreement on its behalf, to assign (or otherwise convey rights) to such Party any Patents and Know-How discovered, conceived or reduced to practice by such employee, Affiliate or Third Party, and to cooperate with such Party in connection with obtaining patent protection therefore.

11.2.4 **CREATE Act**. It is the intention of the Parties that this Agreement is a "joint research agreement" as that phrase is defined in Public Law 108-53 (the "**Create Act**"). In the event that either Party to this Agreement intends to overcome a rejection of a claimed invention within the Adaptive Platform IP and/or GNE Collaboration IP pursuant to the provisions of the Create Act, such Party shall first obtain the prior written consent of the other Party. Following receipt of such written consent, such Party shall limit any amendment to the specification or statement to the patent office with respect to this Agreement to that which is strictly required by 35 USC § 103(c) and the rules and regulations promulgated thereunder and which is consistent with the terms and conditions of this Agreement (including the scope of the Research Program activities). To the extent that the Parties agree that, in order to overcome a rejection of a claimed invention within the Adaptive Platform IP and/or GNE Collaboration IP pursuant to the provisions of the Create Act, the filing of a terminal disclaimer is required or advisable, the Parties shall first agree on terms and conditions under which the patent application subject to such terminal disclaimer and the patent or application over which such application is disclaimed shall be jointly enforced, to the extent that the Parties have not previously agreed to such terms and conditions. In the event that GNE enters into an agreement with a Third Party with respect to the further research, Development or Commercialization of a Licensed Product, the Parties shall in good faith discuss whether Adaptive shall similarly enter into such agreement with such Third Party.

11.3 **Patent Prosecution**.

11.3.1 **Adaptive Controlled Prosecution and Maintenance**. Except as provided in Section 11.3.2, Adaptive shall, at its sole discretion (subject to its obligations under the IPWG) and sole expense, have the right (but not the obligation) to Prosecute and Maintain Patents included within: (a) the Adaptive Core Platform IP in all fields of use (the "**Adaptive Core**

Patents"), and (b) [***]. Adaptive will keep GNE reasonably informed of the status of such Prosecution and Maintenance. GNE will provide all reasonable cooperation and assistance to Adaptive at Adaptive's reasonable request and at [***] in Prosecution and Maintenance of the Adaptive Platform IP, including making data, reports, and scientific personnel reasonably available to prepare and prosecute patent applications.

11.3.2 **GNE Controlled Prosecution and Maintenance**. GNE shall, at its sole discretion (subject to its obligations under the IPWG) and sole expense, have the right (but not the obligation) to Prosecute and Maintain Patents within (a) the GNE Collaboration IP, and (b) [***]. GNE will keep Adaptive reasonably informed of the status of such Prosecution and Maintenance. Adaptive will provide all reasonable cooperation and assistance to GNE at GNE's reasonable request and at [***] in Prosecution and Maintenance of the GNE Collaboration IP, including making data, reports, and scientific personnel reasonably available to prepare and prosecute patent applications. Notwithstanding the division of Prosecution and Maintenance rights and responsibilities in connection with [***] set forth in Sections 11.3.1 and this Section 11.3.2, with respect to: (i) any Patent (or claim of a Patent) that claims [***] that either Party reasonably believes falls within subclause (b) of both Section 11.3.1 and this Section 11.3.2 (*e.g.* product-by-process claims); or (ii) Prosecution and Maintenance strategy in connection with segregation of claims or filing of continuations-in-part or divisional Patents that Cover or claim [***], the Parties shall first discuss such issues at the IPWG and shall determine which Party is to take the lead in Prosecution and Maintenance of such Patents.

11.3.3 **Patent Counsel**. The Parties shall use reasonable efforts to engage outside counsel (mutually agreed by the Parties) to consult in connection with the Prosecution and Maintenance of the Patents within the TCR-Specific Platform IP under Section 11.3.1 and Section 11.3.2.

11.3.4 **Transfer of Prosecution and Maintenance of GNE Collaboration IP**. If GNE elects not to Prosecute and Maintain any Patents claiming a composition of matter, or use thereof, of a TCR (including any modifications thereto) incorporated into a Licensed Product, GNE shall provide at least [***] days written notice to Adaptive. Thereafter, Adaptive shall have the right, but not the obligation, to Prosecute and Maintain any said Patents, at its sole expense and in its sole discretion, *provided* that with respect to any Patent claiming a Third Party TCR, Adaptive shall have such back-up right only to the extent permitted under GNE's agreement with the applicable Third Party. GNE will provide all cooperation and assistance to Adaptive in Prosecution and Maintenance. The Party assuming responsibility to Prosecute and Maintain said Patents may elect to require transfer of ownership or rights of said Patents at their sole discretion.

11.3.5 **Interferences Between the Parties**. If an interference or derivation proceeding is declared by the US Patent and Trademark Office between one or more of the Patents within the GNE Collaboration IP or Adaptive Platform IP, to the extent directed to a Licensed Product and that such declared interference or derivation proceeding does not involve any Patents owned by a Third Party, then the Parties shall in good faith establish a mutually agreeable process to resolve such interference or derivation proceeding in a reasonable manner in conformance with all applicable legal standards, but which prejudices neither Party and does not diminish the value of such Patents at issue.

11.4 **Enforcement Rights for Infringement by Third Parties**.

11.4.1 **Notice**. Each Party shall promptly notify, in writing, the other Party upon learning of any actual or suspected infringement or misappropriation of the GNE Collaboration IP or Adaptive Platform IP by the manufacture, use, import, offer for sale or sale by a Third Party of any product that is competitive with one or more Licensed Products, including if either Party reasonably believes that any claim of a Patent within the Adaptive Platform IP or GNE Collaboration IP is or may be subject to a declaratory judgment or similar action arising from such infringement, (each an "**Infringement**"). At the request of the Party receiving such notice, the other Party shall use commercially reasonable efforts to provide all evidence in its possession pertaining to the actual or suspected Infringement that it can disclose without breach of a preexisting obligation to a Third Party or waiver of privilege.

11.4.2 **Enforcement Actions**. The Parties shall consult (through the IPWG or as otherwise agreed by the Parties) as to potential strategies to terminate suspected or potential Infringement, including IPRs, oppositions, or other actions that may be initiated against a Third Party's Patent or any product or service that infringes or that interferes with either the Adaptive Platform IP or GNE Collaboration IP (each IPR, opposition or other action, an "**Opposition Proceeding**"), consistent with the overall goals of this Agreement. If the Parties fail to agree on such strategies:

(a) With respect to any Infringement by a Third Party of any Patent included in the TCR-Specific Platform IP with respect to (i) composition of matter claims (excluding product-by-process claims), (ii) therapeutic method claims relating to Cell Therapy and/or targeting cancer-specific Antigens, or (iii) manufacturing method claims, in each case in such Patents, GNE shall have the final decision right at the IPWG, and shall have the first right, but not the obligation, to seek to abate any actual or suspected Infringement by a Third Party, or to file suit, including an Opposition Proceeding, against any Third Party for Infringement of such claims in such Patents. If GNE does not, within [***] days of receipt of a notice under Section 11.4.1, take steps to abate the Infringement, or to file suit to enforce against such Infringement, then Adaptive shall have the right upon GNE's prior written consent (not to be unreasonably withheld, conditioned or delayed), but not the obligation, to take action to enforce against such Infringement, including initiating an Opposition Proceeding; *provided*, that if GNE is engaged in ongoing settlement discussions at the end of such [***] day period then Adaptive shall not be permitted to exercise such right unless such settlement discussions cease without reaching settlement or GNE ceases to pursue such discussions.

(b) Except as set forth in Section 11.4.2(a), Adaptive shall have the first right, but not the obligation, to seek to abate any actual or suspected Infringement by a Third Party, or to file suit, including an Opposition Proceeding, against any Third Party for Infringement, in each case of the Adaptive Platform IP (including, for clarity, all Adaptive Core Platform IP and the TCR-Specific Platform IP that is not subject to Section 11.4.2(a)). If Adaptive does not, within [***] days of receipt of a notice under Section 11.4.1, take steps to abate the Infringement, or to file suit to enforce against such Infringement, and such Infringement adversely impacts, or could adversely impact GNE's Net Sales of Licensed Product(s) in the applicable country, then GNE shall have the right, but not the obligation, to take action to enforce against such Infringement, including initiating an Opposition Proceeding; *provided*, that (i) if Adaptive is engaged in

ongoing settlement discussions at the end of such [***] day period then GNE shall not be permitted to exercise such right unless such settlement discussions cease without reaching settlement or Adaptive ceases to pursue such discussions, and (ii) GNE shall not, other than in accordance with Section 11.4.2(a), in respect of such Infringement, have the right to assert (A) any Adaptive Core Patent without Adaptive's prior written consent, or (B) any Patent claiming any TCR-Specific Platform IP if GNE or its Affiliates otherwise have the right to assert any Patent(s) outside of the TCR-Specific Platform IP that claim (1) the composition of a Licensed Product, (2) any method, composition or apparatus for the manufacture of a Licensed Product, or (3) any method of treatment employing or use of a Licensed Product.

(c) GNE shall have the sole right, but not the obligation, to seek to abate any actual or suspected Infringement by a Third Party, or to file suit, including an Opposition Proceeding, against any Third Party for Infringement, in each case of the GNE Collaboration IP.

(d) The non-controlling Party shall cooperate with the Party controlling any such action to abate or enforce (as may be reasonably requested by the controlling Party and at the controlling Party's expense), including, if necessary, by being joined as a party *provided*, that the non-controlling Party shall be indemnified by the controlling Party as to any costs or expenses, and shall have the right to be represented by its own counsel at its own expense. The Party controlling any such action shall keep the other Party updated with respect to any such action, including providing copies of all documents received or filed in connection with any such action.

11.4.3 **Settlement**. The Party controlling any such enforcement action described in Section 11.4.2 (an "**Enforcement**"), at its sole discretion, may take reasonable actions to terminate any alleged Infringement without litigation; *provided*, that if any such arrangement would adversely affect the non-controlling Party's rights under this Agreement, then that arrangement is subject to the non-controlling Party's prior written consent. The Party controlling any Enforcement may not settle or consent to an adverse judgment without the express written consent of the non-controlling Party (such consent not to be unreasonably withheld or delayed).

11.4.4 **Costs and Expenses**. The Party controlling any Enforcement shall bear all costs and expenses, including but not limited to litigation expenses, related to such enforcement actions.

11.4.5 **Damages**. Unless otherwise mutually agreed by the Parties, and subject to the respective indemnity obligations of the Parties set forth in ARTICLE 15, all damages, amounts received in settlement, judgment or other monetary awards recovered in an Enforcement with respect to activities of the Third Party that occurred prior to the effective date of such award shall be shared as follows:

(a) first, to reimburse the controlling Party for costs and expenses incurred under Section 11.4.4;

(b) second, if and to the extent lost sales are specifically determined by the adjudicating authority, to GNE in reimbursement for lost sales (net of royalties thereon which shall be paid in accordance with Section 9.4 and which specific award shall be deemed to be Net Sales in the calendar quarter in which the award was rendered for the purposes of the sales milestones in Section 9.3); and

(c) third, any amounts remaining to be allocated, including any amount that is not determined to be lost sales, [***] percent ([***]%) to GNE and [***] percent ([***]%) to Adaptive.

For the avoidance of doubt, if any settlement results in the granting to the person or entity accused of infringement or misappropriation of a sublicense of any of the Adaptive Platform IP or GNE Collaboration IP with running royalties payable on post-settlement sales by the alleged infringer, such alleged infringer shall be deemed to be a sublicensee of [***].

11.5 **Third Party Infringement Claims**.

11.5.1 **Notice**. In the event that a Third Party shall make any claim, give notice, or bring any suit or other *inter partes* proceeding against GNE or Adaptive, or any of their respective Affiliates or licensees or customers, for infringement or misappropriation of any intellectual property rights with respect to the research, development, making, using, selling, offering for sale, import or export of any Licensed Product ("**Third Party Infringement Claim**"), in each case, the Party receiving notice of a Third Party Infringement Claim shall promptly notify the other Party and use commercially reasonable efforts to provide all evidence in its possession pertaining to the claim or suit that it can disclose without breach of a pre-existing obligation to a Third Party or waiver of privilege.

11.5.2 **Defense**. The Parties shall consult (through the IPWG or otherwise) as to potential strategies to defend against any Third Party Infringement Claim, including by initiating any Opposition Proceeding against the relevant Third Party's Patent, consistent with the overall goals of this Agreement, including by being joined as a Party. If the Parties fail to agree on such strategies, and subject to the respective indemnity obligations of the Parties set forth in ARTICLE 15:

(a) Adaptive shall have the first right, but not the obligation, to defend any Third Party Infringement Claim, which may include initiating an Opposition Proceeding, related to the Adaptive Platform. If Adaptive does not, within [***] days of receipt of a notice under Section 11.5.1, provide written notice of its intention to defend the Third Party Infringement Claim, then to the extent that such Third Party Infringement Claim is brought against Adaptive and impairs GNE's ability to make, use or sell the Licensed Products, GNE shall have the right, but not the obligation, to take action, which may include initiating an Opposition Proceeding, to defend against such Third Party Infringement Claim; *provided*, that if Adaptive is engaged in ongoing settlement discussions at the end of such [***] day period then GNE shall not be permitted to exercise such right unless such settlement discussions cease without reaching settlement or Adaptive ceases to pursue such discussions.

(b) GNE shall have the first right, but not the obligation, to defend or enforce against any Third Party Infringement Claim, which may include initiating an Opposition Proceeding, related to the Licensed Products. If GNE does not, within [***] days of receipt of a notice under Section 11.5.1, provide written notice of its intention to defend the Third Party

Infringement Claim, then to the extent that such Third Party Infringement Claim is brought against Adaptive and relates to acts under the Research Program or Development Program, Adaptive shall have the right, but not the obligation, to take action, which may include initiating an Opposition Proceeding, to defend against such Third Party Infringement Claim; *provided*, that if GNE is engaged in ongoing settlement discussions at the end of such [***] day period then Adaptive shall not be permitted to exercise such right unless such settlement discussions cease without reaching settlement or GNE ceases to pursue such discussions.

11.5.3 The non-controlling Party shall cooperate with the controlling Party in connection with any such defense and counterclaim (as may be reasonably requested by the controlling Party and at the controlling Party's expense), including, if necessary, by being joined as a party *provided*, that the non-controlling Party shall be indemnified by the controlling party as to any costs or expenses, and shall have the right to be represented by its own counsel at its own expense. The Party controlling any such action shall keep the other Party updated with respect to any such action, including providing copies of all documents received or filed in connection with any such action. Any counterclaim or other similar action by a Party, to the extent such action involves any enforcement of rights under the GNE Collaboration IP or Adaptive Platform IP, will be treated as an enforcement action subject to Section 11.4.

11.5.4 **Settlement**. If any such defense under Section 11.5.2 would adversely affect the other Party's rights under this Agreement or impose a financial obligation upon the other Party or grant rights in respect, or affect the validity or enforceability, of the other Party's Patents, then any settlement, consent judgment or other voluntary final disposition of such Third Party Infringement Claim shall not be entered into without the consent of the other Party (such consent not to be unreasonably withheld).

11.5.5 **Costs and Expenses**. The Party controlling the defense of any Third Party Infringement Claim shall bear all costs and expenses, including but not limited to litigation expenses, to defend against any Third Party Infringement Claim.

11.6 **Trademarks**. GNE shall be free to use and to register in any trademark office worldwide, at its sole cost, any trademark for use with a Licensed Product in its sole discretion. GNE shall own all right, title and interest in and to any such trademark (including any and all claims and causes of action, rights to and claims for damages, restitution and injunctive and other legal and equitable relief for past, present and future infringement, dilution, misappropriation, violation, misuse, breach or default, with the right but no obligation to sue for such legal and equitable relief and to collect, or otherwise recover, any such damages) in its own name during and after the Term.

ARTICLE 12
CONFIDENTIALITY

12.1 **Non-Use and Non-Disclosure of Confidential Information**. During the Term, and for a period of ten (10) years thereafter, each Party shall: (a) except to the extent expressly permitted by this Agreement or otherwise agreed to in writing, keep confidential and not disclose to any Third Party any Confidential Information of the other Party; (b) except as is reasonably necessary in connection with activities contemplated by or the exercise of rights expressly

granted by this Agreement, or as otherwise agreed to in writing, not use for any purpose any Confidential Information of the other Party; and (c) take all reasonable precautions to protect the Confidential Information of the other Party (including all precautions a Party employs with respect to its own confidential information of a similar nature and taking reasonable precautions to assure that no unauthorized use or disclosure is made by others to whom access to the Confidential Information of the Party is granted).

12.2 **Exclusions Regarding Confidential Information**. Notwithstanding anything set forth in this ARTICLE 12 to the contrary, the obligations of Section 12.1 shall not apply to the extent that the Party seeking the benefit of the exclusion can demonstrate that the Confidential Information of the other Party:

(a) was already known to the receiving Party, other than under an obligation of confidentiality, at the time of receipt by the receiving Party;

(b) was generally available to the public or otherwise part of the public domain at the time of its receipt by the receiving Party;

(c) became generally available to the public or otherwise part of the public domain after its receipt by the receiving Party other than through any act or omission of the receiving Party in breach of this Agreement;

(d) was received by the receiving Party without an obligation of confidentiality from a Third Party having the right to disclose such information without restriction;

(e) was independently developed by or for the receiving Party without use of or reference to the Confidential Information or other intellectual property of the other Party with respect to which such receiving Party does not have a license; or

(f) was released from the restrictions set forth in this Agreement by express prior written consent of the Party.

12.3 **Authorized Disclosures of Confidential Information**. Notwithstanding the foregoing, a Party may use and disclose the Confidential Information of the other Party as follows:

(a) if required by law, rule or governmental regulation, including as may be required in connection with any filings made with, or by the disclosure policies of a major stock exchange; *provided*, that the Party seeking to disclose the Confidential Information of the other Party: (i) use all reasonable efforts to inform the other Party prior to making any such disclosures and cooperate with the other Party in seeking a protective order or other appropriate remedy (including redaction); and (ii) whenever possible, request confidential treatment of such information; to the extent such use and disclosure is reasonably required in the Prosecution and Maintenance of a Patent within the GNE Collaboration IP or Adaptive Platform IP in accordance with this Agreement;

(b) as reasonably necessary to obtain or maintain any Marketing Approval, including to conduct preclinical studies and Clinical Trials and for pricing approvals, for any Licensed Products, *provided*, that the disclosing Party shall take all reasonable steps to limit disclosure of the Confidential Information outside such regulatory agency and to otherwise maintain the confidentiality of the Confidential Information;

(c) to take any lawful action that it deems necessary to enforce compliance with the terms and conditions of, this Agreement, *provided*, that the Party seeking to disclose the Confidential Information of the other Party: (i) use all reasonable efforts to inform the other Party prior to making any such disclosures and cooperate with the other Party in seeking a protective order or other appropriate remedy (including redaction); and (ii) whenever possible, request confidential treatment of such information; or

(d) to the extent necessary, to permitted sublicensees, licensees, collaborators, vendors, consultants, agents, attorneys, contractors and clinicians under written agreements of confidentiality at least as restrictive as those set forth in this Agreement, who have a need to know such information in connection with such Party performing its obligations or exercising its rights under this Agreement. Further, the receiving Party may disclose Confidential Information to existing or potential acquirers, merger partners, permitted collaborators, licensees and sources of financing or to professional advisors (*e.g.*, attorneys, accountants and prospective investment bankers) involved in such activities, for the limited purpose of evaluating such transaction, collaboration or license and under appropriate conditions of confidentiality, only to the extent necessary and with the agreement by those permitted individuals to maintain such Confidential Information in strict confidence.

12.4 **Return of Confidential Information**. Except as expressly permitted under this Agreement, following any termination of this Agreement each Party shall, upon written request by the other Party, promptly return or destroy all Confidential Information received from the disclosing Party (at the disclosing Party's election and cost), including any copies thereof, (except one copy of which may be retained for archival purposes solely to ensure compliance with the terms of this Agreement).

12.5 **Terms of this Agreement**. Each Party agrees not to, and to cause its Affiliates not to, disclose to any Third Party any terms of this Agreement without the prior written consent of the other Party hereto, except each Party and its Affiliates may disclose the terms of this Agreement: (a) to advisors (including financial advisors, attorneys and accountants), actual or bona fide potential acquirors or investors, on a need to know basis, in each case under appropriate confidentiality provisions substantially equivalent to those in this Agreement or, with respect to investors, on terms common in the industry with respect to the duration of the confidentiality period; or (b) to the extent necessary to comply with applicable laws and court orders (including securities laws or regulations and the applicable rules of any public stock exchange).

12.6 **Termination of Prior Agreements**. As of the Effective Date, as between the Parties, this Agreement supersedes the Non-Disclosure Agreement, effective as of September 10, 2018, by and between GNE and Adaptive, ("**Non-Disclosure Agreement**") but only insofar as each relates to the subject matter of this Agreement. All "Confidential Information" (as defined in such agreement) exchanged between the Parties thereunder relating to the subject matter of this Agreement shall be deemed Confidential Information hereunder and shall be subject to the provisions of this ARTICLE 12.

12.7 **No License**. As between the Parties, Confidential Information disclosed hereunder shall remain the property of the disclosing Party. Disclosure of Confidential Information to the other Party shall not constitute any grant, option or license to the other Party, beyond those licenses expressly granted under ARTICLE 6 or ARTICLE 16, under any patent, trade secret or other rights now or hereinafter held by the disclosing Party.

ARTICLE 13
PUBLICITY; PUBLICATIONS; USE OF NAME

13.1 **Publicity**. GNE hereby agrees to Adaptive issuing a press release, reviewed and approved by the Parties, concerning the execution of this Agreement within [***] days after the Effective Date. The text of any other press releases or other public statements or announcement concerning this Agreement, the subject matter hereof, or the research, development or commercial results of products hereunder (a "**Release**") shall be addressed pursuant to Section 13.2 through Section 13.5. Any such Release shall not include any financial terms of this transaction, other than to the extent allowed pursuant to Section 13.3 through Section 13.5 or as may otherwise be agreed in writing by the Parties on a case-by-case basis.

13.2 **Releases Reporting the Activities of the Research Program**. Subject to Section 13.5, neither Party may issue a Release reporting on the activities under the Research Program without the prior written consent of the other, which consent shall not be unreasonably withheld, conditioned or delayed.

13.3 **Releases Reporting on the Development or Commercialization of Licensed Products**. Subject to Section 13.5, in connection with the Development (outside the Research Program) or Commercialization of Licensed Products, the following shall apply:

13.3.1 **Required Filings; Investor Presentations**. Each disclosing Party acknowledges that the other Party receiving such Party's Confidential Information hereunder may, from time to time: (a) desire to publicly disclose through a: (i) press release; or (ii) media appearance, public announcement or presentation, such as presentations to analysts or shareholders (collectively, "**Investor Presentation(s)**"); or (b) be required to publicly disclose by applicable law, or regulation or rule of any stock exchange ("**Required Filing(s)**"), such as Forms 8-K, 10-Q and 10-K (each such disclosure in (a) and (b), a "**Public Disclosure**"), the terms of this Agreement, or significant Development and commercialization activity regarding any Licensed Products, to keep its investors reasonably informed of the achievement of milestones, significant events in the Development and regulatory process of Licensed Products, and commercialization activities and the like, and that such Public Disclosures may pertain to Confidential Information of the other Party that is not otherwise permitted to be disclosed under this ARTICLE 13 or ARTICLE 12 and which may be beyond what is required to be disclosed by applicable law (collectively, "**Investor Information**"). For clarity, "Investor Information" includes solely those items that are beyond what is required to be disclosed under applicable law.

13.3.2 **Review of Public Disclosures**. With respect to any Public Disclosure, except for the initial press release described in Section 13.1, the receiving Party (the "**Requesting Party**") shall provide the disclosing Party (the "**Reviewing Party**") with a draft of the Content (as defined in the next sentence) of the draft press release or Required Filing at least [***] business

days in advance of the issuance of the press release, filing of the Required Filing or scheduled date of the Investor Presentation. The word "**Content**" in this Section means any information relating to the activities contemplated by this Agreement, including Investor Information, and does not include any other business information of the Requesting Party or information pertaining to the "safe harbor" provisions of the Private Securities Litigation Reform Act of 1995 relating to "forward-looking statements." The Reviewing Party may notify the Requesting Party of any reasonable objections or suggestions that such Party may have regarding the Content in the Public Disclosure provided for review under this Section, and the Requesting Party shall reasonably consider any such objections or suggestions that are provided within [***] business days. The principles to be observed with respect to disclosures of Investor Information shall include accuracy, compliance with applicable law and regulatory guidance documents, reasonable sensitivity to potential negative reactions of a Regulatory Authority, reasonable sensitivity to commercial information of value to competitors, the need to keep investors informed regarding the Requesting Party's business. The Requesting Party shall use commercially reasonable efforts to adopt the reasonable requests of the Reviewing Party with respect to its Confidential Information and shall restrict the use of the Confidential Information of the Reviewing Party that is disclosed in Investor Presentations, under written agreements of confidentiality at least as restrictive as those set forth in this Agreement.

13.3.3 **Adaptive Platform Disclosures**. Notwithstanding the foregoing, GNE may not issue a Release without Adaptive's prior written consent, not be unreasonably withheld, conditioned or delayed if it includes reference to Adaptive by name or references identifying characteristics of Adaptive or the Adaptive Platform.

13.4 **Approved Releases**. If a Release requires consent pursuant to Section 13.2 or Section 13.3, once consent has been given both Parties may make subsequent public disclosure of the contents of such statement without the further approval of the Party whose consent was required; *provided*, that such content is not presented with any new data or information or conclusions and/or in a form or manner that materially alters the subject matter therein.

13.5 **Releases Required by Law or Regulation**. Each Party may issue any Release it is required to issue by applicable law or regulation.

13.6 **Publications**. Notwithstanding Section 13.2 through Section 13.5, both Parties recognize that the publication or disclosure of papers, presentations, abstracts or any other written or oral presentations regarding results of and other information regarding the Licensed Products may be beneficial to both Parties, *provided*, that such publications or presentations are subject to reasonable controls to protect Confidential Information, the patentability of inventions and other commercial considerations. Accordingly, the following shall apply with respect to papers and presentations proposed for disclosure by either Party:

(a) Subject to Section 13.6(b), with respect to any paper or presentation proposed for disclosure by GNE that utilizes information generated by or on behalf of GNE, so long as such paper or presentation does not contain any Confidential Information of Adaptive, or any information about the Adaptive Platform, GNE shall be free to make, publish and disclose such papers and presentations at its discretion. GNE shall acknowledge Adaptive, as appropriate, in any publication that discloses GNE's use of any Collaboration Data or any Licensed Products or the results thereof. For clarity, GNE shall not be permitted to publish or otherwise disclose any Confidential Information of Adaptive except as may be expressly permitted pursuant to Section 12.2, Section 12.3 or Section 13.6(b); and

(b) With respect to any paper or presentation proposed for disclosure by: (i) GNE which includes information generated by or on behalf of GNE that includes or relates to the Collaboration Data, including any publications containing Confidential Information of Adaptive; or (ii) Adaptive which utilizes information generated by or on behalf of Adaptive relating to the Licensed Products, including any publications containing Confidential Information of GNE, (the Party proposing such disclosure, the "**Disclosing Party**"), the other Party shall have the right to review and approve any such proposed paper or presentation (the "**Non-Disclosing Party**"). The Disclosing Party shall submit to the Non-Disclosing Party the proposed publication or presentation (including posters, slides, abstracts, manuscripts and written descriptions of oral presentations) at least [***] calendar days [***] calendar days for abstracts) prior to the date of submission for publication or the date of presentation, whichever is earlier, of any of such submitted materials. The Non-Disclosing Party shall review such submitted materials and respond to the Disclosing Party as soon as reasonably possible, but in any case within [***] calendar days [***] calendar days for abstracts) of receipt thereof. At the option of the Non-Disclosing Party, the Disclosing Party shall: (A) delete from such proposed publication or presentation any Confidential Information of the Non-Disclosing Party; and/or (B) delay the date of such submission for publication or the date of such presentation for a period of time sufficiently long (but in no event longer than [***] calendar days) to permit the Non-Disclosing Party to seek appropriate Patent protection. Once a publication has been approved by the Non-Disclosing Party, the Disclosing Party may make subsequent public disclosure of the contents of such publication without the further approval of the Non-Disclosing Party; *provided*, that such content is not presented with any new data or information or conclusions and/or in a form or manner that materially alters the subject matter therein, and the Disclosing Party provides reasonable notice to the Non-Disclosing Party of such publication no later than [***] days prior to public disclosure.

13.7 **No Right to Use Names**. Except as expressly provided herein, no right, express or implied, is granted by the Agreement to use in any manner the name of "Adaptive" or "Genentech" or any other trade name, symbol, logo or trademark of the other Party in connection with the performance of this Agreement.

ARTICLE 14
REPRESENTATIONS; WARRANTIES; COVENANTS

14.1 **Mutual Representations and Warranties**. Each Party represents and warrants to the other Party that as of the Effective Date:

(a) it is validly organized under the laws of its jurisdiction of incorporation;

(b) it has obtained all necessary consents, approvals and authorizations of all governmental authorities and other persons or entities required to be obtained by it in connection with this Agreement, subject to obtaining any required clearance of this Agreement under the HSR Act;

(c) the execution, delivery and performance of this Agreement have been duly authorized by all necessary corporate action on its part;

(d) it has the legal right and power to enter into this Agreement and to fully perform its obligations hereunder;

(e) the performance of its obligations will not conflict with such Party's charter documents or any agreement, contract or other arrangement to which such Party is a party; and

(f) it follows reasonable commercial practices common in the industry to protect its proprietary and confidential information, including requiring its employees, consultants and agents to be bound in writing by obligations of confidentiality and nondisclosure, and requiring its employees, consultants and agents to assign to it any and all inventions and discoveries discovered by such employees, consultants or agents made within the scope of, and during their employment, and only disclosing proprietary and confidential information to Third Parties pursuant to written confidentiality and non-disclosure agreements.

14.2 **Adaptive Additional Warranty**. Adaptive represents and warrants to GNE, as of the Execution Date, that:

(a) it has the legal right and power to extend the rights and licenses granted to GNE hereunder;

(b) it has never received any written notice asserting or alleging that the Adaptive Platform or the use thereof infringed or misappropriated the Intellectual Property of any Third Party; and

(c) it has no knowledge of any threatened or pending actions, lawsuits, interference or arbitration proceedings, in each case, relating to the Adaptive Platform IP.

14.3 **GNE Additional Warranty.** GNE represents and warrants to Adaptive that as of the Execution Date, it has the legal right and power to extend the rights and licenses granted to Adaptive hereunder.

14.4 **Mutual Covenants**.

14.4.1 **No Debarment**. In the course of the research, Development and Commercialization of the Licensed Products, neither Party (nor its Affiliates) shall use any employee or consultant (including of any (sub)licensee) who has been debarred or disqualified by any Regulatory Authority, or, to such Party's or its Affiliates' knowledge, is the subject of debarment or disqualification proceedings by a Regulatory Authority. Each Party shall notify the other Party promptly upon becoming aware that any of its or its Affiliates' employees or consultants has been debarred or is the subject of debarment or disqualification proceedings by any Regulatory Authority.

14.4.2 **Compliance**. Each Party and its Affiliates shall comply in all material respects with all applicable laws (including all anti-bribery laws) in the research, Development and Commercialization of the Licensed Products and performance of its obligations under this Agreement.

14.5 **Disclaimers**. EXCEPT AS OTHERWISE EXPRESSLY STATED IN THIS AGREEMENT, NEITHER PARTY MAKES ANY REPRESENTATION OR WARRANTY OF ANY KIND WITH RESPECT TO PATENTS, KNOW-HOW, MATERIALS OR CONFIDENTIAL INFORMATION SUPPLIED BY IT TO THE OTHER PARTY HEREUNDER, AND EXPRESSLY DISCLAIMS ALL WARRANTIES, EXPRESS OR IMPLIED, INCLUDING BUT NOT LIMITED TO WARRANTIES OF MERCHANTABILITY, FITNESS FOR A PARTICULAR PURPOSE AND NON-INFRINGEMENT.

ARTICLE 15
INDEMNIFICATION; LIABILITY

15.1 **Indemnification**. Subject to Section 15.2, each Party shall indemnify, defend and hold each of the other Party, its Affiliates and their respective directors, officers, and employees and the successors and assigns of any of the foregoing harmless from and against any and all liabilities, damages, settlements, penalties, fines, costs or expenses payable to a Third Party (including reasonable attorneys' fees and other expenses of litigation) (collectively, "**Loss**" or "**Losses**") arising, directly or indirectly out of or in connection with any Third Party claims, suits, actions, demands or judgments ("**Third Party Claims**") relating to: (a) the activities performed by or on behalf of such Party under this Agreement; (b) the activities performed by or on behalf of such Party in connection with the exercise of its licenses and rights hereunder, including, in the case of GNE and its Affiliates and its and their sublicensees hereunder, product liability claims to the extent relating to the Licensed Products; or (c) breach by such Party of the representations and warranties under ARTICLE 14, except, in each case, to the extent caused by the negligence or willful misconduct of the other Party.

15.2 **Procedure**. If a Party intends to claim indemnification under this Agreement (the "**Indemnitee**"), it shall promptly notify the other Party (the "**Indemnitor**") in writing of such alleged Loss. The Indemnitor shall have the right to control the defense thereof with counsel of its choice as long as such counsel is reasonably acceptable to Indemnitee. Any Indemnitee shall have the right to retain its own counsel at its own expense for any reason; *provided*, that if the Indemnitee shall have reasonably concluded, based upon a written opinion from outside legal counsel, that there is a conflict of interest between the Indemnitor and the Indemnitee in the defense of such action, in each of which cases the Indemnitor shall pay the fees and expenses of one law firm serving as counsel for the Indemnitee. The Indemnitee, and its employees and agents, shall reasonably cooperate with the Indemnitor and its legal representatives in the investigation of any Third Party Claims covered by this Agreement. The obligations of this ARTICLE 15 shall not apply to any settlement of any Third Party Claims if such settlement is effected without the consent of both Parties, which shall not be unreasonably withheld or delayed. The failure to deliver written notice to the Indemnitor within a reasonable time after the commencement of any such action, to the extent prejudicial to its ability to defend such action, shall relieve the Indemnitor of any obligation to the Indemnitee under this Section 15.2. It is understood that only GNE and Adaptive may claim indemnity under this Agreement (on its own behalf or on behalf of its Indemnitees), and other Indemnitees may not directly claim indemnity

hereunder. Each Indemnitee shall take and shall procure that its Affiliates take all such reasonable steps and action as are reasonably necessary or as the Indemnitor may reasonably require in order to mitigate any Losses arising out of or in connection with any Third Party Claims under this ARTICLE 15. Nothing in this Agreement shall or shall be deemed to relieve any Party of any common law or other duty to mitigate any losses incurred by it.

15.3 **Insurance**.

15.3.1 **Evidence of Insurance.** Within thirty (30) days of signing this Agreement, each Party shall provide the other Party with its certificate of insurance evidencing the insurance coverage set forth Section 15.3.2. Each Party shall provide to the other Party at least thirty (30) days prior written notice of any cancellation, non-renewal or material change in any of such insurance coverage.

15.3.2 **Insurance Coverage**. Subject to Section 15.3.4, each Party shall obtain and maintain from an insurance company having an A. M. Best Rating of "A-, VII" or better comprehensive general liability insurance customary in the industry for companies of similar size conducting similar business, and in any case sufficient to cover its obligations.

15.3.3 **Product/Clinical Trial Liability Insurance**. Commencing not later than thirty (30) days prior to the first use in humans of the first Licensed Product by GNE or any of its sublicensees, GNE and Adaptive each shall have and maintain such type and amounts of liability insurance covering the Development, and in the case of GNE, manufacture, use and sale of Licensed Products as is normal and customary in the industry generally for parties similarly situated, but, in any event, GNE shall have and maintain a minimum combined single limit per occurrence for products/Clinical Trials liability as follows: (a) a minimum limit of [***] dollars ($[***]) for any period during which GNE or any of its sublicensees is conducting a Clinical Trial(s) with any Licensed Product(s); and (b) a minimum limit of [***] dollars ($[***]) for any period during which GNE or any of its sublicensees is selling any Licensed Product(s). Each of the above insurance policies shall be primary insurance.

15.3.4 **Election to Self-Insure**. If either Party is an entity which, together with its Affiliates, has worldwide revenues from pharmaceutical sales in excess of $[***] per year, the obligations set forth in Section 15.3.1, Section 15.3.2 and Section 15.3.3 above shall not apply with respect to such Party, if such Party notifies the other Party in writing that it elects to provide coverage through a commercially reasonable program of self-insurance; *provided*, that the obligations set forth in Section 15.3.1, Section 15.3.2 and Section 15.3.3 shall resume with respect to such Party and its Affiliates, or successor-in-interest and its Affiliates, if such program of self-insurance is terminated or discontinued for any reason.

15.3.5 **No Limitations**. The insurance coverage required pursuant to this Section 15.3 shall not be construed to create a limitation of either Party's liability with respect to its indemnification obligations under this ARTICLE 15.

15.4 **Limitation of Damages**. NEITHER PARTY HERETO WILL BE LIABLE FOR INDIRECT, INCIDENTAL, CONSEQUENTIAL, SPECIAL, EXEMPLARY, OR PUNITIVE DAMAGES, INCLUDING LOST PROFITS, ARISING FROM OR RELATING TO THIS

AGREEMENT, REGARDLESS OF ANY NOTICE OF SUCH DAMAGES, EXCEPT IN RESPECT OF ANY BREACH OF A PARTY'S OBLIGATIONS UNDER ARTICLE 12 OR WITH RESPECT TO THE INDEMNIFICATION OBLIGATIONS OF THE PARTIES UNDER THIS ARTICLE 15 FOR CLAIMS OF THIRD PARTIES.

ARTICLE 16
TERM; TERMINATION

16.1 **Term**. The term of this Agreement (the "**Term**") shall commence on the Effective Date and, unless sooner terminated as provided in this ARTICLE 16 shall continue in full force and effect, on a country-by-country and Licensed Product-by-Licensed Product basis until there is no remaining royalty payment or other payment obligation in such country with respect to such Licensed Product under ARTICLE 9, at which time this Agreement shall expire with respect to such Licensed Product in such country, and all licenses granted to GNE with respect to such Licensed Product under this Agreement shall become fully-paid and non-exclusive. The Term shall expire on the date this Agreement has expired in its entirety with respect to all Licensed Products in all countries in the Territory.

16.2 **Termination by Either Party for Material Breach**. Either Party may terminate this Agreement by written notice to the other Party for any material breach of this Agreement by the other Party if, in the case of remediable breach, such material breach is not cured within [***] days [***] days for payment defaults) after the breaching Party receives written notice of such breach from the non-breaching Party; *provided*, that if such breach is not capable of being cured within such [***]-day (or [***]-day) period, the cure period shall be extended for such amount of time that the Parties may agree in writing is reasonably necessary to cure such breach, so long as: (a) the breaching Party is making diligent efforts to do so; and (b) the Parties agree on an extension within such [***]-day (or [***]-day) period. Notwithstanding anything to the contrary herein, if the allegedly breaching Party in good faith either disputes: (i) whether a breach is material or has occurred; or (ii) the alleged failure to cure or remedy such material breach, and provides written notice of that dispute to the other Party within the above time periods, then the matter will be addressed under the dispute resolution provisions in ARTICLE 18, and the notifying Party may not so terminate this Agreement until it has been determined under ARTICLE 18 that the allegedly breaching Party is in material breach of this Agreement, after which the notifying Party may immediately terminate the Agreement by providing notice to the breaching Party, unless the arbitrator rules that the breaching Party should be granted an additional period to cure such breach, in which case the notifying Party will not have the right to terminate until the breaching Party further fails to cure such breach within the relevant cure period.

16.3 **Termination by Either Party for Insolvency or Bankruptcy**. Either Party may terminate this Agreement effective on written notice to the other Party upon the liquidation, dissolution, winding-up, insolvency, bankruptcy, or filing of any petition therefor, appointment of a receiver, custodian or trustee, or any other similar proceeding, by or of the other Party where such petition, appointment or similar proceeding is not dismissed or vacated within [***] calendar days. All rights and licenses granted pursuant to this Agreement are, for purposes of Section 365(n) of Title 11 of the United States Code or any foreign equivalents thereof (as used in this Section 16.3, "**Title 11**"), licenses of rights to "intellectual property" as defined in Title 11. Each

Party in its capacity as a licensor hereunder agrees that, in the event of the commencement of bankruptcy proceedings by or against such bankrupt Party under Title 11, (a) the other Party, in its capacity as a licensee of rights under this Agreement, shall retain and may fully exercise all of such licensed rights under this Agreement (including as provided in this Section 16.3) and all of its rights and elections under Title 11; and (b) the other Party shall be entitled to a complete duplicate of all embodiments of such intellectual property, and such embodiments, if not already in its possession, shall be promptly delivered to the other Party: (i) upon any such commencement of a bankruptcy proceeding, unless the bankrupt Party elects to continue to perform all of its obligations under this Agreement; or (ii) if not delivered under (i), immediately upon the rejection of this Agreement by or on behalf of the bankrupt Party.

16.4 **Permissive Termination**. GNE shall also have the right to permissively terminate this Agreement, in its sole discretion, at any time by providing written notice to Adaptive; such termination to be effective [***] days after such notice.

16.5 **Termination for** [***]. If GNE or its Affiliates or sublicensees [***], then either: (a) GNE or its Affiliate or sublicensee shall [***]; or (b) [***], Adaptive shall have the right to terminate this Agreement on [***] days written notice to GNE; such termination to be effective immediately. For the avoidance of doubt, Adaptive may not terminate the Agreement if GNE or its Affiliate or sublicensee is required by legal process to [***]. In addition, notwithstanding the foregoing, Adaptive shall have no right to terminate this Agreement pursuant to this Section 16.5 if [***].

16.6 **Effects of Termination**.

16.6.1 **Effects of Termination in General**.

(a) Accrued Rights and Obligations. Expiration or termination of this Agreement for any reason shall not release either Party hereto from any liability, which as of the effective date of such expiration or termination, had already accrued to the other Party or which is attributable to a period prior to such termination, nor preclude either Party from pursuing any rights and remedies it may have hereunder or at law or in equity which accrued or are based upon any event occurring prior to the effective date of such expiration or termination. For clarity, it is understood and agreed that if this Agreement is terminated, but GNE nonetheless continues directly or indirectly after the effective date of such termination to Develop and/or Commercialize any Licensed Product that has entered into Clinical Trials (or has achieved Marketing Approval) on or before the effective date of such termination and for which the Royalty Term has not yet expired, GNE shall continue to owe to Adaptive the applicable milestones and royalties with respect thereto until the expiration of the relevant Royalty Term for such Licensed Product.

(b) Termination of Licenses. Subject to Section 9.4.8 and Section 16.6.1(c), upon termination of this Agreement: (i) all licenses (other than those non-exclusive licenses granted irrevocably and in perpetuity) under this Agreement shall terminate as of the effective date of such termination, including all sublicenses thereunder; and (ii) the restrictions and covenants under ARTICLE 8 shall have no further force and effect as of the effective date of such termination.

(c) Continuation of Sublicenses. Upon termination by Adaptive of this Agreement, any existing, permitted sublicense granted by GNE under this Agreement to any Third Party to Develop and/or Commercialize one or more particular Licensed Products shall survive; *provided* that the permitted sublicensee: (i) did not cause the breach that gave rise to a termination under Section 16.2 and is not in breach of such sublicense on the effective date of termination of this Agreement; and (ii) agrees with Adaptive in writing to be bound by all the terms and conditions of this Agreement which are relevant to and consistent with its sublicense, including without limitation the obligation to provide: (A) information and reports and pay milestone payments and royalties to Adaptive of the same nature, amount and scope as GNE is required to provide to and pay to Adaptive pursuant to this Agreement; and (B) reversion rights to Adaptive substantially equivalent to those set forth in Section 16.6.2(b); *provided* further that Adaptive shall not be obligated to assume any obligations under such sublicense that are greater than the obligations contained within this Agreement.

(d) Return of Confidential Information. Following expiry or any early termination of this Agreement and except with respect to Confidential Information included in those non-exclusive licenses granted irrevocably and in perpetuity, either Party that has Confidential Information of the other Party shall destroy (at such Party's written request): (i) all such Confidential Information in its possession as of the effective date of expiration or early termination (with the exception of one copy of such Confidential Information, which may be retained by the legal department of the Party that received such Confidential Information to confirm compliance with the non-use and non-disclosure provisions of this Agreement); and (ii) any Confidential Information of the other Party contained in its laboratory notebooks or databases; *provided*, that each Party may retain and continue to use such Confidential Information of the other Party to the extent necessary to exercise any surviving rights, licenses or obligations under this Agreement, if any.

(e) Inventory at Termination. Upon termination of this Agreement prior to the end of the Shared Royalty Term and/or Private Royalty Term in a given country, GNE and its Affiliates shall cease all Development and Commercialization of Licensed Products in such country(ies), provided however that GNE and its Affiliates (and permitted sublicensees whose licenses are not surviving under Section 16.6.1(c)) shall have the right to sell or otherwise dispose of all inventory of Licensed Products in all such countries then in its stock, subject to the applicable royalty and milestone payments due under this Agreement, and any other applicable provisions of this Agreement, and Adaptive covenants not to sue GNE or its permitted sublicensee for infringement under any of the Patents that were licensed by Adaptive to GNE immediately prior to such termination with respect to such activities conducted by GNE or its permitted sublicensee pursuant to this Section 16.6.1.

(f) Survival. In addition to any provisions specified in this Agreement as surviving under the applicable circumstances, the provisions of ARTICLE 1, ARTICLE 11, ARTICLE 12, ARTICLE 13, ARTICLE 14, ARTICLE 15 (*provided*, that with respect to ARTICLE 14 and ARTICLE 15, only with respect to those claims that arise from the acts or omissions of a Party prior to the effective date of termination or expiration), ARTICLE 18 and ARTICLE 19 (and Sections 6.1.1(b), 6.1.1(c), 6.1.1(d), 6.1.2, 6.2.1(b), 6.2.1(c), 6.2.2, 10.7, 16.1 and 16.6 shall survive any termination or expiration of this Agreement). In addition, the applicable provisions of ARTICLE 9 and ARTICLE 10 shall survive with respect to any outstanding unpaid amounts that accrued prior to the effective date of any termination or expiration of this Agreement (or any amounts owed as a result of the continuing payment obligations addressed in Section 16.6.1(a), if and as applicable).

16.6.2 **Effects of Certain Terminations.** In the event of termination of this Agreement by Adaptive pursuant to [***], or by GNE pursuant to [***], in addition to those provisions surviving under Section 16.6.1(f), upon such termination the following terms of this Section 16.6.2 shall apply:

(a) **Reversionary Rights for TCRs**.

(i) GNE shall grant to Adaptive the right to negotiate the terms of a non-exclusive license under the GNE TCR Technology to research, develop, import, use, make, have made, offer for sale and sell any TCR included within the Shared Library at the time of termination (each, a "**Reversion TCR**") whether alone or as a part of any product or service offering as provided in this Section 16.6.2(a). For the purposes of this Section 16.6, "**GNE TCR Technology**" shall mean all Intellectual Property Controlled by GNE or its Affiliates that: (A) arose as a result [***]; and (B) relates to [***]. Adaptive shall have [***] days following the effective date of termination to notify GNE in writing as to whether Adaptive elects to exercise such right to negotiate, in which case GNE will provide a summary of the rights within the relevant GNE TCR Technology;

(ii) If written notice is given that Adaptive does not want to exercise such right to negotiate, or written notice is not given by Adaptive to GNE within said [***] day period, Adaptive will have waived its right to negotiate for such non-exclusive license under the GNE TCR Technology; or

(iii) If written notice is given within said [***] period that Adaptive elects to exercise such right to negotiate, Adaptive and GNE shall negotiate in good faith, for a period not to exceed [***] days from the date that GNE receives such notice from Adaptive, the commercially reasonable terms under which GNE would grant to Adaptive a non-exclusive, sublicensable license under the GNE TCR Technology identified in such notice from Adaptive, to research, develop, import, use, make, have made, offer for sale and sell any Reversion TCR whether alone or as a part of any product or service offering (the "**Reversion TCR License**"); and

(iv) To the extent the Parties cannot agree upon the terms upon which GNE would grant the Reversion TCR License within such [***] day negotiation period, Adaptive shall have the right to submit such disagreement to the arbitration provisions of Section 16.6.3 (and not Section 18.2).

(b) **Reversionary Rights for Non-TCR GNE IP**.

(i) With respect to all GNE Collaboration IP, and all Intellectual Property owned or Controlled by GNE and used in connection with the Development or Commercialization of any Licensed Product prior to the effective date of termination that in each case is not licensed to Adaptive pursuant to Section 16.6.2(b)(i) (the "**Additional Reversion IP**"), GNE shall grant to Adaptive the right to negotiate for an exclusive (or non-exclusive)

license under such Additional Reversion IP (or an exclusive license under the GNE TCR Technology), in either case to make, use, import, sell and offer for sale Licensed Products in the Territory. Adaptive shall have [***] days following the effective date of termination to notify GNE in writing as to whether Adaptive elects to exercise such right to negotiate, in which case GNE will provide a summary of the rights within the relevant Additional Reversion IP and GNE TCR Technology (if applicable);

(ii) If written notice is given that Adaptive does not want to exercise such right to negotiate, or written notice is not given by Adaptive to GNE within said [***] day period, Adaptive will have waived its right to negotiate for such exclusive license under the Additional Reversion IP; or

(iii) If written notice is given that Adaptive wants to exercise such right to negotiate, Adaptive and GNE shall negotiate in good faith, for a period not to exceed [***] days from the date that GNE receives such notice from Adaptive, the commercially reasonable terms under which GNE may grant to Adaptive an exclusive (or non-exclusive), sublicensable license under the Additional Reversion IP to make, have made, use, sell, offer for sale and import Licensed Products in the Territory; and

(iv) The terms set forth in this Section 16.6.2(b), including the decision by GNE to grant or not grant such a license (including the terms thereof) shall not be subject to the arbitration provisions of Section 18.2.

16.6.3 **Baseball-Style Arbitration.** If the Parties are unable to agree on the terms of the Reversion TCR License under Section 16.6.2, Adaptive may submit such dispute to arbitration for resolution in accordance with the following provisions:

(a) Adaptive shall notify GNE of its decision to initiate the arbitration proceeding pursuant to this Section 16.6.3 through written notice to GNE within [***] days of the end of [***] day negotiation period specified in Section 16.6.2(a)(iii) above;

(b) Within [***] calendar days following GNE's receipt of such notice, the Parties shall use commercially reasonable efforts to agree on an independent Third Party expert with at least ten (10) years of experience in the licensing of pharmaceutical compounds or products. If the Parties cannot agree on such expert within such time period, each Party shall nominate one independent expert within such [***]-day period, and the two experts so selected shall nominate the final independent expert within [***] calendar days of their nomination. If the two experts so selected cannot agree on the final independent expert, such final independent expert shall be nominated by the President of the Chamber of Commerce of New York. For the avoidance of doubt, it is understood and agreed that such final independent expert should have at least ten (10) years of experience in the licensing of pharmaceutical compounds or products.

(c) Within [***] calendar days of its appointment, the expert shall set a date for the arbitration, which date shall be no more than [***] calendar days after the date the arbitration is demanded under clause (a) above.

(d) The arbitration shall be "baseball-style" arbitration; accordingly, at least [***] calendar days prior to the arbitration, each Party shall provide the expert with a form of the definitive written agreement containing the terms of the Reversion TCR License proposed by it (each, a "**Proposed Agreement**"). Such Proposed Agreement may be no more than [***] pages, and must clearly provide and identify the Party's position with respect to the disputed matter(s);

(e) after receiving both Parties' Proposed Agreements, the expert will distribute each Party's Proposed Agreement to the other Party. [***] calendar days in advance of the arbitration (described in clause (f) below), the Parties shall submit to the expert and exchange response briefs of no more than [***] pages. The Parties' briefs may include or attach relevant exhibits in the form of documentary evidence, any other material voluntarily disclosed to the submitting Party in advance, or publicly available information. The Parties' briefs may also include or attach demonstratives and/or expert opinion based on the permitted documentary evidence. Neither Party may have any other communications (either written or oral) with the expert other than for the sole purpose of engaging the expert or as expressly permitted in this Section 16.6.3;

(f) the arbitration shall consist of a [***] hearing of no longer than [***], such time to be split equally between the Parties, in the form of presentations by counsel and/or employees and officers of the Parties. No live witnesses shall be permitted except expert witnesses whose opinions were provided with the Parties' briefs;

(g) no later than [***] calendar days following the arbitration, the expert shall issue his or her written decision. The expert shall select one Party's Proposed Agreement as his or her decision, and shall not have the authority to render any substantive decision other than to select the Proposed Agreement submitted by either GNE or Adaptive. The expert shall have no discretion or authority with respect to modifying the positions of the Parties. The expert's decision shall be final and binding on the Parties and the written agreement selected by the expert shall constitute a binding agreement between the Parties that may be enforced in accordance with its terms. Each Party shall bear its own costs and expenses in connection with such arbitration, and shall share equally the expert's fees and expenses;

(h) The violation of one of the time limits prescribed in this Section 16.6.3 by the expert shall not affect the expert's competence to decide on the subject matter, and shall not affect the final and binding decision rendered by the expert, unless otherwise agreed by the Parties; and

(i) the above "baseball-style" arbitration shall be the exclusive remedy of either Party if the Parties cannot agree on the terms of the Reversion TCR License under this Section 16.6.3.

ARTICLE 17
HSR FILING; TERMINATION UPON HSR DENIAL

If GNE determines that an HSR Filing is necessary, each Party shall, comply promptly but in no event later than [***] business days of the Execution Date (or such later time as may

be agreed to in writing by the Parties), file with the United States Federal Trade Commission and the Antitrust Division of the United States Department of Justice, and/or with equivalent foreign authorities, any HSR Filing required of it under the HSR Act or applicable antitrust or competition laws of other jurisdictions with respect to the transactions contemplated hereby. The Parties shall seek expedited treatment of any HSR Filing unless otherwise agreed by the Parties in writing. Each Party will use reasonable efforts to do, or cause to be done, all things necessary or advisable to, as promptly as practicable, take all actions necessary to make the filings required of such Party or its Affiliates under the HSR Act and obtain the requisite Governmental Required Consents. The Parties shall cooperate with one another to the extent necessary in the preparation of any such HSR Filing. Each Party shall be responsible for its own costs, expenses, and filing fees associated with any HSR Filing. If the Parties make an HSR Filing under this Agreement, then this Agreement shall terminate: (a) at the election of either Party, immediately upon written notice to the other Party, if the U.S. Federal Trade Commission or the U.S. Department of Justice, or an equivalent authority in the European Union, seeks a preliminary injunction under the applicable antitrust laws against the Parties to enjoin the transactions contemplated by this Agreement; or (b) at the election of either Party, immediately upon written notice to the other Party, in the event that the HSR Clearance Date shall not have occurred on or prior to [***] days after the effective date of the HSR Filing. In the event of such termination, this Agreement shall be of no further force and effect.

ARTICLE 18
DISPUTE RESOLUTION

18.1 **Disputes**. Adaptive and GNE recognize that a dispute, controversy or claim of any nature whatsoever arising out of or relating to this Agreement, or the breach, termination or invalidity thereof, (each, a "**Dispute**") may from time to time arise during the Term. Unless otherwise specifically recited in this Agreement, such Disputes between Adaptive and GNE will be resolved as recited in this ARTICLE 18. In the event of the occurrence of such a Dispute, the Parties shall first refer such Dispute to their respective Alliance Managers for attempted resolution by such Alliance Managers within [***] days after such referral. If such Dispute is not resolved within such [***] day period by the Alliance Managers, either Adaptive and GNE may, by written notice to the other, have such Dispute referred to their respective officers designated below (or their designees who have been duly authorized to resolve such Dispute), for attempted resolution within [***] days after such notice is received. Such designated officers are as follows:

For GNE – [***]

For Adaptive – [***]

In the event the designated officers, or their respective designees, are not able to resolve such Dispute within [***] days of receipt of the written notice referring such Dispute to such designated officers, then either Party may initiate the dispute resolution procedures set forth in Section 18.2.

18.2 **Arbitration**.

18.2.1 **Rules**. Except as otherwise expressly provided in this Agreement (including under Section 18.3), the Parties agree that any Dispute not resolved internally by the Parties pursuant to Section 18.1 shall be resolved through final and binding arbitration administered by JAMS in accordance with its Comprehensive Arbitration Rules and Procedures (the "**Rules**"), except as modified in this Agreement, applying the substantive law specified in Section 19.1.

18.2.2 **Arbitrators; Location**. Each Party shall select [***], and the [***] arbitrators so selected shall choose a [***] arbitrator. All [***] arbitrators shall serve as neutrals and have at least ten (10) years of: (a) dispute resolution experience (including judicial experience) and/or (b) legal or business experience in the biotech or pharmaceutical industry. If a Party fails to nominate its arbitrator, or if the Parties' arbitrators cannot agree on the third, the necessary appointments shall be made in accordance with the Rules. Once appointed by a Party, such Party shall have no *ex parte* communication with its appointed arbitrator, other than as permitted by Rule 14(b) of the Rules. The arbitration proceedings shall be conducted in New York, New York, USA. The arbitration proceedings and all pleadings and written evidence shall be in the English language. Any written evidence originally in another language shall be submitted in English translation accompanied by the original or a true copy thereof.

18.2.3 **Procedures; Awards**. Each Party agrees to use reasonable efforts to make all of its current employees available, if reasonably needed, and agrees that the arbitrators may determine any person as necessary. The arbitrators shall be instructed to render a written, binding, non-appealable resolution and award on each issue that clearly states the basis upon which such resolution and award is made. The written resolution and award shall be delivered to the Parties as expeditiously as possible, but in no event more than [***] days after conclusion of the hearing, unless otherwise agreed by the Parties. Judgment upon such award may be entered in any competent court or application may be made to any competent court for judicial acceptance of such an award and order for enforcement. Each Party agrees that, notwithstanding any provision of applicable law or of this Agreement, it will not request, and the arbitrators shall have no authority to award, punitive or exemplary damages against any Party.

18.2.4 **Costs**. The prevailing Party, as determined by the arbitrators, shall be entitled to: (a) its share of fees and expenses of the arbitrators; and (b) its reasonable attorneys' fees and associated costs and expenses. In determining which Party "prevailed," the arbitrators shall consider: (i) the significance, including the financial impact, of the claims prevailed upon; and (ii) the scope of claims prevailed upon, in comparison to the total scope of the claims at issue. If the arbitrators determine that, given the scope of the arbitration, neither Party "prevailed," the arbitrators shall order that the Parties: (A) share equally the fees and expenses of the arbitrators; and (B) bear their own attorneys' fees and associated costs and expenses.

18.2.5 **Interim Equitable Relief**. Notwithstanding anything to the contrary in this Section 18.2, either Party may seek a temporary injunction or other interim equitable relief in a court of competent jurisdiction pending the ability of the arbitrators to review the decision under this Section 18.2. Such court shall have no jurisdiction or ability to resolve Disputes beyond the specific issue of temporary injunction or other interim equitable relief.

18.2.6 **Protective Orders; Arbitrability**. At the request of either Party, the arbitrators shall enter an appropriate protective order to maintain the confidentiality of information produced or exchanged in the course of the arbitration proceedings. The arbitrators shall have the power to decide all questions of arbitrability.

18.3 **Subject Matter Exclusions**. Notwithstanding the provisions of Section 18.2, any Dispute not resolved internally by the Parties pursuant to Section 18.1 that involves the validity or infringement of a Patent included in a license granted in this Agreement that is issued in: (a) the United States shall be subject to actions before the United States Patent and Trademark Office and/or submitted exclusively to the federal court located in the jurisdiction of the district where any of the defendants resides; and (b) any other country (or region) shall be brought before an appropriate regulatory or administrative body or court in that country (or region), and the Parties hereby consent to the jurisdiction and venue of such courts and bodies.

18.4 **Continued Performance**. *Provided*, that this Agreement has not terminated, the Parties agree to continue performing under this Agreement in accordance with its provisions, pending the final resolution of any Dispute.

ARTICLE 19
MISCELLANEOUS

19.1 **Applicable Law**. This Agreement (including the arbitration provisions of Section 18.2) shall be governed by and interpreted in accordance with the laws of the State of New York, without reference to the principles of conflicts of laws. The United Nations Convention on Contracts for the International Sale of Goods shall not apply to the transactions contemplated by this Agreement.

19.2 **Notices**. Except as otherwise expressly provided in the Agreement, any notice required under this Agreement shall be in writing and shall specifically refer to this Agreement. Notices shall be sent via one of the following means and will be effective: (a) on the date of delivery, if delivered in person; (b) on the date of receipt, if sent by a facsimile (with delivery confirmed); or (c) on the date of receipt, if sent by private express courier or by first class certified mail, return receipt requested. Any notice sent via facsimile shall be followed by a copy of such notice by private express courier or by first class mail. Notices shall be sent to the other Party at the addresses set forth below. Either Party may change its addresses for purposes of this Section 19.2 by sending written notice to the other Party.

If to GNE:

Genentech, Inc.
Attn: Corporate Secretary
1 DNA Way
South San Francisco, CA 94080 USA.
Fax: [***]
Phone: [***]

with required copies (which shall not constitute notice) to:

Genentech, Inc.
Attn: Vice President, Genentech Partnering
1 DNA Way
South San Francisco, CA 94080 USA
Fax: [***]
[***]

If to Adaptive:

Adaptive Biotechnologies
Attn: CEO
1551 Eastlake Ave. East, Suite 200
Seattle, WA 98102

with required copies (which shall not constitute notice) to:

Adaptive Biotechnologies
Legal Department
1551 Eastlake Ave. East, Suite 200
Seattle, WA 98102

19.3 **Assignment**. Neither Party may assign or otherwise transfer, in whole or in part, this Agreement without the prior written consent of the non-assigning Party, such approval not to be unreasonably withheld or delayed. Notwithstanding the foregoing, either Party may assign this Agreement to: (a) an Affiliate; or (b) any purchaser of all or substantially all of the assets of such Party (and in such event this Agreement must be assigned to such purchaser), or of all of its capital stock, or to any successor corporation or entity resulting from any merger or consolidation of such Party with or into such corporation or entity (whether arising under contract, by statute or at law), or otherwise in connection with a Change of Control of such Party; *provided*, that the party to which this Agreement is assigned expressly agrees in writing to assume and be bound by all obligations of the assigning Party under this Agreement. A copy of such written agreement by such assignee shall be provided to the non-assigning Party within [***] calendar days of execution of such written agreement. Subject to the foregoing, this Agreement will benefit and bind the Parties' successors and assigns.

19.4 **Independent Contractors**. The Parties hereto are independent contractors and nothing contained in this Agreement shall be deemed or construed to create a partnership, joint venture, employment, franchise, agency or fiduciary relationship between the Parties.

19.5 **Integration**. Except to the extent expressly provided herein, this Agreement constitutes the entire agreement between the Parties relating to the subject matter of this Agreement and supersedes all previous oral and written communications between the Parties with respect to the subject matter of this Agreement (including the Non-Disclosure Agreement and term sheets exchanged by and between Adaptive and GNE).

19.6 **Amendment; Waiver**. Except as otherwise expressly provided herein, no alteration of or modification to this Agreement shall be effective unless made in writing and executed by an authorized representative of both Parties. No course of dealing or failing of either Party to strictly

enforce any term, right or condition of this Agreement in any instance shall be construed as a general waiver or relinquishment of such term, right or condition. The observance of any provision of this Agreement may be waived (either generally or in any given instance and either retroactively or prospectively) only with the written consent of the Party granting such waiver.

19.7 **Further Assurance**. Each Party shall and shall use all reasonable endeavors to procure that any necessary Third Party shall promptly execute and deliver such further documents and do such further acts as may be required for the purpose of giving full effect to this Agreement.

19.8 **Severability**. The Parties do not intend to violate any public policy or statutory or common law. However, if any sentence, paragraph, clause or combination or part thereof of this Agreement is in violation of any law or is found to be otherwise unenforceable, such sentence, paragraph, clause or combination or part of the same shall be deleted and the remainder of this Agreement shall remain binding, *provided*, that such deletion does not alter the basic purpose and structure of this Agreement.

19.9 **No Third Party Rights**. The Parties do not intend that any term of this Agreement should be enforceable by any person who is not a Party.

19.10 **Construction**. The Parties mutually acknowledge that they and their attorneys have participated in the negotiation and preparation of this Agreement. Ambiguities, if any, in this Agreement shall not be construed against any Party, irrespective of which Party may be deemed to have drafted this Agreement or authorized the ambiguous provision.

19.11 **Interpretation**. The captions and headings to this Agreement are for convenience only, and are to be of no force or effect in construing or interpreting any of the provisions of this Agreement. Unless context otherwise clearly requires, whenever used in this Agreement: (a) the words “include” or “including” shall be construed as incorporating “but not limited to” or “without limitation”; (b) the words “hereof,” “herein,” “hereby” and derivative or similar words refer to this Agreement, including the Exhibits; (c) the word “law” or “laws” means any applicable, legally binding statute, ordinance, resolution, regulation, code, guideline, rule, order, decree, judgment, injunction, mandate or other legally binding requirement of a governmental authority (including a court, tribunal, agency, legislative body or other instrumentality of any: (i) government or country or territory; (ii) any state, province, county, city or other political subdivision thereof; or (iii) any supranational body); (d) all references to the word “will” are interchangeable with the word “shall” and shall be understood to be imperative or mandatory in nature; (e) all references to “sublicensees” shall include all sublicensees of sublicensees through multiple tiers of sublicensing; (f) the singular shall include the plural and vice versa; and (g) the word “or” has the inclusive meaning represented by the phrase “and/or”. All references to days, months, quarters or years are references to calendar days, calendar months, calendar quarters, or calendar years. Whenever any matter hereunder requires consent or approval, such consent shall not be unreasonably withheld or delayed.

19.12 **Counterparts**. This Agreement may be executed in two or more counterparts, each of which will be deemed an original, but all of which together will constitute one and the same instrument. For purposes hereof, a facsimile copy, or email with attached pdf copy, of this Agreement, including the signature pages hereto, will be deemed to be an original. Notwithstanding the foregoing, the Parties shall deliver original execution copies of this Agreement to one another as soon as practicable following execution thereof.

[Signature page follows – the rest of this page intentionally left blank.]

IN WITNESS WHEREOF, Adaptive and GNE have executed this Agreement by their respective officers hereunto duly authorized, on the Execution Date.

ADAPTIVE BIOTECHNOLOGIES CORPORATION

By: /s/Chad Robins

Name: Chad Robins

Title: CEO and Co-founder

GENETECH, INC.

By: /s/Edward Harrington

Name: Edward Harrington

Title: CFO, Genetech

EXHIBIT 1.8
Adaptive Platform

[***]

Certain information, as identified by [***], has been excluded from this agreement because it (i) is not material and (ii) would be competitively harmful if publicly disclosed.

Exhibit 1.159
TruTCR Criteria

[***]

Certain information, as identified by [***], has been excluded from this agreement because it (i) is not material and (ii) would be competitively harmful if publicly disclosed.

EXHIBIT 2.2.2(d)
TCR Sequencing Plan Requirements

[***]

Certain information, as identified by [***], has been excluded from this agreement because it (i) is not material and (ii) would be competitively harmful if publicly disclosed.

EXHIBIT 3.2
Research Plan

[***]

Certain information, as identified by [***], has been excluded from this agreement because it (i) is not material and (ii) would be competitively harmful if publicly disclosed.

EXHIBIT 3.4
Approved Subcontractors

Subcontractor Name	Item Description
[***]	[***]
[***]	[***]
[***]	[***]
[***]	[***]
[***]	[***]

Certain information, as identified by [***], has been excluded from this agreement because it (i) is not material and (ii) would be competitively harmful if publicly disclosed.

EXHIBIT 4.2
Development Plan Overview

[***]

Certain information, as identified by [***], has been excluded from this agreement because it (i) is not material and (ii) would be competitively harmful if publicly disclosed.

EXHIBIT 4.3
Approved Development Subcontractors

To be agreed upon the commencement of Development activities.

EXHIBIT 7.4
Adaptive Screening Technology Transfer

If Adaptive is required by this Agreement or the TCR Sequence Supply Agreement to make a transfer of any of the Adaptive Platform technology to a GNE facility and/or a facility of a GNE Third Party contract manufacturer (the "**Screening Contract Manufacturer**") to enable either GNE and/or the Screening Contract Manufacturer to conduct the TCR, screening, selection, sequencing, and/or pairing elements of the Adaptive Platform in order to manufacture a Private Antigen TCR Product (a "**Screening Technology Transfer**" and the Adaptive Confidential Information and Adaptive Know-How to be transferred in any Screening Technology Transfer the "**Screening Technology**"), then the following provisions shall be applicable, unless otherwise agreed in the TCR Sequence Supply Agreement.

(a) GNE shall provide written notice to Adaptive of the need for the Screening Technology Transfer and the location of the facility to which GNE proposes the Screening Technology be transferred, which may be either a GNE facility or the facility of a Screening Contract Manufacturer.

(b) If the proposed Screening Technology Transfer is to a Screening Contract Manufacturer, then such Screening Contract Manufacturer shall be subject to the reasonable approval of Adaptive, not to be unreasonably withheld, conditioned or delayed. If Adaptive declines to approve a Screening Contract Manufacturer proposed by GNE, then GNE shall have the right to propose one or more additional Screening Contract Manufacturers for Adaptive's approval, such approval not to be unreasonably withheld, conditioned or delayed (and in any event not delayed more than [***] days).

(c) The Screening Technology Transfer shall be accomplished as promptly as practicable, and in any event the Parties shall use their respective best efforts to complete it within [***] days following full execution of the Screening Technology Transfer Agreement, unless otherwise mutually agreed by the Parties.

If the proposed Screening Technology Transfer is to a Screening Contract Manufacturer proposed by GNE and approved by Adaptive as provided above, then prior to Adaptive undertaking any Screening Technology Transfer, and prior to the disclosure of any Screening Technology Transfer to the Screening Contract Manufacturer, Adaptive and the Screening Contract Manufacturer shall enter into an Screening Technology Transfer agreement reasonably satisfactory in form and content to Adaptive ("**Screening Technology Transfer Agreement**"). In the Screening Technology Transfer Agreement, the Screening Contract Manufacturer shall agree that the Screening Technology will be transferred by Adaptive to the Screening Contract Manufacturer pursuant to the terms and conditions of the Screening Technology Transfer Agreement. In the Screening Technology Transfer Agreement, the Screening Contract Manufacturer shall agree to usual and customary terms observed in the US pharmaceutical industry for the protection of commercially valuable know-how, including the following: (i) to maintain the confidentiality of the Screening Technology, and to use the Screening Technology solely for the purpose of screening TCRs for the manufacture of Private Antigen TCR Product and supplying the resultant TCRs to GNE; (ii) not to misappropriate, or make any other unauthorized use or disclosure of the Screening Technology; and (iii) that the misappropriation or other unauthorized use or disclosure of the Screening Technology (any use other than for the purpose specified above) will be a material breach of Screening Technology Transfer Agreement and will cause irreparable harm to Adaptive not compensable by monetary damages, and that Adaptive will have the right to seek and obtain an injunction or other similar equitable remedy against the Screening Contract Manufacturer for any breach by the Screening Contract Manufacturer of its obligations relating to the use or confidentiality of the Screening Technology, without the necessity for Adaptive to post a bond.

Certain information has been excluded from this exhibit because it (i) is not material and (ii) would be competitively harmful if publicly disclosed.

EXECUTION VERSION

MICROSOFT ARTIFICIAL INTELLIGENCE & RESEARCH GROUP

STRATEGIC COLLABORATION AGREEMENT

This Strategic Collaboration Agreement (this "**Agreement**") is made and entered into as of the last signature date written below (the "**Effective Date**") by and between Microsoft Corporation, a Washington corporation having its principal place of business at One Microsoft Way, Redmond, Washington, USA 98052 ("**Microsoft**") and Adaptive Biotechnologies Corporation, a company having its principal place of business at 1551 Eastlake Ave E, Seattle, WA 98102 ("**Adaptive**"). Microsoft and Adaptive are sometimes referred to in this Agreement individually as a "**Party**" and collectively as the "**Parties**."

BACKGROUND

A. Adaptive is a biotechnology industry pioneer and leader that focuses on combining high-throughput sequencing and expert bioinformatics capabilities to profile T-cell and B-cell receptors. Adaptive owns or has access to data that can be used to computationally derive T-cell receptor-antigen mappings.

B. Microsoft is a worldwide technology company that develops, sells and otherwise makes available a wide variety of software applications, cloud services, machine learning technologies, and other products that affect the life sciences and healthcare industries.

C. Adaptive and Microsoft desire to set forth the terms on which they intend to pursue their shared goal of computationally deriving T-cell receptor ("**TCR**") to antigen mappings in order to create a comprehensive map for purposes of developing biological research, diagnostic or therapeutic applications (the "**Project**"). The Parties' vision is that their collaboration will ultimately enable them to develop a universal diagnostic based on a single blood draw and TCR sequencing.

D. To pursue the goals described above, Microsoft intends to provide reasonable machine learning, software and cloud services development support, including making Microsoft Research personnel with computational and machine learning domain expertise reasonably available to work with Adaptive on the collaboration project, and to develop the Immunomics AI Services (as defined in this Agreement), at no charge to Adaptive, in order to carry out activities under the Development Plan (as defined in this Agreement).

E. To pursue the goals described above, Adaptive intends to provide data and immunomics, diagnostic and bioinformatics expertise, at no charge to Microsoft, in order to carry out activities under the Development Plan.

F. Adaptive also intends, after a reasonable transition period and subject to the further terms and conditions set forth in this Agreement, to use Microsoft's Azure cloud services to host all of its existing and new activities that are hosted on a public cloud service. Adaptive and Microsoft are entering into a commercial agreement regarding Adaptive's use of Azure concurrently with this Agreement.

AGREEMENT

In consideration of the terms of this Agreement and other good and valuable consideration, the sufficiency of which is acknowledged, the Parties agree as follows:

1. DEFINITIONS. The definitions of terms used in initially capitalized form in this Agreement are set forth in **Exhibit A** or elsewhere in this Agreement.

2. DEVELOPMENT EFFORT.

2.1 Development Plan. The Parties have mutually agreed on the initial Development Plan incorporated in this Agreement as **Exhibit B.** The Parties' Project Managers will review the Development Plan periodically, and upon mutual written agreement of the Parties' Relationship Managers, the Parties may update the Development Plan to reflect the evolution of activities under the then-current Development Plan and add details regarding upcoming activities they intend to carry out under the Collaboration; provided, however, that in the event any such update to the Development Plan has the effect of amending, modifying or supplementing the terms of this Agreement, such update to the Development Plan must be approved in accordance with Section 12.12.

2.2 Good Faith Efforts to Carry Out Development Plan. The Parties will act in good faith during the Development Term to carry out the activities described in the Development Plan in accordance with the timelines it sets forth. Without limiting the foregoing, each Party will act in good faith to develop, procure and make available the technologies, data and/or other project components for which it is responsible under the Development Plan.

3. PROJECT MANAGEMENT AND RELATIONSHIP MANAGEMENT

3.1 Project Management. Each Party will designate an individual to act as its project manager ("**Project Manager**") with respect to the Collaboration and coordinate that Party's activities under the Development Plan. The Parties' Project Managers will schedule and conduct regular meetings to discuss the status of the activities under the Development Plan. Without limiting the foregoing, the Project Managers will:

(a) review the Development Plan at least once every calendar quarter during the Development Term, and more frequently if requested by either Party;

(b) recommend changes in the Development Plan as may be desirable to reflect any changes in the scope, objectives, tasks, responsibilities of each Party, schedule, or other aspects of the Collaboration;

(c) coordinate the review and approval process regarding any publicity activities, publications or other communications regarding the Collaboration; and

(d) prepare written reports on the status of activities under the Development Plan for review by the Relationship Managers at least once during each calendar quarter and more frequently if requested by either Party.

3.2. Relationship Management. Each Party will designate an individual to serve as that Party's overall relationship manager for purposes of the Collaboration (each, a "**Relationship Manager**"). As of the Effective Date, the Relationship Managers are the individuals designated to perform such role in **Exhibit C**. Either Party may replace its Relationship Manager upon written notice to the other Party.

3.3 GTM Discussions. The Relationship Managers will meet at least twice per calendar year during the Development Term, or as otherwise mutually agreed, to discuss go to market ("**GTM**") strategies applicable to products or services that result from the Collaboration. Adaptive will provide Microsoft with information about GTM strategies that Adaptive is considering in advance of execution of such strategies and will provide Microsoft an equitable opportunity to provide input to and participate in the development and execution of such GTM strategies; provided, however, that Adaptive will have the sole and exclusive right to make final determinations regarding GTM strategies. For clarity, the foregoing proviso does not modify or supersede any of the license terms or conditions set forth in this Agreement.

3.4 Dispute Resolution. The Parties will endeavor to resolve any dispute that arises under this Agreement by using the escalation procedures set forth in Exhibit C, subject to the exceptions described in Exhibit C.

4. OWNERSHIP OF PROJECT MATERIALS, COLLABORATION OUTPUTS AND RELATED PROPRIETARY RIGHTS

4.1 Project Materials and Background Rights. Each Party owns and will retain all ownership rights in all Project Materials such Party uses or makes available for use in the Collaboration. Each Party also owns and will retain all ownership rights in such Party's Background Non-Patent IP and Background Inventions.

4.2 Outputs of the Collaboration.

(a) Adaptive will own (i) all Adaptive's Outputs, (ii) all Foreground Non-Patent IP embodied or implemented in Adaptive's Outputs, (iii) all Adaptive Foreground Inventions, and (iv) all Joint Foreground Inventions and Microsoft Foreground Inventions that (in each case) read on Adaptive's Outputs or Microsoft's Outputs.

(b) Microsoft will own (i) all Microsoft's Outputs, and (ii) all Foreground Non-Patent IP embodied or implemented in Microsoft's Outputs.

4.3 Assignments of Rights.

(a) Pursuant to Section 4.2(a), Microsoft hereby assigns and agrees to assign to Adaptive (i) all of Microsoft's rights in any Foreground Non-Patent IP embodied or implemented in Adaptive's Outputs, (ii) all Microsoft Foreground Inventions that read on Adaptive's Outputs or Microsoft's Outputs, and (iii) all Microsoft Patent Rights in Joint Foreground Inventions that read on Adaptive's Outputs or Microsoft's Outputs.

(b) Pursuant to Section 4.2(b), Adaptive hereby assigns and agrees to assign to Microsoft all of Adaptive's rights in any Foreground Non-Patent IP embodied or implemented in Microsoft's Outputs.

(c) Each Party will take all necessary steps, at such Party's expense, to execute and deliver any instruments and take any other actions reasonably requested by the other Party to perform the assignments of Non-Patent IP and Patent Rights contemplated by Sections 4.3(a) and (b), as applicable.

(d) For clarity, the assignments contemplated by this Section 4.3 are limited to the Foreground Non-Patent IP and Foreground Patent Rights expressly specified in Sections 4.3(a) and (b), as applicable. Assignments under this Section 4.3 do not and will not include any other Non-Patent IP or Patent Rights of the assigning Party, including without limitation in such Party's Background Non-Patent IP and Background Inventions, even if these are included in or necessary for the assignee's exploitation of Microsoft's Outputs or Adaptive's Outputs, as applicable.

(e) Adaptive will be responsible for, and will have the sole and exclusive right to make final determinations regarding, the maintenance and prosecution of Microsoft Foreground Inventions and Joint Foreground Inventions assigned to Adaptive under Section 4.3(a), but Adaptive will consider Microsoft's input regarding such maintenance and prosecution activities. Microsoft will provide such non-monetary assistance as Adaptive may reasonably request in connection with Adaptive's preparing, filing, and prosecuting applications for Microsoft Foreground Inventions and Joint Foreground Inventions assigned to it under Section 4.3(a).

(f) Neither Party will transfer to or grant to any Third Party any ownership of or rights or licenses in any Foreground Inventions or Foreground Non-Patent IP owned by that Party that prevent the other Party from practicing license rights granted to it under this Agreement or interfere with the other Party's ability to fully exercise any such license rights.

5. LICENSE GRANTS

5.1 Development Plan Activities. Each Party hereby grants to the other Party a non-exclusive, non-sublicensable, non-transferable (except as set forth in Section 12.2), worldwide, royalty-free, fully paid license under all of the granting Party's Non-Patent IP and Patent Rights to exercise all rights necessary to carry activities under the Development Plan during the Development Term.

5.2 Microsoft Licenses to Adaptive. Microsoft hereby grants to Adaptive:

(a) (i) An exclusive, perpetual, non-transferable (except as set forth in Section 12.2), irrevocable, worldwide, royalty free, full paid license, under Microsoft's Foreground Non-Patent IP, for Adaptive's internal research and development and to Commercialize Adaptive's Outputs and Adaptive Offerings that use the Immunomics AI Services, all solely within the Field of Use; (ii) an exclusive, perpetual, non-transferable (except as set forth in Section 12.2), irrevocable, worldwide, royalty free, full paid license, under Microsoft's Foreground Non-Patent IP, for Adaptive's internal research and development and to Commercialize Adaptive's Outputs and Adaptive Offerings that use Algorithms, all solely within the Project; and (iii) a non-exclusive, perpetual, non-transferable (except as set forth in Section 12.2), irrevocable, worldwide, royalty free, full paid license, under Microsoft's Foreground Non-Patent IP, for Adaptive's internal research and development and to Commercialize Adaptive's Outputs and Adaptive Offerings that use Algorithms, all solely within the Field of Use outside of the Project;

(b) A non-exclusive, perpetual, non-transferable (except as set forth in Section 12.2), irrevocable, worldwide, royalty free, fully paid license, under Microsoft's Background Non-Patent IP, for Adaptive's internal research and development and to Commercialize Adaptive's Outputs and Adaptive Offerings that use Microsoft's Outputs, all solely within the Field of Use; and

(c) A non-exclusive, perpetual, non-transferable (except as set forth in Section 12.2), irrevocable, worldwide, royalty free, fully paid license, under Microsoft's Background Inventions that are necessarily infringed by Microsoft's Outputs, for Adaptive's internal research and development and to Sell Adaptive's Outputs and Adaptive Offerings that use Microsoft's Outputs, all solely within the Field of Use.

5.3 Adaptive Licenses to Microsoft. Adaptive hereby grants to Microsoft and its Affiliates:

(a) An exclusive, perpetual, non-transferable (except as set forth in Section 12.2), irrevocable, worldwide, royalty free, fully paid license, under Adaptive's Foreground Non-Patent IP, to Commercialize Microsoft's Outputs as part of any and all Microsoft Offerings, all solely outside the Field of Use;

(b) (i) An exclusive, perpetual, non-transferable (except as set forth in Section 12.2), irrevocable, worldwide, royalty free, fully paid license, under Adaptive Foreground Inventions, Joint Foreground Inventions and Microsoft Foreground Inventions, to Sell Microsoft's Outputs as part of any and all Microsoft Offerings, all solely outside the Field of Use; and (ii) a non-exclusive, perpetual, nontransferable (except as set forth in Section 12.2), irrevocable, worldwide, royalty free, fully paid license, under Adaptive Foreground Inventions, Joint Foreground Inventions and Microsoft Foreground Inventions, to Sell Algorithms as part of any and all Microsoft Offerings, all solely within the Field of Use outside the Project.

(c) A non-exclusive, perpetual, non-transferable (except as set forth in Section 12.2), irrevocable, worldwide, royalty free, fully paid license, under Adaptive's Background Non-Patent IP, to Commercialize Microsoft Outputs as part of any and all Microsoft Offerings, all solely outside the Field of Use;

(d) A non-exclusive, perpetual, non-transferable (except as set forth in Section 12.2), irrevocable, worldwide, royalty free, fully paid license, under Adaptive Background Inventions that are necessarily infringed by Microsoft's Outputs, to Sell Microsoft Outputs as part of any and all Microsoft Offerings, all solely outside the Field of Use; and

(e) A non-exclusive, perpetual, non-transferable (except as set forth in Section 12.2), irrevocable, worldwide, royalty free, fully paid license, under all Joint Foreground Inventions and Microsoft Foreground Inventions, for Microsoft's internal research purposes only (including research within the Field of Use); provided, however, that such internal research may not be conducted in collaboration with any Third Party on any research substantially similar to the Project or used to assist any Third Party Commercialization of any Offerings for purposes or with the effect of circumventing Adaptive's rights under Sections 4 and 5 or in any manner that would not comply with Section 6.5; and provided further that following the Development Term, the foregoing license may not be used by Microsoft for research substantially similar to the Project.

5.4 Modified and New License Grants Arising from Certain Circumstances. Upon consummation of a Corporate Event in which [***] or any Affiliate of the foregoing is the counter-party:

(a) the exclusive licenses granted by Microsoft under Section 5.2(a)(i) and (ii) will automatically become non-exclusive (and, for clarity, this license will remain limited to the Field of Use);

(b) Adaptive will automatically be deemed to grant to Microsoft and its Affiliates a nonexclusive, perpetual, non-transferable (except as set forth in Section 12.2), irrevocable, worldwide, fully paid, royalty free, fully paid up, license (i) under Adaptive's Foreground Non-Patent IP and Adaptive's Background Non-Patent IP, to Commercialize the Computational Models as part of any and all Microsoft Offerings (i.e., whether or not in the Field of Use), and (ii) under Adaptive Foreground Inventions, Joint Foreground Inventions, Microsoft Foreground Inventions, and Adaptive Background Inventions, to Sell the Computational Models as part of any and all Microsoft Offerings (i.e., whether or not in the Field of Use); and

(c) The limitations regarding Microsoft research activities after the Development Term in the final clause of Section 5.3(e) will no longer apply.

5.5 Enforcement Rights under Exclusive Licenses. The exclusive licenses granted to each Party under this Agreement will provide the licensed Party with an exclusive right to enforce the licensed rights within the scope of its exclusive licenses against infringers at its own cost and expense, and the Party that is the licensor agrees to join enforcement actions (at the licensed Party's expense) if the licensor Party is a necessary party to bring such an action.

5.6 Protection of Licenses in Bankruptcy. The Non-Patent IP and Patent Rights referenced in Section 4 are intellectual property, and the licenses granted in this Section 5 are licenses to intellectual property, under the Bankruptcy Law. In the event of any proceeding for the bankruptcy, reorganization, or protection of either Party or any of their Affiliates under any applicable Bankruptcy Law, the licenses granted under this Section 5 will be subject to Section 365(n) of the United States Bankruptcy Code and any corresponding or similar provision for the protection of licensees of intellectual property under any other Bankruptcy Laws. If any debtor-in-possession, trustee, or similar authority rejects, cancels, or similarly acts with respect to this Agreement under any applicable Bankruptcy Law, the licensed Party may elect to retain its rights under the applicable license terms in this Section 5 as provided for in Section 365(n) of the United States Bankruptcy Code or any corresponding or similar provision under any other applicable Bankruptcy Law.

5.7 Reservations of Rights. Except to the extent expressly set forth in this Agreement, this Agreement does not assign, grant or otherwise transfer, whether by implication, estoppel or otherwise, any license or other right in, to or under any Non-Patent IP or Patent Rights of either Party. All rights not expressly granted in this Agreement are reserved. Without limiting the generality of the foregoing:

(a) except for the licenses in Section 5, and the assignments in Section 4, each Party reserves all of its right, title and interest in and to its Project Materials, Non-Patent IP and Patent Rights;

(b) Nothing contained in this Agreement will be construed as:

(i) a warranty or representation by either Party as to the validity, enforceability, and/or scope of any Patent Rights or Non-Patent IP; or

(ii) imposing upon either Party any obligation to institute any suit or action for infringement of any Patent or Non-Patent IP, or to defend any suit or action brought by a Third Party against such Party which challenges or concerns the validity, enforceability, or scope of any Patent or Non-Patent IP; and

(c) except as may be expressly agreed upon by the Parties with respect to any press release or other publicity activities conducted pursuant to Section 7.3, neither Party grants any license or other right in or to any of its Trademarks under this Agreement, and neither Party will use any Trademark of the other Party in any publicity, advertising or other promotional activities without the prior written consent of such other Party, provided that the foregoing does not restrict any right that either Party may have under Applicable Laws to make accurate, descriptive and nominative references to the other Party's Trademarks.

6. EXCLUSIVITY AND CLOUD SERVICES COMMITMENTS

6.1 Azure Commercial Agreement. Following the Parties' entry into this Agreement, Microsoft and Adaptive plan to enter into separate commercial agreements regarding Adaptive's purchase of Azure Services (the "**Commercial Agreement**"), which include standard volume pricing terms and a minimum Azure consumption requirement. Nothing in this Agreement will be deemed to modify or supersede the terms of the Commercial Agreement.

6.2 Exclusive Use of Azure. Adaptive agrees that throughout the Development Term and, if longer, until the seven (7) year anniversary of the Effective Date, all Collaboration activities that use a cloud service (including the Immunomics AI Services) will use Azure exclusively, subject to Adaptive's right to terminate the Commercial Agreement for breach or non-performance as set forth in the Commercial Agreement. In addition, Adaptive agrees to ensure that on a reasonably expedient schedule, and in any event within no more than eighteen (18) months after the Effective Date, all activities for which Adaptive uses any cloud (or "hosted") service, including both new and ongoing Adaptive activities that use a cloud service (regardless of whether such activities are related to the Collaboration), will use Azure exclusively, subject to Adaptive's right to terminate the Commercial Agreement for breach or nonperformance as set forth in the Commercial Agreement. Accordingly, Adaptive will wind down any existing agreements it may have with other cloud service providers within eighteen (18) months after the Effective Date. Notwithstanding anything to the contrary in this paragraph, (a) Adaptive's obligation to use Azure exclusively does not apply to applications or services that Adaptive acquires from Third Parties for which the Third Party provider controls selection of the cloud services provider that hosts such application or service (e.g., Salesforce or MerrillEdge applications or services) and (b) in the event that Adaptive acquires another entity or the assets thereof, whether by merger, purchase of equity or assets or otherwise, Adaptive shall have a period of eighteen (18) months following the closing of such acquisition to wind down any existing agreements such other entity may have with other cloud service providers. Further, Adaptive will not, and will not authorize any Third Party to, promote, market or otherwise publicly discuss Adaptive's use of any Third Party cloud service provider to host any Adaptive Offering after the Effective Date.

6.3 Exclusive Use of Immunomics AI Services by Adaptive. Adaptive agrees that throughout the Development Term it (a) will use the Immunomics AI Services exclusively for TCR-antigen mapping in connection with any Adaptive Offering developed as a direct result of the Collaboration and for which use of services similar to the Immunomics AI Services is relevant and (b) will not sublicense its rights under Sections 4 and 5 hereof for the purpose of circumventing the foregoing clause (a). The Parties anticipate that the Immunomics AI Services will be relevant (and therefore Adaptive will use exclusively the Immunomics AI Services pursuant to the previous sentence) in connection with any diagnostic applications for one or a set of medical conditions developed as a direct result of the Collaboration ("**Diagnostic Products**"). The Parties anticipate that the Immunomics AI Services may also be relevant to some (but not the preponderance of) therapeutic applications for one or a set of medical conditions developed as a direct result of the Collaboration ("**Therapeutic Products**"), and that Adaptive will use the Immunomics AI Services exclusively in all relevant Therapeutic Products cases but that Adaptive will also make available Therapeutic Products that do not use the Immunomics AI Services or any similar services. Notwithstanding anything to the contrary in this Section 6.3, if Adaptive identifies alternative services that it reasonably determines would provide superior business or technical performance, as compared to the Immunomics AI Services, in connection with one or more Adaptive Offerings developed as a direct result of the Collaboration and for which such services are relevant, Adaptive may notify Microsoft in writing of the information and analysis on which Adaptive has based such a determination (an "**Alternative AI Service Notice**"). If Adaptive delivers an Alternative AI Service Notice to Microsoft, the Parties' Relationship Managers will promptly meet to discuss the information and analysis it contains and, if the Parties agree that Microsoft cannot reasonably cause the Immunomics AI Services to provide at least equivalent business and technical performance to the alternative services identified by Adaptive for the particular use identified in the Alternative AI Service Notice (the "**Target Use**"), within one hundred twenty (120) days (or such other time period as the Parties may agree is commercially reasonable), Adaptive may thereafter use alternative services in place of the Immunomics AI Services for the Target Use (as used by applicable Adaptive Offerings) notwithstanding the terms of this Section 6.3.

6.4 Exclusive Use of Azure for Diagnostic Products. Adaptive agrees to host each Diagnostic Product exclusively on Azure throughout the Development Term and the five (5) year period immediately following the Development Term, subject to Adaptive's right to terminate the Commercial Agreement for breach or non-performance as set forth in the Commercial Agreement.

6.5 Microsoft and Adaptive Business Exclusivity Commitments. Microsoft and Adaptive each agree that during the Development Term, neither such Party nor any of such Party's Affiliates will enter into any collaboration agreement or other arrangement, with any Third Party under which such Party or any of such Party's Affiliates agrees to provide custom services in support of any project that is substantially similar to the Project. For clarity, this paragraph does not limit either Party's right to enter into, maintain and perform in accordance with Ordinary Course Relationships with any and all Third Parties, including Third Parties that may be undertaking projects in mapping TCR-antigen associations, provided that each Party will not disclose or provide any of the other Party's Confidential Information to any Third Parties except in accordance with the NDA and the terms of Section 7 of this Agreement and provided further that such Ordinary Course Relationships are consistent with each Party's rights set forth in Sections 4 and 5 hereof. As used herein, "**Ordinary Course Relationships**" with respect to Microsoft means Microsoft's provision of on-premises software, Azure, Office 365 and other cloud services, and associated updates, upgrades, technical support, general research and consulting services (including in the fields of artificial intelligence and machine learning not substantially similar to the Project). Adaptive acknowledges that Microsoft has estimated that as of the Effective Date, it provides Offerings under Ordinary Course Relationships to more than 150,000 life sciences and health care entities. As used herein, "**Ordinary Course Relationships**" with respect to Adaptive means Adaptive's ordinary course agreements, licenses, arrangements and relationships with pharmaceutical companies, therapeutics companies, diagnostics companies, clinical laboratory companies, academic and research institutions and governmental bodies, agencies and institutions that are, in each case, not substantially similar to the Project.

7. CONFIDENTIALITY; PUBLICITY AND RELATED ACTIVITIES

7.1 Application of NDA. Subject to the license rights expressly set forth in this Agreement, any disclosures, information or documents made or shared between the Parties under this Agreement will be governed by the NDA. The terms of the NDA are incorporated in this Agreement by reference and will apply to all Confidential Information (as defined in the NDA) exchanged between the Parties in connection with this Agreement. In addition, the terms of, and any discussions or negotiations in connection with, this Agreement are Confidential Information for purposes of the NDA. In the event of any conflict between any provision of this Agreement and any provision of the NDA, the provision of this Agreement will control. If the NDA is terminated during the Development Term, it will nonetheless continue in effect for the purposes of this Agreement for the remainder of the Development Term and the survival period set forth in Section 11.5 below.

7.2 Data Privacy & Security. No Protected Health Information (as such term is defined in the Health Insurance Portability and Accountability Act of 1996), other than the Protected Health Information necessary for a Party to carry out the Collaboration, will be provided by a Party to the other Party under this Agreement. If Adaptive intends to makes any Protected Health Information available to Microsoft for use in the Collaboration, Adaptive will first notify Microsoft of such intent and provide documentation

of: (i) the source of the data, (ii) any required consents, approvals and authorizations necessary for Microsoft to have access to or use such Protected Health Information in the Collaboration, and (iii) any security, privacy, use restrictions or other requirements that would apply to Microsoft's access to or use of such Protected Health Information. Microsoft may elect to accept or not to accept receiving access to the proposed Protected Health Information following its review of such documentation. For clarity, Adaptive is not required to follow the advance notice process described in this paragraph in order to provide to Microsoft, for use in the Collaboration, anonymous sequencing data (which data must not include any data that could enable the sequencing data to be linked to Protected Health Information of a donor). Microsoft covenants and agrees that it will not store, process or otherwise take any action with respect to data under the Collaboration that causes Adaptive to be subject to the data privacy or data security laws of any jurisdiction other than the United States of America, without Adaptive's prior written consent.

7.3 Approval Required for Publicity Activities. Neither Party will: (a) issue any press release or make any public statement of any kind about or related to this Agreement or the Collaboration without the express prior written consent of the other Party; or (b) use the other Party's name or Trademark for any purpose without the other Party's written consent. Subject to the foregoing, the Parties intend to collaborate on publicity upon entering into this Agreement, including by cooperating to issue a jointly-approved announcement of the overall strategic intent of this Agreement that includes CEO-level quotes from each Party, and a statement by Adaptive that Azure is the exclusive cloud service that Adaptive plans to use for its scientific and commercial activities.

8. REPRESENTATIONS AND WARRANTIES

8.1 General. Each Party represents, warrants and covenants to the other Party that:

(a) It has all necessary rights, power and authority to enter into and perform under this Agreement in accordance with its terms;

(b) It has not granted, and will not grant, any rights to any Third Party that would conflict with the terms of this Agreement;

(c) It has not entered into, and will not enter into, any agreement that would conflict with the terms of this Agreement;

(d) the individual signing this Agreement on its behalf has authority to bind it to this Agreement: and

(e) Except as otherwise disclosed by Adaptive to Microsoft in the Disclosure Schedule, as defined in that certain Series F-1 Preferred Stock Purchase Agreement, of even date herewith, by and between Adaptive, Microsoft and the other parties thereto, it has no knowledge (and has not been notified) of any allegation (or facts that would support an allegation) of any infringement or misappropriation of any Third Party Non-Patent IP or Patent Rights by any Project Material that it contemplates providing for use in the Collaboration (either in its standalone form or in the use contemplated under this Agreement).

8.2 Compliance with Laws. In addition to the representations, warranties and covenants set forth in Section 8.1,

(a) each Party represents, warrants and covenants to the other Party that it will comply with all Applicable Laws in connection with its performance under this Agreement;

(b) without limiting the foregoing, Adaptive represents, warrants and covenants that (i) if it makes any personal data available for use in the Collaboration, including any individually identifiable health information, Adaptive will have obtained all consents, approvals, authorizations, permits and waivers required by Applicable Laws to make such personal data available for such use, and (ii) Adaptive's provision and use of personal data under this Agreement will in all cases be in accordance with all Applicable Laws; and

(c) without limiting the foregoing, Microsoft covenants and agrees that if Adaptive makes any Protected Health Information available for use in the Collaboration in accordance with Section 8.2(b), Microsoft will use such Protected Health Information in all cases in accordance with all Applicable Laws.

8.3 Warranty Disclaimer. EXCEPT FOR THE EXPRESS WARRANTIES SET FORTH IN THIS SECTION 8, EACH PARTY DISCLAIMS ALL OTHER WARRANTIES, EXPRESS OR IMPLIED, INCLUDING THE IMPLIED WARRANTIES OF MERCHANTABILITY AND FITNESS FOR A PARTICULAR PURPOSE.

9. DEFENSE AND INDEMNIFICATION OF CLAIMS

9.1 Indemnification. Each Party (the "**Indemnifying Party**") will defend, indemnify and hold harmless the other Party, its Affiliates, and their respective successors, directors, officers, employees and agents (each as the "**Indemnified Party**") from and against all Claims to the extent that any such Claim is brought against the Indemnified Party and arises out of or relates to (a) any breach by the Indemnifying Party of any representation, warranty or covenant set forth in Section 8; or (b) the negligent or willful acts or omissions of the Indemnifying Party or its agents or contractors resulting in any bodily injury or death to any person or loss, disappearance or damage to tangible or intangible property.

9.2 Indemnification Procedures. Neither Party will have liability under Section 9.1 to the other Party to the comparative extent that Claims result from the negligent or willful acts of the other Party. As a condition of its rights under Section 9.1, the Indemnified Party will provide the Indemnifying Party with reasonably prompt notice of an indemnifiable Claim under this Section 9; permit the Indemnifying Party to solely control the defense and settlement of the Claim; and provide the Indemnifying Party with reasonable information and assistance to help the Indemnifying Party defend the Claim at the Indemnifying Party's expense. Any Indemnified Party will have the right to employ separate counsel and participate in the defense of any such Claim at its own expense.

9.3 Acknowledgment of Fault and Settling Claims. Neither Party will stipulate, admit or acknowledge any fault or liability on the part of the other without the other's prior written consent. Neither the Indemnifying Party nor the Indemnified Party (if it has tendered the Claim for indemnity) will settle any indemnifiable Claim under this Section 9 or publicize any settlement without the other Party's prior written consent.

10. LIMITATIONS OF LIABILITY

10.1 Exclusion of Certain Damages. SUBJECT TO SECTION 10.3, NEITHER PARTY WILL BE LIABLE FOR ANY INDIRECT, CONSEQUENTIAL, INCIDENTAL, PUNITIVE, OR SPECIAL DAMAGES WHATSOEVER (INCLUDING LOSS OF PROFITS) RELATING TO THIS AGREEMENT OR THE COLLABORATION, EVEN IF SUCH PARTY HAS BEEN ADVISED OF THE POSSIBILITY OF SUCH DAMAGES.

10.2 Damages Cap. EXCEPT FOR THE EXCLUSIONS IN SECTION 10.3, THE MAXIMUM, TOTAL, AGGREGATE LIABILITY OF EACH PARTY TO THE OTHER, AND TO ANY THIRD PARTY, FOR ANY AND ALL CLAIMS OR LIABILITIES ARISING UNDER THIS AGREEMENT IS $1,000,000 U.S. DOLLARS OR, IN THE EVENT OF A BREACH OF SECTION 8.2, $5,000,000 U.S. DOLLARS.

10.3 Exclusions. Sections 10.1 and 10.2 do not apply to:

(a) any infringement or misappropriation of a Party's Non-Patent IP or Patent Rights by the other Party;

(b) any breach by either Party of its obligations set forth in Section 7; or

(c) either Party's obligations under Section 9.

10.4 Failure of Essential Purpose. If any remedy under this Agreement is determined to have failed of its essential purpose, all limitations of liability and exclusions of damages will remain in effect to the maximum extent permitted by Applicable Laws.

11. TERM AND TERMINATION

11.1 Term. This Agreement will be effective on the Effective Date and will continue until the seven (7)-year anniversary of the Effective Date, unless otherwise terminated pursuant to the terms of this Agreement or extended by written mutual agreement of the Parties (such period, the "**Development Term**"). If, during the period beginning on the date twelve (12) months before the end of the Development Term and ending on the date six (6) months before the end of the Development Term, either Party notifies the other Party in writing of its desire to extend the Development Period, the Relationship Managers and Project Managers for each Party shall meet within thirty (30) days following delivery of such written notice and discuss in good faith potential extension of the Development Term.

11.2 Mutual Termination. The Parties may mutually agree in writing to terminate this Agreement at any time.

11.3 Termination for Material Breach. In the event that one Party (as the "**Non-Performing Party**") materially breaches or materially fails to perform its obligations under this Agreement, and fails to cure such material breach or fails to perform such obligations within thirty (30) days after receipt of written notice by the other Party, then the other Party may immediately terminate this Agreement upon written notice to the Non-Performing Party. For the avoidance of doubt, failure to achieve technical milestones described in the Development Plan will not be deemed a material breach or a material failure to perform obligations, provided that good faith efforts were exercised by the Party accused of such breach or failure. Microsoft may also terminate this Agreement upon thirty (30) days written notice to Adaptive if Microsoft terminates for cause the letter agreement being entered into by the Parties concurrent with this Agreement that contains Adaptive's minimum guaranteed amounts.

11.4 Wrap Up. In the event of any termination or expiration hereunder, the Parties mutually agree in good faith to (i) promptly cooperate in winding down all Collaboration activities and completing all assignment-related activities contemplated by Section 4.3, and (ii) destroy or return to each other all Confidential Information in one Party's possession or control that is owned solely by the other Party and not licensed to such one Party with rights that survive termination or expiration of this Agreement, and, if requested in writing by the other Party, provide a written certificate confirming compliance with this clause (ii) within sixty (60) days of termination or expiration.

11.5 Survival.

(a) If Adaptive terminates this Agreement under Sections 11.3, (i) the licenses set forth in Sections 5.2 and 5.3 will remain in effect in accordance with their terms, and (ii) Section 6.5 will remain in effect through the end of the original Development Term (disregarding the termination of such Development Term pursuant to Section 11.3), after which it will cease to apply.

(b) If Microsoft terminates this Agreement under Sections 11.3, (i) the exclusive license granted by Microsoft under Section 5.2(a)(i) and (ii) will automatically become non-exclusive (and, for clarity, this license will remain limited to the Field of Use) and the licenses set forth in Sections 5.2(a)(iii), 5.2(b), 5.2(c) and 5.3 will remain in effect in accordance with their terms; (ii) Adaptive will automatically be deemed to grant to Microsoft the license described in Section 5.4(b), and (iii) Sections 6.2, 6.3 and 6.4 will remain in effect through the end of the original Development Term (disregarding the termination of such Development Term pursuant to Section 11.3), after which they will cease to apply.

(c) Upon any other expiration or termination of the Development Term (i.e., where neither Party has terminated this Agreement under Sections 11.3), the licenses set forth in Sections 5.2 and 5.3 will remain in effect in accordance with their terms.

(d) Upon any expiration or termination of the Development Term, the following designated Sections of the Agreement will also survive, and all other Sections of the Agreement will terminate except as specified in Sections 11.5(a), (b) or (c) (as applicable): Sections 4, 7, 8, 9, 10, 11.4, 11.5, and 12, as well as **Exhibit A** to the extent applicable to the foregoing Sections.

12. MISCELLANEOUS

12.1 No Obligation/Independent Development. Except as expressly set forth in Sections 6.2 through 6.5, and with respect to exclusive licenses granted under Section 5 (subject to the terms of Sections 5.4 and 11.5), this Agreement is nonexclusive and does not limit either Party's independent development, marketing, commercialization or other use of any technologies, services or products, provided that any independent development is carried out without use of any Foreground Non-Patent IP or the other Party's Project Materials or Confidential Information. Additionally, subject to Sections 6.2 through 6.5, this Agreement does not restrict either Party from licensing to any Third Party its respective Background Patent Rights and Background Non-Patent IP without any approval or any compensation to the other Party. Nothing in this Agreement will be deemed to require either Party to engage in any efforts or activities to Commercialize products or services conceived or developed under the Collaboration.

12.2 Assignment. This Agreement may not be assigned or otherwise transferred by either Party, nor, except as expressly provided herein, may any right or obligation hereunder be assigned or transferred to a Third Party (excluding, for clarity, any assignment or deemed assignment by Adaptive in connection with a Corporate Event) without the prior written consent of the other Party, which consent will not be unreasonably withheld, delayed, or conditioned. Any assignment without such prior written consent will be null and void and of no legal effect. If such assignment is permitted, the assignee will be responsible for and perform all obligations and duties of the assignor pursuant to and in accordance with the terms and conditions of this Agreement.

12.3 Notices. All notices and requests in connection with this Agreement are deemed given as of the day they are received either by messenger, delivery service, or in the United States of America mails, postage prepaid, certified or registered, return receipt requested, and will be addressed to the receiving Party in accordance with the notice information set forth below the signature block of this Agreement. Each Party may change the persons to whom notices will be sent by giving prior notice to the other.

12.4 Compliance with Laws. Each Party will comply with all Applicable Laws, including privacy and U.S. Export Administration Regulations, as well as end-user, end-use, and destination restrictions issued by the U.S. and other governments.

12.5 Relationship of Parties. The Parties are independent contractors. Neither Party has any express or implied right or authority to assume or create any obligations on behalf of the other Party or to bind the other Party to any contract, agreement or undertaking with any Third Party. Nothing in this Agreement will be construed to create a partnership, joint venture, employment or agency relationship between the Parties.

12.6 Construction. This Agreement has been negotiated by the Parties and their respective counsel and will be interpreted fairly in accordance with its terms and without any strict construction in favor of or against either Party. If any provision of this Agreement is determined by a court of competent jurisdiction to be invalid, illegal, or unenforceable, the Parties will deem the provision to be modified to the extent necessary to allow it to be enforced to the extent permitted by law. If it cannot be so modified, the provision will be deleted from this Agreement, and the remainder of this Agreement will continue to be binding and enforceable according to its terms. Lists of examples following “including”, “e.g.”, “for example”, or the like are interpreted to include “without limitation,” unless qualified by words such as “only” or “solely.” This Agreement will be interpreted according to its plain meaning without presuming that it should favor either Party.

12.7 Third Party Beneficiaries. This Agreement is for the benefit of, and will be enforceable by, the Parties only. It is not intended to confer any right or benefit on any Third Party.

12.8 Governing Law; Jurisdiction and Venue. The laws of the State of Washington govern this Agreement. In the event of any dispute, if federal jurisdiction exists, the Parties consent to exclusive jurisdiction and venue in the federal courts of the Western Washington, and if not, the Parties consent to exclusive jurisdiction and venue in the courts located in King County, Washington. The provisions of the 1980 U.N. Convention on Contracts for the International Sale of Goods do not apply. Both Parties waive all defenses of lack of personal jurisdiction and *forum non conveniens*. Process may be served on either Party in the manner authorized by applicable law or court rule. If either Microsoft or Adaptive employs attorneys to enforce any rights arising out of or relating to this Agreement, the substantially prevailing Party will be entitled to recover its costs, including reasonable attorneys’ fees.

12.9 Taxes. Each Party will be responsible for the payment of its own tax liability arising from entry into or performance under this Agreement or any activities contemplated by it.

12.10 Compliance with Laws. Anything contained in this Agreement to the contrary notwithstanding, the obligations of the Parties hereto will be subject to all laws, present and future, of any government entity having jurisdiction over the Parties hereto, and to orders, regulations, directions or requests of any such government entity.

12.11 Use of Contractors. If a Party uses any Third Party contractors in performance under this Agreement, such Party will take all necessary steps to have such contractors comply with all terms and conditions of this Agreement, including without limitation confidentiality, and will be responsible for the breach of this Agreement by any such contractor. Each Party will require that its Third Party contractors assign to it all right, title and interest in any work product, materials, data and intellectual property rights created by such Third Party contractor in connection with activities under the Collaboration.

12.12 Modification; Waiver. This Agreement may be modified, amended, or altered, or any rights under this Agreement waived, only by a written instrument signed by a duly authorized representative of each Party. The waiver of any breach or default will not constitute a waiver of any other right under, or any subsequent breach or default of, this Agreement.

12.13 Entire Agreement. This Agreement (together with the NDA and each exhibit attached hereto, each of which is incorporated herein by this reference) constitutes the entire understanding and agreement between the Parties with respect to the subject matter hereof and merges and supersedes any and all prior or contemporaneous, electronic, oral, or written agreements, understandings, representations, negotiations, discussions, communications, or proposals, whether implied or express.

12.14 Counterparts; Electronic Signature Process. This Agreement may be executed in two or more counterparts, each of which will be deemed an original, but all of which together will constitute one and the same instrument. This Agreement may be executed by electronic means.

[Remainder of page left blank intentionally.]

SIGNATURE PAGE

IN WITNESS WHEREOF, the Parties have executed this Agreement by each of their duly authorized representatives and it will be effective as of the Effective Date.

ADAPTIVE BIOTECHNOLOGIES CORPORATION

Signature: /s/ Chad M. Robins
Print Name: Chad M. Robins
Print Title: CEO & Co-Founder
Adaptive Biotechnologies
Signature Date: 12/8/17

MICROSOFT CORPORATION

Signature: /s/ Peter K. Lee
Print Name: Peter K Lee
Print Title: CVP, Microsoft Research

Signature Date: December 11, 2017

Notice and Contact Information

Address: 1551 Eastlake Ave E
Seattle, WA 98102 U.S.A.
Business Contact:
Phone Number:
Fax Number:
E-Mail Address:
All legal notices must also be sent to the address above, attention General Counsel, Gene DeFelice.

Address: One Microsoft Way
Redmond, WA 98052 U.S.A.
Business Contact:
Phone Number:
Fax Number:
E-Mail Address:
All legal notices must also be sent to the address above, attention Deputy General Counsel, Artificial Intelligence & Research Group.

EXHIBIT A

Definitions

Initially capitalized terms used in this Agreement will have the meanings set forth in this **Exhibit A** or as otherwise specified in the Agreement, including its Exhibits.

"**Adaptive's Outputs**" means (a) the Input Data and (b) all Computational Models developed, authored, or otherwise created by the Parties' employees, agents, or contractors individually or jointly as part of the Collaboration.

"**Affiliate**" means any legal entity that Controls, is Controlled by, or is under common Control with a Party or other specified entity. An entity will be deemed an "Affiliate" of the applicable Party or specified entity only so long as such Control exists.

"**Algorithm**" means a computational specification and associated software for data processing and calculations that takes Input Data and generates and executes Computational Models.

"**Applicable Laws**" means all applicable international, federal, state and local laws, ordinances, regulations, orders and other legal requirements, now or hereafter in effect, of governmental authorities having jurisdiction.

"Azure Services" or "**Azure**" means one or more of the Microsoft services and features identified at http://azure.microsoft.com/en-us/, and any updates, new versions and successors to such services or features.

"**Claim**" means any lawsuit, action, proceeding, investigation by any governmental authority, demand, or other claim by any Third Party, together with any related cash liabilities, damages, costs, and expenses (including attorneys' fees).

"**Collaboration**" means all activities undertaken by the Parties, separately or jointly, pursuant to this Agreement.

"**Commercialize"** means to use, copy, reproduce, sell, offer to sell, import, display, distribute, license, translate, publicly display, publicly perform, create derivative works of, broadcast, transmit, rent, lease, lend and otherwise exploit Non-Patent IP within the scope specified in an applicable provision of this Agreement. Any license granting the right to Commercialize Non-Patent IP includes the right for the licensee to grant sublicenses to vendors or contractors solely for purposes of the authorized Commercialization.

"**Computational Model**" means a mathematical representation, generated by applying Algorithms to Input Data, of various mappings or predictions of interest related to TCR-antigen associations.

"Control" means, as to an entity or person, owning a majority of the outstanding equity interests of such entity or person or having the right (whether or not contingent) to control the appointment of a majority of the directors or officers of such entity or person or to otherwise manage or direct the operations of such entity or person.

"**Corporate Event**" shall have the meaning set forth in Adaptive's Amended and Restated Articles of Incorporation, as in effect on the date hereof.

"**Development Plan**" means the document attached as **Exhibit B** that describes the activities to be carried out as the Collaboration, or such updated or modified version of such document as may be mutually approved by the Parties in accordance with Section 2.1.

"**Field of Use**" means diagnostics, therapeutics, or immunological research.

"**Immunomics AI Services**" means software and cloud-hosted services that use the Algorithms and Computational Models to implement and execute applications. For clarity, Immunomics AI Services do not include Algorithms.

"**Input Data**" means TCR, antigen, and binding information, as well as any associated metadata or clinical data such as patient medical records, in each case as owned, developed or licensed by Adaptive or which Adaptive otherwise has the right to use.

"**Microsoft's Outputs**" means the Immunomics AI Services and all Algorithms developed, authored, or otherwise created by the Parties' employees, agents, or contractors individually or jointly as part of the Collaboration.

"NDA" means the Non-Disclosure Agreement entered into between the Parties dated July 21, 2017, as set forth in **Exhibit D.**

"Non-Patent IP" means all intellectual property rights worldwide, existing under statute or at common law or equity, in force or recognized now or in the future, with the exceptions of Patent Rights and Trademarks. Non-Patent IP includes, without limitation (except as set forth in the foregoing sentence): (a) copyrights, trade secrets, and mask works; (b) any application or right to apply for these rights; (c) all renewals, extensions, and restorations of these rights; and (d) any other intellectual property rights in data or research materials.

"**Background Non-Patent IP**" means all Non-Patent IP owned or controlled by a Party or its Affiliates that is (i) developed, authored, obtained or acquired before the Effective Date (together with any improvements, modifications or derivatives of the foregoing developed, authored, obtained or acquired after the Effective Date and arising from the Collaboration), or (ii) developed, authored, obtained or acquired independently from the Collaboration. For clarity, Computational Models will not be deemed to be derivatives of the Algorithms that generate them.

"**Foreground Non-Patent IP**" means all Non-Patent IP developed or authored by the Parties' employees, agents, or contractors individually or jointly as part of the Collaboration, but excluding any Background Non-Patent IP.

"**Offering**," as to either Party, means any technology, service, product or component of any of the foregoing, including internal, preview, pre-release and generally available versions; any specification or other proposal for any such technology, service, product or component; and any documentation for any such technology, service, product or component.

“Patent Rights” means all patent rights worldwide, existing under statute or at common law or equity, in force, or recognized now or in the future, including: (a) patents or applications, inventions, and designs; and (b) any applications, registrations or rights to apply for the foregoing rights, and all renewals, extensions, continuations, divisionals, re-issues, and restorations.

“Background Inventions” means Patent Rights owned or controlled by a Party or its Affiliates that are (i) developed, conceived, reduced to practice, obtained or acquired before the Effective Date (together with any improvements and modifications of the foregoing developed, conceived, reduced to practice, obtained or acquired after the Effective Date and arising from the Collaboration), or (ii) developed, conceived, reduced to practice, obtained or acquired independently from the Collaboration. For clarity, Computational Models will not be deemed to be improvements or modifications of the Algorithms that generate them.

“Adaptive Foreground Inventions” means Patent Rights developed, conceived or reduced to practice solely by Adaptive’s employees, agents, or contractors as part of the Collaboration, but excluding any Background Inventions.

“Joint Foreground Inventions” means Patent Rights developed, conceived or reduced to practice jointly by one or more of Adaptive’s employees, agents, or contractors and one or more of Microsoft’s employees, agents, or contractors as part of the Collaboration, but excluding any Background Inventions.

“Microsoft Foreground Inventions” means Patent Rights developed, conceived or reduced to practice solely by Microsoft’s employees, agents, or contractors as part of the Collaboration, but excluding any Background Inventions.

“**Project Materials**” means all pre-existing (i.e., not created or developed under the Development Plan) technologies, tools, materials and data that are provided by either Microsoft or Adaptive for use in the Collaboration, excluding any Background Non-Patent IP and any Background Inventions.

“**Sell**” means to make, have made, use, sell, offer to sell and import under the applicable Patent Rights within the scope specified in an applicable provision of this Agreement.

“**Third Party**” means a person or entity that is not an Affiliate of a Party.

“Trademark” means any word, phrase, name, trade name, trademark, logo, brand, trade dress, acronym, symbol, emblem or other identifier that identifies and distinguishes the source of goods or services associated therewith.

EXHIBIT B

Development Plan

Collaborative Development Plan for
The Microsoft/Adaptive Biotechnologies TCR-Antigen Map Project

Vision

We aim to translate the scale and precision of the adaptive immune system to diagnose and treat disease. More specifically, we seek to develop a universal disease diagnostic based on a single blood draw and T-cell Receptor (TCR) sequencing.

Problem

[***] Adaptive has technologies for sequencing TCRs at scale, and has initial demonstration that the TCR repertoire is predictive of infection with certain pathogens and cancers, as well as predictive of responses to certain antigens. However, the existing predictive models are limited in scope (order 10 antigens, and single infections) and their accuracy is not high enough for clinical use.

Solution

[***]

Operational Governance

Executive Sponsors. Peter Lee (MSFT), Chad Robins (Adaptive)

Project Managers. Desney Tan and Jonathan Carlson (MSFT), Sean Nolan and Harlan Robins (Adaptive)

Specific named individuals may change over time as appropriate to support success of the project.

Roles and Responsibilities. Adaptive will provide Immunology expertise and drive data acquisition; Microsoft will provide Machine Learning (ML) expertise and drive algorithmic and software development. Data acquisition may include acquisition of samples, TCR sequencing, and related bioinformatic and infrastructure software. Adaptive will grant Microsoft access to existing TCR, binding and clinical data, and the two teams will work together to develop a data acquisition strategy. Microsoft will provide ML algorithm development and cloud-based services that ingest TCR sequences and output diagnostic and/or antigen binding predictions. We expect that data acquisition will adapt to the needs of the ML models over time. As appropriate during the course of the project, Adaptive and Microsoft will collaboratively determine milestones, target diseases and use cases, and go-to-market strategies.

The Adaptive technical team will initially be made up of [***] including lab, computational biology and software resources. This project will represent a significant portion of Adaptive's portfolio; additional laboratory and other resources are envisioned to be committed.

The Microsoft technical team will comprise a combination of dedicated researchers and engineers spending the majority of their energy on the TCR-Antigen Mapping Project, as well as a larger set of internal collaborators adding specific expertise at appropriate points in the project. The team is expected to [***]. Additionally, Microsoft intends to mobilize non-technical Microsoft resources, including marketing and communications, business development, privacy and compliance, as well as field and sales teams.

The above is for planning purposes only and subject to ongoing assessment and adjustment as the project proceeds.

Communications and Cadence. Communication will be broadly encouraged at all levels of the project and teams. To facilitate, we anticipate frequent in-person meetings among the principals, and regular meetings that include the entire team. Teams will (separately or collaboratively) provide status reports at similar cadence.

At least bi-annually, the Executive Sponsors will, together with appropriate team members, meet to review progress and discuss outstanding issues or proposed changes in direction or priority. These checkpoints will provide a mechanism to ensure attention to long-term success, but are not intended to delay important decision-making or limit communication between team members in any way.

Project Roadmap and Schedule

[***]

Note that this project requires a significant amount of R&D, and strong emphasis will be placed on pivoting quickly and not being tied to a preconceived path. This roadmap is thus an example of how we expect this project may proceed.

Year 1

[***]

Year 2-3

[***]

Year 4-6

[***]

Year 10

[***]

Exhibit C

Escalation Procedures

The Parties will work together to resolve disputes that may arise under this Agreement in a collaborative fashion. If a dispute arises that the Parties are unable to resolve in their normal course of operations, then, except with respect to issues described in Section 7 of this **Exhibit C**, each Party agrees to use the escalation process described in Section 2 through Section 4 of this **Exhibit C** ("**Formal Escalation**") to resolve the dispute (an "**Escalated Dispute**") and each Party agrees to suspend pursuit of any other remedies to which it may be entitled with respect to the Escalated Dispute until completion of Formal Escalation.

1. **Relationship Managers**. As of the Effective Date, each Party has designated the following individual to serve as its Relationship Manager:

   Adaptive Relationship Manager: _____

   Microsoft Relationship Manager: _____

2. **Notice of Formal Escalation**. One Party 's Relationship Manager will provide written notice to the other Party's Relationship Manager that they wish to invoke Formal Escalation ("**Notice of Escalation**").

3. **First Negotiation Period**. During the fifteen (15) calendar days immediately following receipt of the Notice of Escalation, or such other time period on which the Parties agree in writing (such period, the "**First Negotiation Period**"), each Party will have its Relationship Manager engage in good faith negotiations (in person or by phone) with the other Party's Relationship Manager to resolve the Escalated Dispute.

4. **Escalation to Supporting Sponsors**. If the Escalated Dispute is not resolved by the end of the First Negotiation Period, then each Party will have a senior executive promptly engage in good faith negotiations with the other Party's senior executive (in person, unless otherwise agreed in writing by the Parties) during the fifteen (15) calendar days immediately following the end of the First Negotiation Period, or such other time period on which the Parties agree in writing, to resolve the Escalated Dispute (such period, the "**Second Negotiation Period**").

5. **Resolved Disputes**. If the Escalated Dispute is resolved at any stage during Formal Escalation then, as appropriate, the Relationship Managers will oversee implementation of the decision of the Parties resolving the dispute, provided, however, that any amendment, modification or alteration of or any waiver under this Agreement shall comply with the provisions set forth in Section 12.12 of this Agreement.

6. **Unresolved Disputes**. If the Escalated Dispute is not resolved by the end of the Second Negotiation Period, then each Party will be entitled to pursue any remedy to which such Party is entitled under this Agreement, at law or in equity.

7. **Exclusions from Formal Escalation.** Formal Escalation will not apply to or limit the right of a Party: (i) to seek a temporary restraining order or other provisional remedy to preserve the status quo or to prevent irreparable harm; or (ii) to exercise its termination rights under Section 11 of this Agreement.

Exhibit D

Non-Disclosure Agreement

Microsoft

Non-Disclosure Agreement

This Non-Disclosure Agreement ("agreement") is between the patties signing below. "We," "us" and "our" refer to both of the patties signing below and our respective affiliates.

COMPANY AND ITS AFFILIATES or INDIVIDUAL: Adaptive Biotechnologies Address: 1551 Eastlake Ave E Seattle, WA 98102 USA	**MICROSOFT CORPORATION AND ITS AFFILIATES** One Microsoft Way Redmond, WA 98052-6399 USA
Sign: /s/ Gene DeFelice	/s/ Lucy Bassli
Print Name: GENE DEFELICE Print Title: Senior Vice President, General Counsel Signature Date:7/21/17	Lucy Bassli (CELA) 21-Jul-17

For information about this agreement, contact the Microsoft Contact, Vikram Dendi.

1. The purpose of this agreement. This agreement allows us to disclose confidential information to each other, to our own affiliates and to the other's affiliates, under the following terms. An "affiliate" is any legal entity that one of us owns, that owns one of us or that is under common control with one of us. "Control" and "own" mean possessing a 50% or greater interest in an entity or the right to direct the management of the entity.

2. Confidential information.

a. **What is included.** "Confidential information" is non-public information, know-how and trade secrets in any form that:

- Are designated as "confidential"; or
- A reasonable person knows or reasonably should understand to be confidential.

b. **What is not included.** The following types of information, however marked, are not confidential information. Information that:

- Is, or becomes, publicly available without a breach of this agreement;
- Was lawfully known to the receiver of the information without an obligation to keep it confidential;
- Is received from another source who can disclose it lawfully and without an obligation to keep it confidential;
- Is independently developed; or
- Is a comment or suggestion one of us volunteers about the other's business, products or services.

3. Treatment of confidential information.

a. **In general**. Subject to the other terms of this agreement, each of us agrees:

- We will not disclose the other's confidential information to third parties; and
- We will use and disclose the other's confidential information only for purposes of our business relationship with each other.

b. **Security precautions.** Each of us agrees:

- To take reasonable steps to protect the other's confidential information. These steps must be at least as protective as those we take to protect our own confidential information;
- To notify the other promptly upon discovery of any unauthorized use or disclosure of confidential information; and
- To cooperate with the other to help regain control of the confidential information and prevent further unauthorized use or disclosure of it.

c. **Sharing confidential information with affiliates and representatives.**

- A "representative" is an employee, contractor. advisor or consultant of one of us or one of our respective affiliates.
- Each of us may disclose the other's confidential information to our representatives (who may then disclose that confidential information to other of our representatives) orly if those representatives have a need to know about it for purposes of our business relationship with each other. Before doing so, each of us must:
  - ensure that affiliates and representatives are required to protect the confidential information on terms consistent with this agreement; and
  - accept responsibility for each representative's use of confidential information.
- Neither of us is required to restrict work assignments of representatives who have had access to confidential information. Neither of us can control the incoming information the other will disclose to us in the course of working together, or what our representatives will remember, even without notes or other aids. We agree that use of information in representatives' unaided memories in the development or deployment of our respective products or services does not create liability under this agreement or trade secret law, and we agree to limit what we disclose to the other accordingly.

d. **Disclosing confidential information if required to by law**. Each of us may disclose the other's confidential information if required to comply with a court order or other government demand that has the force of law. Before doing so, each of us must seek the highest level of protection available and, when possible, give the other enough prior notice to provide a reasonable chance to seek a protective order.

4. Length of confidential information obligations.

a. **Termination.** This agreement continues in effect until one of us terminates it. Either of us may terminate this agreement for any reason by providing the other with 30 days' advance written notice. Termination of this agreement will not change any of the rights and duties made while this agreement is in effect.

b. **No other use or disclosure of confidential information**. Except as permitted above, neither of us will use or disclose the other's confidential information for five years after we receive it. The five-year time period does not apply if applicable law requires a longer period.

5. **General rights and obligations.**

a. **Law that applies; jurisdiction and venue.** The laws of the State of Washington govern this agreement. If federal jurisdiction exists, we each consent to exclusive jurisdiction and venue in the federal courts in King County, Washington. If not, we each consent to exclusive jurisdiction and venue in the Superior Court of King County, Washington.

b. **Compliance with law.** Each of us will comply with all export laws that apply to confidential information.

c. **Waiver.** Any delay or failure of either of us to exercise a right or remedy will not result in a waiver of that, or any other, right or remedy.

d. **Money damages insufficient**. Each of us acknowledges that money damages may not be sufficient compensation for a breach of this agreement. Each of us agrees that the other may seek court orders to stop confidential information from becoming public in breach of this agreement.

e. **Attorneys' fees.** In any dispute relating to this agreement the prevailing party will be entitled to recover reasonable attorneys' fees and costs.

f. **Transfers of this agreement.** If one of us transfers this agreement, we will not disclose the other's confidential information to the transferee without the other's consent.

g. **Enforceability.** If any provision of this agreement is unenforceable, the parties (or, if we cannot agree, a court) will revise it so that it can be enforced. Even if no revision is possible, the rest of this agreement will remain in place.

h. **Entire agreement.** This agreement does not grant any implied intellectual property licenses to confidential information, except as stated above. We may have contracts with each other covering other specific aspects of our relationship ("other contracts"). The other contract may include commitments about confidential information, either within it or by referencing another non-disclosure agreement. If so, those obligations remain in place for purposes of that other contract. With this exception, this is the entire agreement between us regarding confidential information. It replaces all other agreements and understandings regarding confidential information. We can only change this agreement with a signed document that states that it is changing this agreement.

Certain information has been excluded from this exhibit because it (i) is not material and (ii) would be competitively harmful if publicly disclosed.

MASTER COLLABORATION AGREEMENT

This Master Collaboration Agreement (this "**Agreement**") is made effective as of July 10, 2015 by and between ADAPTIVE BIOTECHNOLOGIES CORPORATION, a Washington corporation ("**Adaptive**"), and Adaptimmune Limited, a limited company formed under the laws of England and Wales ("**Collaborator**" and together with Adaptive, the "**Parties**").

BACKGROUND

Collaborator desires to access Adaptive's advanced immune profiling technology to facilitate its business of developing and commercializing pharmaceutical products. The Parties have therefore entered into this Agreement to set forth the terms and conditions of their research collaboration.

AGREEMENT

1. SCOPE OF COLLABORATION

(a) Projects. Adaptive hereby agrees to collaborate with Collaborator on such projects as may be mutually agreed to by the Parties in writing from time to time (each, a "**Project**"). This Agreement sets forth the general terms and conditions applicable to the work to be performed with respect to any and all Projects.

(b) Project Orders. With respect to each Project, Adaptive and Collaborator will prepare and execute a written project order (each a "**Project Order**") setting forth the specific tasks to be performed by each Party, the timeline for performing the tasks, the estimated fees and expenses associated with the tasks, the payment schedule applicable to the tasks, format of deliverables associated with the tasks, and any other matters deemed appropriate by Adaptive and Collaborator. Either Party may accept or reject a proposed Project Order for any reason in its sole discretion, and no Project Order will be effective until executed by both Parties. As appropriate, Project Orders will logically and/or sequentially order and/or group tasks and note decision points. Each mutually executed Project Order will be attached to this Agreement.

(c) Conflicts. In the case of a conflict between the terms of this Agreement and a Project Order, the terms and conditions of this Agreement will control unless Adaptive and Collaborator specifically acknowledge in the Project Order their intent to modify the terms and conditions of this Agreement.

2. OBLIGATIONS OF COLLABORATOR

(a) Provision of Collaborator Materials. Collaborator will supply all biological samples and any related information reasonably required to carry out the Projects conducted under this Agreement and which Collaborator has in its possession and control, including those described in the applicable Project Order (collectively, the "**Material**s") in such formats as Adaptive may reasonably request or as otherwise set forth in more detail in a Project Order. All Materials will be deemed Confidential Information of Collaborator within the meaning of Section 4.

(b) Handling of Materials; De-identification. Collaborator represents and warrants that (i) as at the time any Material is supplied to Adaptive by Collaborator, Collaborator has the right to send the Materials to Adaptive for all uses contemplated by this Agreement in relation to such Materials, (ii) the

Materials contain no information that could be used to identify the individuals from which such Materials were derived, and (iii) proper informed consent has been obtained for the transfer of the biological samples and other Materials to Adaptive for the purposes of performing research, including documented approvals of patients or institutional review board that may be required by applicable law or regulation. Collaborator will notify Adaptive if it becomes aware at any time that it ceases to have the right to supply any Material to Adaptive for the uses contemplated by this Agreement. Adaptive may upload, use, display and modify the Materials and Collaborator Developments into the immunoSEQ™ Analyzer database for storage and use solely for the purposes contemplated under the relevant Project Order.

(c) For Research Use Only; Not for Diagnostic Use. In no event will Collaborator use the Collaborator Developments or other data and results provided by Adaptive hereunder for diagnosing, evaluating or treating individual patients from which the samples were derived.

3. OBLIGATIONS OF ADAPTIVE

(a) Adaptive Obligations Generally. Adaptive will provide the facilities, personnel and other resources required for the Projects other than biological materials and related information to be supplied by Collaborator. Adaptive will not sub-contract performance of the Projects to any third party without Collaborator's prior written consent, other than Adaptive's wholly owned subsidiary, Sequenta LLC and provided Sequenta LLC is identified in any Project Order as carrying any part of the relevant Project. Adaptive will conduct each Project with reasonable skill and care, in a good scientific manner, in accordance with the applicable Project Order and in accordance with relevant industry standards and any laws and regulations generally applicable to research laboratories in Adaptive's line of business and jurisdiction and to the services being provided by Adaptive. With respect to each Project, Adaptive will communicate regularly with Collaborator and respond to reasonable requests for status updates. Project Orders will be performed in accordance with the policies set out in Exhibit A to this Agreement. Adaptive will ensure that in performing the Project it uses personnel which are suitably qualified and experienced to perform the activities delegated to them.

(b) Delivery of Results. Subject to timely receipt of the Materials and payment of amounts due hereunder, Adaptive will use its commercially reasonable efforts to complete each Project within the timeline established for such Project. Adaptive will keep Collaborator reasonably informed of the progress of the Project as against timelines. Adaptive will provide the results of each Project to Collaborator in its customary *.TSV format through the immunoSEQ Analyzer software platform (including the entire raw processed data set). Subject to Collaborator's timely payments of all amounts accrued hereunder, Adaptive will use its commercially reasonable efforts to retain all Project results for at least 24 months following the completion of each Project. Adaptive will notify Collaborator where reasonably possible prior to any destruction of any Project results prior the expiration of such period and provide Collaborator with an opportunity to store Project results itself or at a nominated third party.

(c) Handling of Biological Materials. Adaptive will test, handle and store all materials supplied by Collaborator in accordance with Adaptive's customary handling procedures and any special handling instructions set forth in a Project Order, and will return or destroy all unused biological materials supplied by Collaborator. Samples received by Adaptive will be handled in accordance with Adaptive SOPs. All arriving packages will be opened the same day they arrive and Inspected thoroughly for correct labeling and packaging integrity. Adaptive will contact Collaborator via phone or email promptly about any sample receipt issues, including identification, modification in shipping conditions, or condition of the sample which may delay sample processing. Should any sample be deemed unacceptable for processing. Adaptive

will communicate with Collaborator about the nature of the issue. More specific handling requirements may be set forth in the Project Order. Materials provided by the Collaborator (and any derivatives, modifications or progeny of such materials) shall only be used for the performance of the relevant Project Order and must not be provided to any third party. Materials provided by Collaborator (and any derivatives, modifications or progeny of such materials) and information associated with such materials will constitute Confidential Information of Collaborator.

(d) No Debarred Personnel. Adaptive represents that, to its knowledge, no person who will perform activities under this Agreement has been suspended, debarred or subject to temporary denial of approval, nor is under consideration to be suspended, debarred or subject to temporary denial of approval, by the U.S. Food and Drug Administration from working in or providing services, directly or indirectly, to any applicant for approval of a drug product or any pharmaceutical or biotechnology company under the Generic Drug Enforcement Act of 1992, as amended.

(e) Limited Warranty. Collaborator understands that the Projects are experimental and Adaptive cannot guarantee any outcome. Collaborator's sole warranty with respect to the services performed under this Agreement is that Adaptive will perform such services in accordance with generally prevailing industry standards and all laws, rules and regulations applicable to Adaptive.

4. CONFIDENTIALITY

(a) Definitions. For purposes of this Agreement, the term "**Confidential Information**" means any scientific, technical, trade or business information possessed by a Party which is treated by such Party as confidential or proprietary, including information pertaining to cells, antibodies, organisms, chemical compounds, products, formulations, technologies, techniques, methodologies, algorithms, computer programs, computer security systems and processes, assay systems, procedures, tests, data, documentation, reports, sources of supply, know-how, patent positioning, relationships with employees and consultants, business plans, business developments, research, development, process development, manufacturing, commercialization, and marketing, and any other confidential information about or belonging to a Party's affiliates, suppliers, licensors, licensees, partners, collaborators, customers or others, and is provided by one Party or its affiliated companies (the "**Discloser**") to the other Party (the "**Recipient**") under this Agreement. Without limiting the generality of the foregoing, the Collaborator Materials and the Collaborator Developments (as defined in Section 5) constitute Confidential Information of Collaborator, and the pricing offered to Collaborator and the other general terms of this Agreement constitute Confidential Information of Adaptive. For the purpose of clarity, the identity of any of Collaborator's programs or drug development candidates will be considered Collaborator's Confidential Information.

(b) Confidentiality Obligation. Each Party agrees that, except in connection with the performance of its obligations under this Agreement or the exercise of its rights or licenses under this Agreement, it will not otherwise use in any way for its own account or the account of any third party, nor disclose to any third party, any Confidential Information revealed to it by the other Party; provided, however, that Confidential Information may be disclosed pursuant to a regulation, law, court order or rule of any applicable securities exchange, but only to the minimum extent required to comply with such regulation, order, or rule and with advance written notice to the Discloser; and provided further that a Recipient may disclose Confidential Information to its subsidiaries, affiliates, professional advisors, consultants, agents to the extent such entities or individuals require access to the Confidential Information for the performance of obligations under this Agreement or the exercise of rights or licenses

under this Agreement provided that they are under confidentiality and use limitations consistent with those in this agreement and such Party will be liable for breaches of the restrictions set forth in this Section 4 by all such persons. Each Party will take commercially reasonable efforts to protect the confidentiality of the other Party's Confidential Information, such precaution not to be less than the precautions each Party takes to protect the confidentiality of its own Confidential Information of the same kind. Collaborator may also disclose Confidential Information of Adaptive to its third-party collaborators where such disclosure is necessary for the performance of the relevant collaboration that relates to the therapeutic agent that is the subject of the Project or the data and results provided by Adaptive hereunder, provided that they are under confidentiality and use limitations consistent with those in this agreement and Collaborator will be liable for breaches of the restrictions set forth in this Section 4 by all such persons. Each party will ensure that any Confidential Information of the other Party (including, with respect to Collaborator, the Collaborator Developments) will be stored securely and can be easily retrieved.

(c) Exclusions. For purposes of this Agreement, the term Confidential Information does not include any information which (i) was known to Recipient at the time it was disclosed, other than by previous disclosure by Discloser; (ii) becomes known by disclosure from a third party without an obligation of confidentiality; (iii) is or becomes publicly known without breach of this Agreement; or (iv) is independently developed by the Recipient without the use of the Discloser's Confidential Information. The obligations of confidentiality under this Section 4 will survive and continue after any expiration or termination of the Project Order under which such Confidential Information was disclosed or this Agreement.

5. DEVELOPMENTS

(a) Ownership of Pre-existing Materials. All information and materials furnished by a Party pursuant to this Agreement and all associated intellectual property rights will remain the exclusive property of the furnishing Party, including without limitation Collaborator's ownership of the Materials. All preexisting or separately developed technology and associated intellectual property rights used by Adaptive in conducting the Projects, including Adaptive's predictive algorithms, assays and associated methods (collectively the "**Adaptive Technology**"), will remain the exclusive property of Adaptive. No rights are granted by either Party to their pre-existing intellectual property except the limited licenses expressly set forth herein. Collaborator will not attempt to reverse engineer, characterize, or ascertain the chemical structure of Adaptive's assays or proprietary algorithms or other elements of the Adaptive Technology.

(b) Ownership of Project Deliverables. Other than the Adaptive Developments, all results arising from the performance of a Project (including all associated intellectual property rights in and to such results) will be solely owned by Collaborator (the "**Collaborator Developments**"). Adaptive hereby assigns and agrees to assign to Collaborator all of its right, title and interest in and to the Collaborator Developments. Adaptive will solely own the Adaptive Developments and all associated intellectual property rights. The term "**Adaptive Developments**" means inventions and discoveries arising from a Project that consist of modifications, refinements or improvements to the Adaptive Technology and all diagnostic applications, provided that in each case the practice of such inventions and discoveries does not require the use of any pre-existing Confidential Information or intellectual property rights of Collaborator.

(c) The test results, receptor sequences and other data and analysis will be delivered in the formats specified in the Project Order (or if blank, in a mutually agreed format readily readable by commercially available off-the-shelf software such as Microsoft Office). Adaptive confirms and represents that the test results, receptor sequences and other data and analysis delivered to Collaborator can be used within any need to access the Adaptive Technology or Adaptive Developments.

(d) Each party agrees that it shall have sufficient agreements in place with its employees or other individuals performing the Project to ensure that any intellectual property rights are owned in accordance with this Section 5 and in particular that all Collaborator Developments are owned by Collaborator. Adaptive will provide all reasonable assistance as may be required to ensure that title to Collaborator Developments vests in Collaborator including as relevant the obtaining of confirmatory assignment agreements from individuals if required in relation to any registration or prosecution of any intellectual property rights.

6. PAYMENTS

(a) Sequencing Price; Discounts. ImmunoSEQ™ sequencing pricing is based on the resolution required for the samples in the Project and will be specified in the relevant Project Order. As of the date of this Agreement, the list price per sample for each locus are as follows: $[***] per Survey sample, $[***] per Deep sample, and $[***] per Ultra Deep sample. [***]

(b) Technology Access Fee. A technology access fee equal to [***] may be invoiced upon completion of sequencing for each Project for basic bioinformatics and experimental design support, use of immunoSEQ Analyzer 2.0 for [***] months following sequencing of hereunder, and up to [***] hours of data analysis support. Where applicable such Technology Access Fee will be specified in the Project Order.

(c) Professional Services. The technology access fee described above includes basic bioinformatics and experimental design support. For Projects that require significantly deeper engagement by Adaptive personnel, Adaptive will separately invoice monthly for such professional services at rates and for times mutually agreed by the parties.

(d) Project Payment Schedule. The payment schedule for each Project shall be specified in the relevant Project Order, provided, however, that if no payment schedule is specified Projects with total charges under $[***] will be invoiced [***]% in advance, and for larger Projects Collaborator will pay to Adaptive the assay charges for each Project according to the payment schedule below:

First payment [***]	[***]%
Second payment [***]	[***]%
Third payment [***]	[***]%
Completion of the Project	[***]%

In this context Completion of the Project constitutes delivery of all deliverables including the final report in agreed format.

All other Project-related charges (including the technology access fee, any applicable taxes, shipping and handling and professional services fees) and in each case as specified in Project Order or otherwise agreed in writing by Collaborator will be invoiced as accrued. All payments are non-refundable.

(e) Invoicing; Payments. Adaptive will invoice Collaborator for each Project in accordance with the payment schedule set forth in the applicable Project Order. Invoiced payments are due within 30 days of receipt. Invoices should be sent to Collaborator at its address stated on the signature page hereto, Attn: Accounts Payable. For any amounts due under this Agreement that are not paid within [***] days of receipt of invoice, Adaptive may accrue interest at [***]% per month, not to exceed the maximum permitted by applicable law. Adaptive will provide written notification of non-payment to Collaborator prior to charging any interest or taking any action to recover any overdue amounts. All sums payable under this Agreement will be exclusive of value added tax or any equivalent sales tax applicable which shall be payable in addition by Collaborator.

7. TERM AND TERMINATION

(a) Term of Agreement. This Agreement will commence on the date first set forth above and will expire 48 months thereafter, *provided, however,* that if one or more Projects remain outstanding and active at the end of such period, the expiration date shall be automatically extended until the scheduled completion date of the last such Project. This Agreement may thereafter be renewed with the express mutual written consent of the Parties.

(b) Termination. Either Party may terminate or suspend its performance under this Agreement or a particular Project in the event of a breach of a material term of this Agreement by the other Party, which breach is not cured within [***] business days ([***] business days in the event of a payment default) after written notice by the non-breaching Party to the breaching Party.

(c) Effect of Termination. Termination of this Agreement will simultaneously terminate all Project Orders then outstanding as of the effective date of termination. In the event of termination, Collaborator will pay all fees and expenses accrued through the effective date of termination. Other than with respect to uncured material breaches by Adaptive, no refunds will be due upon termination. The provisions of Sections 3(e), 2(b), 4, 5, 6(e), 7(c), 8 and the last two sentences of Section 3(b) will survive termination or expiration of this Agreement for any reason.

8. MISCELLANEOUS

(a) Construction. When a reference is made in this Agreement to a Section, such reference is to a section of this Agreement unless otherwise indicated. The words “herein,” “hereunder” and “hereof” refer to this Agreement (taken as a whole and together with any relevant Project Orders) and not to any particular provision of this Agreement. The words “include,” “includes” and “including” will be deemed to be followed by the words “without limitation.” The headings contained in this Agreement are for reference purposes only and will not affect in any way the meaning or interpretation of this Agreement. The words “agrees to”, “will” and “shall” are used in a mandatory, not a permissive, sense. . All payments hereunder will be made in U.S. dollars. The Parties specifically disclaim the application of the UN Convention on Contracts for the International Sale of Goods. This Agreement has been written in the English language, and the Parties agree that the English version will govern.

(b) Independent Contractors. Adaptive and Collaborator are independent contractors and nothing in this Agreement will be construed to create a partnership, joint venture, license or employment relationship between the Parties.

(c) No Implied Warranties; Limited Remedy. Except as expressly stated elsewhere in this Agreement, NEITHER PARTY MAKES ANY GUARANTEE OR WARRANTY, EXPRESS OR IMPLIED, INCLUDING

WITHOUT LIMITATION WARRANTIES OF MERCHANTABILITY, NON-INFRINGEMENT OR FITNESS FOR A PARTICULAR PURPOSE. THE SOLE REMEDY OF COLLABORATOR FOR BREACH OF WARRANTY HEREUNDER WILL BE TO REQUIRE ADAPTIVE, AT ADAPTIVE'S ELECTION, TO EITHER RE-PERFORM THE PORTION OF THE PROJECT GIVING RISETO SUCH BREACH AT ADAPTIVE'S COST OR REFUND THE FEES PAID BY COLLABORATOR FOR THE PORTION OF THE PROJECT THAT GAVE RISETO SUCH BREACH.

(d) LIMITATION OF LIABILITY GENERALLY. NEITHER PARTY WILL BE LIABLE FOR ANY INDIRECT, SPECIAL, INCIDENTAL, PUNITIVE OR CONSEQUENTIAL DAMAGES {INCLUDING CLAIMS ARISING FROM LOST DATA AND INDIRECT AND DIRECT LOST PROFITS) (COLLECTIVELY, "**LOSSES**"), ARISING OUT OF OR IN CONNECTION WITH THIS AGREEMENT, HOWEVER CAUSED, AND UNDER WHATEVER CAUSE OF ACTION OR THEORY OF LIABILITY BROUGHT (INCLUDING, WITHOUT LIMITATION, UNDER ANY CONTRACT, NEGLIGENCE OR OTHER TORT THEORY OF LIABILITY) EVEN IF SUCH PARTY HAS BEEN ADVISED OF THE POSSIBILITY OF SUCH DAMAGES OR SUCH DAMAGES WERE OTHERWISE FORESEEABLE. TOTAL CUMULATIVE LIABILITY OF A PARTY IN CONNECTION WITH THIS AGREEMENT AND THE PROJECTS, WHETHER IN CONTRACT OR TORT OR OTHERWISE, WILL NOT EXCEED AN AMOUNT EQUIVALENT TO THE AMOUNT OF FEES PAID TO ADAPTIVE BY COLLABORATOR UNDER THIS AGREEMENT OVER THE 12-MONTH PERIOD PRECEDING THE EVENT GIVING RISE TO SUCH CLAIM. THE LIMITATION OF LIABILITY UNDER THIS PARAGRAPH INCLUDING THE EXCLUSION OF LOSSES DOES NOT APPLY TO THE PAYMENT OF FEES AND EXPENSES OWING UNDER THIS AGREEMENT, LOSSES ARISING FROM THE GROSS NEGLIGENCE OR WILLFUL MISCONDUCT OF A PARTY, OR CLAIMS ARISING UNDER SECTION 2, SECTION 4 AND SECTION 5, OR LOSSES ARISING FROM ANY FRAUD OR FRAUDULENT MISREPRESENTATION.

(e) Notices. All notices under this Agreement must be in writing and at the applicable address set forth on the signature page to this Agreement or at such other address as a Party may specify in writing. Notices are effective as follows: (i) 3 business days following delivery in the mail using recorded delivery, (ii) upon delivery if sent via a nationally recognized commercial courier, (iii) upon delivery if hand-delivered, or (iv) sent by email or facsimile, upon non-automated confirmation of receipt.

(f) Publicity. Any publicity using the other Party's name and logo including on a website, in marketing materials or in any press release must be prior approved by the other Party.

(g) Publications. Without limiting the generality of Section 4 ("**Confidentiality**"), each Party agrees to use reasonable efforts to provide the other Party with advance copies of any publications containing experimental results that directly or Indirectly result from a Project. Such prior provision shall not apply where there are any third party confidentiality restrictions or such release would breach any applicable laws or regulations affecting the publishing party. In any such publication, the publishing Party will acknowledge the other Party's contribution (including authorship if appropriate under the circumstances and customary industry practice).

(h) No Assignment. The rights and obligations under this Agreement may not be assigned or transferred by either Party without the prior written consent of the other Party, except that either Party may assign this Agreement without such consent to an affiliated company or in connection with the merger, consolidation, sale or transfer of all or substantially all of a Party's business to which this Agreement relates.

(i) Entire Agreement. This Agreement, taken together with each mutually executed Project Order, constitutes the entire agreement of the Parties with regard to its subject matter and supersedes all previous oral or written representations, agreements and understandings between Adaptive and Collaborator. Use of the immunoSEQ Analyzer is subject to separate license terms users must accept as part of the account creation or log-in process. Nothing in this clause shall exclude any liability for fraud or fraudulent misrepresentation.

(j) Amendments; No Implied Waivers. This Agreement may only be modified in writing, executed by duly constituted officers of both Parties. Any terms and conditions on a purchase order or a bill of lading that conflict with or are in addition to any of the terms of this Agreement will be null and void and without legal effect unless expressly agreed upon by the Parties in a written document specifically referencing this Section 8(j). Either Party's waiver of any term or condition of this Agreement at any time will not be construed to waive such term or condition at subsequent times or any other term or condition, nor as a waiver of its rights to enforce such term or condition.

(k) Severability. In the event that any one or more provisions of this Agreement are, for any reason, held to be invalid, illegal or unenforceable in any respect, such invalidity, illegality or unenforceability will not affect any other provision of this Agreement, and all other provisions will remain in full force and effect. If any of the provisions are held to be excessively broad, any such provision will be reformed and construed by limiting and reducing it so as to be enforceable to the maximum extent permitted by law.

(l) Governing Law. This Agreement will in all events and for all purposes be governed by and construed in accordance with the law of New York, without regard to any choice of law principle that would dictate the application of the law of another jurisdiction. The Parties consent to the exclusive jurisdiction of the state and federal courts located in New York County, New York for all claims or disputes arising in connection with this Agreement. In any suit or action brought to enforce this Agreement, or to obtain an adjudication, declaratory or otherwise, of rights hereunder, the losing Party will pay to the prevailing Party reasonable attorneys' fees and all other costs and expenses that may be incurred by the prevailing Party in such suit or action.

(m) Counterparts. This Agreement may be executed in counterparts and delivered via facsimile, emailed PDF or other electronic means, each of which will be deemed to be an original, and both of which taken together, will constitute one agreement binding on both Parties.

[Signature Page Follows]

IN WITNESS WHEREOF, the Parties have caused this Agreement to be signed and executed by their duly authorized officers as of the date first written above.

ADAPTIVE

By: /s/ Chad M. Robins

Print Name: Chad M. Robins

Title: CEO, President & Founder

Address: 1551 Eastlake Ave. E., Ste. 200

Seattle, Washington 98102

Facsimile: (206) 659-0667

Email: support@adaptiveblotechnoloeles.com

COLLABORATOR

By: /s/ H.K. Tayton-Martin

Print Name: H.K. Tayton-Martin

Title: Chief Operating Officer

Address: 91 Park Drive Milton Park

Abingdon, England, UK

Facsimile: N/A

Email: N/A

TEMPLATE FOR PROJECT ORDER NO. 1

PURSUANT TO MASTER COLLABORATION AGREEMENT

This Project Order No. 1 (this "**Project Order**") is made effective as of _____, 201__ by and between ADAPTIVE BIOTECHNOLOGIES CORPORATION, a Washington corporation ("**Adaptive**"), and Adaptimmune Limited,, a limited formed under the laws of England and Wales ("**Collaborator**") pursuant to the Master Collaboration Agreement between the Parties dated July 10, 2015 (the "**Agreement**"). The activities described in this Project Order will be governed by the terms and conditions of the Agreement. Capitalized terms used herein and not otherwise defined will have the meanings given such terms in the Agreement.

1. PROJECT DESCRIPTION

(a) Project Overview and Objectives.

Exploratory analyses of [INSERT T OR B] cell diversity by [INSERT SEQUENCING DEPTH] sequencing of [INSERT LOCUS TO BE SEQUENCED] will be performed on [INSERT MATERIAL TYPE] samples. [INSERT MATERIAL TYPE] obtained from Protocol INSERT PROTOCOL NUMBER will be assessed. The sequencing data generated by Adaptive will be used by Collaborator to monitor [INSERT WHAT WE WILL MONITOR].

Objectives of the correlative study may include:

- Determine if a minimum threshold of baseline T cell or B cell diversity correlates with clinical activity
- Characterize the apparent presence/absence and relative quantity of T cell clones during treatment
- Monitor individual sequence frequencies for each patient over the course of therapy and correlate data to outcomes

(b) Samples.

Collaborator will provide to Adaptive [INSERT MATERIAL AND NUMBER OF SAMPLES] samples for use in performing the activities described in this Project Order, together with any related information on a sample manifest as may be reasonably requested by Adaptive to carry out the Project.

Total of ____ patients: ____ Patients each with _____ time points as follows:

(c) Workflow.

(i) [INSERT MATERIAL TYPE] samples will be shipped to Adaptive in provided shipping materials.

(ii) Samples received by Adaptive will be handled in accordance with Adaptive SOPs. All arriving packages will be opened the same day they arrive and inspected thoroughly for correct labeling and packaging integrity. Adaptive will contact Collaborator via phone or email promptly about any sample receipt issues, such as but not limited to identification, modification in shipping conditions, or condition of the sample which may delay sample processing. Should any sample be deemed unacceptable for processing, Adaptive will communicate with Collaborator about the nature of the issue.

(iii) Adaptive will perform "[INSERT SEQUENCING RESOLUTION)" sequencing on each of the [INSERT SAMPLE SOURCE] samples provided by Collaborator. As part of these analyses, Adaptive uses a proprietary assay for the amplification and massively parallel sequencing of millions of CDR3 regions in the (INSERT LOCUS TO BE SEQUENCED] using a multiplex PCR amplification across the VDJ junction of rearranged [INSERT LOCUS TO BE SEQUENCED].

(d) Adaptive Deliverables. Within 6-8 weeks of Adaptive's receipt of the samples, all raw processed sequence data from the assay of the Materials will made available to Collaborator in *.TSV format through the immunoSEQ Analyzer software platform for download and/or analysis. Subject to timely payment of the technology access fee, Adaptive will also provide basic level support for Collaborator's analysis of the samples provided (must be utilized within 30 days of notification of Project data availability; up to 5 hours of Adaptive personnel time) as set forth below. Adaptive may offer additional professional and analytical services for an additional fee.

Sequencing analysis may include:

- Identification and quantification of all clones in a given sample, including number of unique clones and frequency of each clone.
- Identification and comparison of common clones in all samples (between patients, and between pre-treatment and post-treatment samples for the same patient).
- Computation of V, D, and J usage in each sample.
- Comparisons of expansion of clones.
- Computation of the diversity and clonality of all samples.

(e) Results Sharing. Should Collaborator choose to share de-identified clinical data, Adaptive's bioinformatics team will also prepare analyses correlating clinical outcomes with sequencing data.

(f) Project Schedule. The parties anticipate that the activities contemplated by this Project Order will be completed over months, with the first samples expected to be shipped to Adaptive in_____ , 201__, and all sequencing completed and results delivered by ____, 201__.

2. PAYMENTS; INVOICING

(a) Invoicing. Adaptive will invoice Collaborator at the address set forth in the Agreement unless an alternate invoicing address is set forth below. All invoices will reference the applicable Collaborator purchase order number, if any.

Optional: alternate address for invoicing:

(b) Pricing. Services under this Project Order will be billed in accordance with the pricing set forth in the Agreement. The Parties agree that such compensation reflects the fair market value of the services rendered hereunder. Except for the payments by Collaborator as set forth below, each Party will be responsible for all costs and expenses it incurs related to the performance of this Project.

(c) Estimated Charges. The following table sets forth the estimated charges for the Project:

[INSERT TABLE]

(d) Estimated Payment Schedule: The following table sets forth the estimated payment schedule for the Project:

[***] [or] [***]

3. LONG-TERM ARCHIVING

☐ If this box is checked, the Materials and Collaborator Developments relating to this Project may be released to the public immunoSEQ data set along with the sequencing results (without attribution to Collaborator) upon the expiration of the confidentiality period described in Section 4

Certain information, as identified by [***], has been excluded from this agreement because it (i) is not material and (ii) would be competitively harmful if publicly disclosed.

Exhibit A - R&D POLICY PRINCIPLES

A. Ethical Conduct Requirements Ethical Conduct

Ethical Conduct

The Parties are committed to the highest standards of conduct in all aspects of their respective businesses and to conduct their business with honesty and integrity, and in compliance with all applicable legal and regulatory requirements.

- Always act with integrity and honesty and protect the Parties' public image and reputation in relationships with customers, competitors, suppliers, business partners and staff
- Promptly raise any concerns about possible unethical or illegal conduct
- Be free from actual or potential conflicts of interest that might influence, or appear to influence their judgment or actions when performing duties on behalf of the Parties
- The Parties' reputation and the respect of those who deal with the Parties must not be put at risk by acceptance of any entertainment, gifts or favours intended or perceived by others to influence their business judgment
- Communications with external audiences, i.e., investors and the media, should be managed through appointed company spokespersons to minimize risk to the Parties' reputation
- Provide accurate and reliable information in records submitted, safeguard the Company's confidential information, and respect the confidential information of other parties with whom the Company does business or competes
- Comply with all applicable anti-bribery practices legal requirements including U.S. Foreign Corrupt Practices Act ("FCPA") and the United Kingdom Bribery Act 2010. In particular no employee of either party shall give or authorize directly or indirectly any illegal payments to government officials of any country.
- Each employee of a Party should endeavour to deal fairly with the Company's customers, suppliers, competitors and employees. No-one should take unfair advantage of anyone through manipulation, concealment, abuse of privileged information, misrepresentation of material facts, or any other unfair-dealing practice.

B. Requirements for Engaging External Experts

Use of External Experts within R&D

The Parties believe that the engagement of external experts in R&D should be done In accordance with the following principles:

- There must be a legitimate need for the services of the expert that cannot be fulfilled in-house, and the minimum number of experts needed should be used
- Selection of experts should be based solely on the expert's qualifications and expertise in the subject matter for which such expert is retained
- The expert's services must be documented in a written signed agreement
- Compensation must be based on fair market value for the services provided
- Reimbursement or pre-payment for costs associated with travel, lodging, meals and hospitality (i.e. refreshments, background music at meetings) for an expert are acceptable if permitted by all law for the location in which the services are rendered and are modest in value
- Experts shall not receive any gifts of any value, especially where the expert is also a healthcare professional

- Gift includes anything of value, regardless of amount, given to show friendship, appreciation, or support, including meals, entertainment or recreational activities (excludes fair market value for services rendered).
- Healthcare Professionals includes, but is not limited to, physicians, their allied health professionals, and medical office staff. This term also applies to pharmacists and employees of pharmacy benefit managers.

1551 Eastlake Ave E, Ste 200
Seattle, WA 98102

206.659.0067
adaptivebiotech.com

[Date]

[Non-Employee Director Name]
[Non-Employee Director Address]
[Non-Employee Director Address]

Re: Restated Non-Employee Director Change in Control Agreement

Dear [Non-Employee Director Name]:

On behalf of Adaptive Biotechnologies Corporation (the "***Company***"), I am pleased to offer you the following protections in case of a Change in Control (as defined in the Company's 2009 Equity Incentive Plan, as amended, the "***Plan***"). In the event of a Change in Control, and provided you are then providing Service (as defined in the Plan), all stock options or other equity granted to you under the Plan, the Company's 2019 Equity Incentive Plan and/or other equity incentive plans or programs established by the Company, which are unvested as of the date of such Change in Control shall become immediately vested in full immediately prior to the consummation of the Change in Control.

If any payment or benefit pursuant to this letter agreement or otherwise that you would receive in connection with a Change in Control (a "***Transaction Payment***") would (i) constitute a "parachute payment" within the meaning of Section 280G of the Internal Revenue Code of 1986, as amended (the "***Code***"), and (ii) but for this sentence, be subject to the excise tax imposed by Section 4999 of the Code (the "***Excise Tax***"), then the Company shall cause the following: (1) payment in full of the entire amount of the Transaction Payments (a "***Full Payment***"), or (2) payment of only a part of the Transaction Payments so that you receive the largest payment possible without the imposition of the Excise Tax (a "***Reduced Payment***"), whichever amount results in your receipt, on an after-tax basis, of the greater amount of the Transaction Payment notwithstanding that all or some portion of the Transaction Payment may be subject to the Excise Tax. For purposes of determining whether to make a Full Payment or a Reduced Payment, the Company shall cause to be taken into account all applicable federal, state and local income and employment taxes and the Excise Tax (all computed at the highest applicable marginal rate, net of the maximum reduction in federal income taxes which could be obtained from a deduction of such state and local taxes). If a Reduced Payment is made, (x) the Transaction Payment shall be paid only to the extent permitted under the Reduced Payment alternative, and you shall have no rights to any additional payments and/or benefits constituting the Transaction Payment, and (y) reduction in payments and/or benefits shall occur in the following order: (1) reduction of cash payments (if any); (2) cancellation of accelerated vesting of equity awards other than stock options; (3) cancellation of accelerated vesting of stock options; and (4) reduction of other benefits (if any) paid to you; provided that in each case, the reduction of payments and benefits shall be implemented in a manner that does not violate Section 409A of the Code. In the event that acceleration from your equity awards is to be reduced, such acceleration of vesting shall be canceled in the reverse order of the date of grant. The Company shall appoint a nationally recognized independent registered public accounting firm or law firm to make the determinations required hereunder. The Company shall bear all expenses with respect to the determinations required to be made hereunder. The firm engaged to make the determinations hereunder shall provide its calculations, together with detailed supporting documentation, to the Company and you within fifteen (15) calendar days after the date on which your right to a Transaction Payment is triggered (if requested at that time by the Company or you) or such other time as reasonably requested by the Company or you. If firm determines that no Excise Tax is payable with respect to the Transaction Payments, either before or after the application of the Reduced Amount, it shall furnish the Company with an opinion reasonably acceptable to the Company that no Excise Tax will be imposed with respect to such Transaction Payments. Any good faith determinations of the firm made hereunder shall be final, binding and conclusive upon you.

In consideration for the foregoing protections, by counter-signing below you agree that for a period ending two (2) years after the date of your termination of service on the Company's board of directors, you will not without the written consent of the Company, directly or indirectly through another entity, induce or attempt to induce any employee of the Company and its subsidiaries to leave the employ of the Company or a Company subsidiary, or in any way interfere with the relationship between the Company or a Company subsidiary and any employee thereof and will not induce or attempt to induce any customer, supplier, client, broker, licensee or other business relation of the Company or its subsidiaries to cease doing business, or to alter in any manner its business relationship, with the Company or its subsidiaries. By signing this agreement, both parties signify their intent for the non-solicitation covenant to be enforceable to the maximum extent allowable by law.

This letter agreement supersedes, and amends and restates in its entirety, that certain Non-Employee Director change of control agreement by and between you and the Company dated as of [ ].

Sincerely,

ADAPTIVE BIOTECHNOLOGIES CORPORATION

_____

Chad Robins
Chief Executive Officer

I agree to and accept the terms and conditions set forth in this letter agreement.

_____

[Non-Employee Director Name]

Date: _____

1551 Eastlake Ave E, Ste 200
Seattle, WA 98102

206.659.0067
adaptivebiotech.com

_____ __, 2019

[Employee Name]
[Employee Address]
[Employee Address]

Re: Employment Agreement

Dear [Employee Name]:

This letter agreement (this "***Agreement***") confirms the terms of your employment with Adaptive Biotechnologies Corporation, a Washington corporation (the "***Company***").

1. Title and Cash Compensation

Your title is, and shall remain, [ ]. In such capacity, you will continue to report to [ ]. You shall devote your best efforts and full business time, skill and attention to the performance of your duties. You will also be expected to adhere to the general policies of the Company that may be in effect from time to time. As a condition of your employment, you will continue to be subject to the terms of the employee nondisclosure and assignment agreement executed by you on [ ] (the "***Nondisclosure and Assignment Agreement***").

As of the date hereof, your monthly base salary is $[ ] per month (or $[ ] on an annualized basis), payable in accordance with the Company's standard payroll schedule, less deductions and withholdings.

2. Bonus Compensation

As an employee, you may be eligible for certain cash incentive or bonus compensation in such amounts and based on such metrics as may be determined periodically by the Company's Board of Directors and/or Compensation Committee thereof.

3. Equity Awards

In connection with your service to the Company, you have been granted certain equity incentive awards as set forth on Exhibit A hereto (together with the notices of grant and stock option agreement related thereto, the "***Existing Awards***") under the Company's 2009 Equity Incentive Plan, as amended ("***2009 Plan***"), which shall continue to be governed in all respects by the terms of the 2009 Plan and your equity agreements thereunder. The Company may grant additional equity awards to you in the future from time to time under the Company's 2019 Equity Incentive Plan and/or other equity incentive plans or programs established by the Company (any such awards, "***Future Awards***", and together with the Existing Awards, the "***Awards***"), which will be subject to the terms of the applicable equity compensation plan or arrangement in effect at the time of grant. The Company's Board of Directors and/or Compensation Committee thereof will determine in its discretion whether you will be granted any such Future Awards and the terms and conditions of any such awards in accordance with the terms of any applicable equity plan. In addition to other applicable award documentation, the terms of the Existing Awards and Future Awards are and shall be subject to the terms and provisions of the change in control agreement attached hereto as Exhibit B (the "***CIC Agreement***").

You should be aware that you may incur federal and state income taxes as a result of your receipt or the vesting of any equity compensation awards and it is your responsibility to pay any such applicable taxes.

4. Other Benefits

As an employee, you will continue to be eligible for our standard employee benefits, subject to the terms and conditions of such plans and programs, except to the extent that this letter agreement provides you with more valuable benefits than the Company's standard policies.

5. Arbitration

In the event of any dispute or claim solely related to or arising out of the termination of your employment with the Company for any reason (including, but not limited to, any claims for breach of contract, wrongful termination, or age, sex, race, national origin, disability or other discrimination or harassment), you agree that all such disputes will be fully, finally and exclusively resolved by binding arbitration conducted by Judicial Dispute Resolution, LLC (or a similar entity if acceptable to the Company) in King County, Washington, pursuant to the Federal Arbitration Act. You and the Company hereby waive your respective rights to have any such disputes or claims tried by a judge or jury. This section will not apply to any claims for injunctive relief by the Company or you, any claims by the Company or you arising out of or related to proprietary and intellectual property rights, claims pursuant to the National Labor Relations Act, claims pursuant to the Washington State Law Against Discrimination, claims under federal discrimination laws, workers compensation claim(s), unemployment compensation benefits claim(s), or any other claims that, as a matter of law, the parties cannot agree to arbitrate.

6. Additional Terms

Your employment with the Company is for no specified period and constitutes "at will" employment. As a result, you are free to resign at any time, for any reason or for no reason. Similarly, the Company is free to conclude its employment relationship with you at any time, with or without cause or advance notice. You should note that the Company may modify job titles, compensation and benefits from time to time as it deems necessary or appropriate.

This Agreement, the Nondisclosure and Assignment Agreement, the Existing Awards and the CIC Agreement constitute the entire agreement between you and the Company regarding the terms and conditions of your employment and are the complete and exclusive statement of all of the terms and conditions of your employment with the Company, and supersede and replace any and all prior agreements or representations with regard to the subject matter hereof, whether written or oral, including that certain letter agreement by and between you and the Company dated on or about [ ], and that certain change of control agreement between you and the Company dated on or about [ ].

This Agreement is entered into without reliance on any promise or representation other than those expressly contained herein, and (except for changes reserved to the Company's discretion herein) cannot be modified or amended except in a writing signed by you and a duly authorized Company representative. Whenever possible, each provision of this Agreement will be interpreted in such manner as to be effective and valid under applicable law, but if any provision of this Agreement is held to be invalid, illegal or unenforceable in any respect under any applicable law or rule in any jurisdiction, such invalidity, illegality or unenforceability will not affect any other provision or any other jurisdiction, but this Agreement will be reformed, construed and enforced as if such invalid, illegal or unenforceable provisions had never been contained herein. This Agreement and the terms of your employment with the Company shall be governed in all aspects by the laws of the State of Washington.

[*Signature page follows.*]

Please sign and date this Agreement on the spaces provided below to acknowledge your acceptance of the terms of this Agreement.

Sincerely,

Chad Robins
Chief Executive Officer

I agree to and accept the terms and conditions set forth in this Agreement.

[Employee Name]

Date: _____

Exhibit A

Existing Awards

Option Type	Date of Grant	Number of Shares	Exercise Price	Vesting Commencement Date	Expiration Date	Vesting Schedule

Exhibit B
Change in Control Agreement

If (a) your Service (as defined in the 2009 Plan) to the Company is terminated by the Company other than for death, disability or Cause (as defined in the 2009 Plan) within the three-month period prior to or the twelve-month period following a Change in Control (as defined in Section 2(g) of the 2009 Plan), or (b) the Acquiror (as defined in the 2009 Plan) in such Change in Control does not either (i) assume the Company's rights and obligations with respect to an Award or (ii) substitute such for such Award a substantially equivalent (A) award to purchase the Acquiror's (or its subsidiary's) stock or (B) cash award, then 100% of any unvested shares underlying your Existing Awards and any Future Awards shall immediately vest and, as applicable, become exercisable upon the later to occur of such termination and such Change in Control.

If any payment or benefit pursuant to this Agreement or otherwise that you would receive in connection with a Change in Control (a "***Transaction Payment***") would (i) constitute a "parachute payment" within the meaning of Section 280G of the Internal Revenue Code of 1986, as amended (the "***Code***"), and (ii) but for this sentence, be subject to the excise tax imposed by Section 4999 of the Code (the "***Excise Tax***"), then the Company shall cause the following: (1) payment in full of the entire amount of the Transaction Payments (a "***Full Payment***"), or (2) payment of only a part of the Transaction Payments so that you receive the largest payment possible without the imposition of the Excise Tax (a "***Reduced Payment***"), whichever amount results in your receipt, on an after-tax basis, of the greater amount of the Transaction Payment notwithstanding that all or some portion of the Transaction Payment may be subject to the Excise Tax. For purposes of determining whether to make a Full Payment or a Reduced Payment, the Company shall cause to be taken into account all applicable federal, state and local income and employment taxes and the Excise Tax (all computed at the highest applicable marginal rate, net of the maximum reduction in federal income taxes which could be obtained from a deduction of such state and local taxes). If a Reduced Payment is made, (x) the Transaction Payment shall be paid only to the extent permitted under the Reduced Payment alternative, and you shall have no rights to any additional payments and/or benefits constituting the Transaction Payment, and (y) reduction in payments and/or benefits shall occur in the following order: (1) reduction of cash payments (if any); (2) cancellation of accelerated vesting of equity awards other than stock options; (3) cancellation of accelerated vesting of stock options; and (4) reduction of other benefits (if any) paid to you; provided that in each case, the reduction of payments and benefits shall be implemented in a manner that does not violate Section 409A of the Code. In the event that acceleration from your equity awards is to be reduced, such acceleration of vesting shall be canceled in the reverse order of the date of grant. The Company shall appoint a nationally recognized independent registered public accounting firm or law firm to make the determinations required hereunder. The Company shall bear all expenses with respect to the determinations required to be made hereunder. The firm engaged to make the determinations hereunder shall provide its calculations, together with detailed supporting documentation, to the Company and you within fifteen (15) calendar days after the date on which your right to a Transaction Payment is triggered (if requested at that time by the Company or you) or such other time as reasonably requested by the Company or you. If firm determines that no Excise Tax is payable with respect to the Transaction Payments, either before or after the application of the Reduced Amount, it shall furnish the Company with an opinion reasonably acceptable to the Company that no Excise Tax will be imposed with respect to such Transaction Payments. Any good faith determinations of the firm made hereunder shall be final, binding and conclusive upon you.

Nothing in this Agreement changes the nature of your employment. Your employment with the Company continues to be "at will"; it is for no specified term, and may be terminated by you or the Company at any time, with or without cause or advance notice.

In consideration for the foregoing protections, by counter-signing the Agreement to which this is attached you reaffirm and agree that: (1) for a period ending one year after the Date of Termination for any reason (the "***Noncompetition Period***"), you will not directly or indirectly other than on behalf of the Company, without the prior written consent of the Company, engage (whether as an employee, agent, consultant, advisor, independent contractor, proprietor, partner, officer, director or otherwise), or have any ownership interest in (except for passive ownership of five percent (5%) or less of any entity whose securities have been registered under the Securities Act of 1933 or Section 12 of the Securities Exchange Act of 1934), or participate in the financing, operation, management or control of, that portion of any firm, partnership, corporation, entity or business that engages or participates in a competing business purpose; and (2) during the Noncompetition Period, you will not without the written consent of the Company, directly or indirectly through another entity, induce or attempt to induce any employee of the Company and its subsidiaries to leave the employ of the Company or a Company subsidiary, or in any way interfere with the relationship between the Company or a Company subsidiary and any employee thereof and will not induce or attempt to induce any customer, supplier, client, broker, licensee or other business relation of the Company or its subsidiaries to cease doing business, or to alter in any manner its business relationship, with the Company or its subsidiaries. By signing the Agreement, both parties signify their intent for the non-compete to be enforceable to the maximum extent allowable by law. This Agreement shall be governed in all aspects by the laws of the State of Washington.

1551 Eastlake Ave E, Ste 200
Seattle, WA 98102

206.659.0067
adaptivebiotech.com

May 1, 2019

Chad Cohen
[address]

Re: Executive Severance Agreement

Dear Chad:

This letter agreement (this "***Agreement***") confirms the terms of your severance rights in connection with your employment with Adaptive Biotechnologies Corporation, a Washington corporation (the "***Company***"), and supplements that certain letter agreement regarding your employment with the Company dated on or about May 1, 2019 (the "***Employment Agreement***"). Capitalized terms used but not otherwise defined herein shall have the meanings ascribed to them in the Employment Agreement.

1. Severance

As further detailed in your Employment Agreement, your employment with the Company is "at will"; it is for no specified term, and may be terminated by you or the Company at any time, with or without cause or advance notice.

If (i) you are terminated for a reason other than for Cause (as defined below), death, or your disability or (ii) you resign for Good Reason (as defined below), then, if you execute a full release of claims in the form of the release attached as Exhibit A (the "***Release***") and such Release becomes effective and irrevocable within sixty (60) days of the effective date of such termination, the Company will pay you a lump sum payment equivalent to twelve (12) months of your base salary (at the base salary rate then in effect as of your termination date or, if your termination is due to a Good Reason resignation, the greater of the base salary rate then in effect on your termination date or the date immediately prior to the event constituting Good Reason) (the "***Severance Payment***"), payable on the first payroll period after the sixty (60) day anniversary of your termination date, subject to your continued compliance with the obligations set forth in the Release and the Company's standard form of nondisclosure and assignment agreement.

For purposes of this Agreement, "***Cause***" is defined as: (a) theft or embezzlement by you with respect to the Company or its subsidiaries; (b) intentional failure to perform your duties to the Company without the same being corrected within thirty (30) days after being given written notice thereof by the Company; (c) the commission by you of any felony or any crime involving moral turpitude (but excluding driving offenses); (d) willful or prolonged absence from work by you (other than by reason of disability due to physical or mental illness) or failure, gross neglect or refusal by the you to perform your duties and responsibilities without the same being corrected within thirty (30) days after being given written notice thereof by the Company; (e) continued and habitual use of alcohol by you to an extent which materially impairs your performance of your duties without the same being corrected within fifteen (15) days after being given written notice thereof by the Company; or (f) your use of illegal drugs without the same being corrected within thirty (30) days after being given written notice thereof.

For purposes of this Agreement, "***Good Reason***" means, without your written consent, (a) the material diminution or variation of your title or any of your material duties or responsibilities or the engagement by Company of unlawful employment practices with respect to you, (b) a reduction in the your base salary, (c) a breach by the Company of this Agreement or any other agreement between you and the Company, or (d) the occurrence of a Change in Control; *provided, however*, that for "Good Reason" to be established, you must provide written notice to the Company's general counsel within thirty (30) days immediately following such events described in (a) through (d) above, the Company must fail to remedy such event within thirty (30) days after receipt of such notice, and your resignation must be effective not later than ninety (90) days after the expiration of such cure period.

To the extent that payments and benefits in this Agreement are subject to Section 409A of the Internal Revenue Code of 1986, as amended (the "***Code***"), this Agreement is intended to comply with and will be interpreted in a manner intended to comply with Section 409A of the Code. To the extent that any provision in this offer is ambiguous as to its compliance with Section 409A of the Code, the provision shall be read in such a manner so that no payments due under this Agreement shall be subject to an "additional tax" as defined in Section 409(a)(1)(B) of the Code. Notwithstanding anything herein to the contrary, if at the time of your separation from service from the Company you designated as a "specified employee" as defined in Section 409A of the Code (and any related regulations or other pronouncements thereunder) and the deferral of the commencement of any payments or benefits otherwise payable hereunder as a result of such separation from service is necessary in order to prevent any accelerated or additional tax under Section 409A of the Code, then the Company will defer the commencement of the payment of any such payments or benefits hereunder (without any reduction in such payments or benefits ultimately paid or provided to you) until the expiration of the six-month period measured from the date of your separation from service with the Company (or the earliest date as is permitted under Section 409A of the Code). On the first day of the seventh month following the date of your separation from service, or if earlier, the date of your death, all payments delayed pursuant to this paragraph (whether they would have otherwise been paid or reimbursed to you in a single sum or in installments) shall be paid or reimbursed to you in a single sum and any remaining payments and benefits due to you shall be paid or provided in accordance with the normal dates specified for them in this Agreement or in another agreement between you and the Company. In addition, if any other payments of money or other benefits due to you hereunder could cause the application of an accelerated or additional tax under Section 409A of the Code as determined jointly by you and the Company, such payments or other benefits shall be deferred if deferral will make such payment or other benefits compliant under Section 409A of the Code, or otherwise such payment or other benefits shall be restructured, to the extent possible, in a manner, determined by the Company, that does not cause such an accelerated or additional tax. To the extent any reimbursements or in-kind benefits due to you under this Agreement or otherwise constitute "deferred compensation" under Section 409A of the Code as determined jointly by you and the Company, any such reimbursements or in-kind benefits shall be paid to you in a manner consistent with Treas. Reg. Section 1.409A-3(i)(1)(iv). Each payment made under this Agreement or otherwise shall be designated as a "separate payment" within the meaning of Section 409A of the Code. References herein to a termination of your employment shall be deemed to refer to the date upon which you have experienced a "separation from service" within the meaning of Code Section 409A. The Company shall consult with you in good faith regarding the implementation of the provisions of this paragraph. Additionally, in the event that the acceleration of vesting of equity awards contemplated under this Agreement is deemed a "parachute payment" to you under the Code, the Company shall pay to you an additional cash bonus at the time of the consummation of such Change in Control (or later termination of your employment, if applicable) so as to fully compensate you for the additional tax liability resulting from such acceleration of vesting, including additional tax liability with respect to payments made pursuant to this sentence. The preceding provisions, however, shall not be construed as a guarantee by the Company of any particular tax effect to you under this Agreement.

2. Arbitration

In the event of any dispute or claim solely related to or arising out of the termination of your employment with the Company for any reason (including, but not limited to, any claims for breach of contract, wrongful termination, or age, sex, race, national origin, disability or other discrimination or harassment), you agree that all such disputes will be fully, finally and exclusively resolved by binding arbitration conducted by Judicial Dispute Resolution, LLC (or a similar entity if acceptable to the Company) in King County, Washington, pursuant to the Federal Arbitration Act. You and the Company hereby waive your respective rights to have any such disputes or claims tried by a judge or jury. This section will not apply to any claims for injunctive relief by the Company or you, any claims by the Company or you arising out of or related to proprietary and intellectual property rights, claims pursuant to the National Labor Relations Act, claims pursuant to the Washington State Law Against Discrimination, claims under federal discrimination laws, workers compensation claim(s), unemployment compensation benefits claim(s), or any other claims that, as a matter of law, the parties cannot agree to arbitrate.

3. Additional Terms

This Agreement, the Employment Agreement, the Nondisclosure and Assignment Agreement, the Existing Awards and the CIC Agreement (as defined below) constitute the entire agreement between you and the Company regarding the terms and conditions of your employment are the complete and exclusive statement of all of the terms and conditions of your employment with the Company, and supersede and replace any and all prior agreements or representations with regard to the subject matter hereof, whether written or oral, including that certain employment letter agreement by and between you and the Company dated on or about June 26, 2015, as amended September 23, 2015, and that certain change of control agreement between you and the Company dated on or about August 7, 2017. However, this Agreement shall not supersede the change in control agreement between you and the Company dated on or about May 1, 2019 ("***CIC Agreement***").

This Agreement is entered into without reliance on any promise or representation other than those expressly contained herein, and (except for changes reserved to the Company's discretion herein) cannot be modified or amended except in a writing signed by you and a duly authorized Company representative. Whenever possible, each provision of this Agreement will be interpreted in such manner as to be effective and valid under applicable law, but if any provision of this Agreement is held to be invalid, illegal or unenforceable in any respect under any applicable law or rule in any jurisdiction, such invalidity, illegality or unenforceability will not affect any other provision or any other jurisdiction, but this Agreement will be reformed, construed and enforced as if such invalid, illegal or unenforceable provisions had never been contained herein. This Agreement and the terms of your employment with the Company shall be governed in all aspects by the laws of the State of Washington.

[*Signature page follows.*]

Please sign and date this Agreement on the spaces provided below to acknowledge your acceptance of the terms of this Agreement.

Sincerely,

/s/ Chad Robins
Chad Robins
Chief Executive Officer

I agree to and accept the terms and conditions set forth in this Agreement.

/s/ Chad Cohen
Chad Cohen

Date: May 1, 2019

Exhibit A
Release

[*Separately attached*.]

1551 Eastlake Ave E, Ste 200
Seattle, WA 98102

206.659.0067
adaptivebiotech.com

April 22, 2019

Lance Baldo, MD
[address]

Re: Executive Severance Agreement

Dear Lance:

This letter agreement (this "***Agreement***") confirms the terms of your severance rights in connection with your employment with Adaptive Biotechnologies Corporation, a Washington corporation (the "***Company***"), and supplements that certain letter agreement regarding your employment with the Company dated on or about the date hereof (the "***Employment Offer***"). Capitalized terms used but not otherwise defined herein shall have the meanings ascribed to them in the Employment Offer.

1. Severance

As further detailed in your Employment Offer, your employment with the Company is "at will"; it is for no specified term, and may be terminated by you or the Company at any time, with or without cause or advance notice.

If (i) you are terminated by the Company for a reason other than for Cause (as defined below), death, or your disability or (ii) you resign for Good Reason (as defined below) (either of (i) or (ii), an "***Involuntary Termination***"), then, if you execute a full release of claims in the form of the release attached as Exhibit A (the "***Release***") and such Release becomes effective and irrevocable within sixty (60) days of the effective date of such termination, the Company will pay you a lump sum payment equivalent to (a) if such Involuntary Termination occurs after your Start Date but before the twelve (12) month anniversary of your Start Date, twelve (12) months of your base salary, (b) if such Involuntary Termination occurs on or after the twelve (12) month anniversary of your Start Date but before the twenty-four (24) month anniversary of your Start Date, six (6) months of your base salary, and (c) if such Involuntary Termination occurs on or after the twenty-four (24) month anniversary of your Start Date, three (3) months of your base salary (in each case, with such payment to be calculated based on the base salary rate then in effect as of your termination date or, if your termination is due to a Good Reason resignation, the greater of the base salary rate then in effect on your termination date or the date immediately prior to the event constituting Good Reason) (the "***Severance Payment***"), payable on the first payroll period after the sixty (60)-day anniversary of your termination date, subject to your continued compliance with the obligations set forth in the Release and the Employee Confidentiality Agreement.

Furthermore, in the event of an Involuntary Termination other than within the three-month period prior to or the twelve-month period following a Change in Control (as defined in the Company's 2009 Equity Incentive Plan, as amended), then 25% of any unvested shares under that certain stock option grant contemplated in your Employment Offer shall immediately vest and become exercisable as of the date of such Involuntary Termination and the post termination exercise period for all vested shares under such option grant (including those accelerated pursuant hereto) shall be automatically extended to two years from the date of such Involuntary Termination.

For purposes of this Agreement, "***Cause***" shall have the following meaning:

"***Cause***" means: (i) your theft, dishonesty, willful misconduct, breach of fiduciary duty for personal profit, or falsification of any Company documents or records; (ii) your material failure to abide by the Company's code of conduct or other policies (including, without limitation, policies relating to confidentiality

and reasonable workplace conduct), provided that you are given written notice of the alleged failure and a 30 day period to cure provided cure is possible; (iii) your intentional and unauthorized use, misappropriation, destruction or diversion of any tangible or intangible asset or corporate opportunity of the Company (including, without limitation, your improper use or disclosure of the Company's confidential or proprietary information); (iv) any intentional act by you which has a material detrimental effect on the Company's reputation or business; (v) your repeated failure or inability to perform any reasonable assigned material duties after written notice from the Company of, and a reasonable opportunity to cure, such failure or inability; (vi) any material breach by you of any employment, service, non-disclosure, non-competition, non-solicitation or other similar agreement between you and the Company, provided you receive written notice of the alleged breach and which breach is not cured pursuant to the terms of such agreement; or (vii) your conviction (including any plea of guilty or nolo contendere) of any criminal act involving fraud, dishonesty, misappropriation or moral turpitude, or which impairs your ability to perform your duties with the Company.

For purposes of this Agreement "***Good Reason***" means, without your written consent, (a) the material diminution of your title or of any of your material duties or responsibilities, (b) a reduction in your base salary, other than in connection with a simultaneous and proportionate reduction in the base salary of all other executive officers of the Company that does not exceed 10% of each such executive officer's base salary and (c) you are required to move more than 35 miles from your current residence, except, however if the San Francisco office is closed and you are required to move to Seattle; provided, however, that for "Good Reason" to be established, you must provide written notice to the Company's general counsel within thirty (30) days immediately following the relevant event described in (a) or (b) above, the Company must fail to remedy such event within thirty (30) days after receipt of such notice, and your resignation must be effective no later than fourteen (14) days after the expiration of such cure period.

In the event there is any conflict between the terms defined in this Severance Agreement and any other documents you receive from the Company (including the Company's Equity Incentive Plan, Stock Agreement or Offer Letter), the defined terms in this Agreement control.

To the extent that payments and benefits in this Agreement are subject to Section 409A of the Internal Revenue Code of 1986, as amended (the "***Code***"), this Agreement is intended to comply with and will be interpreted in a manner intended to comply with Section 409A of the Code. To the extent that any provision in this offer is ambiguous as to its compliance with Section 409A of the Code, the provision shall be read in such a manner so that no payments due under this Agreement shall be subject to an "additional tax" as defined in Section 409(a)(1)(B) of the Code. Notwithstanding anything herein to the contrary, if at the time of your separation from service from the Company you designated as a "specified employee" as defined in Section 409A of the Code (and any related regulations or other pronouncements thereunder) and the deferral of the commencement of any payments or benefits otherwise payable hereunder as a result of such separation from service is necessary in order to prevent any accelerated or additional tax under Section 409A of the Code, then the Company will defer the commencement of the payment of any such payments or benefits hereunder (without any reduction in such payments or benefits ultimately paid or provided to you) until the expiration of the six-month period measured from the date of your separation from service with the Company (or the earliest date as is permitted under Section 409A of the Code). On the first day of the seventh month following the date of your separation from service, or if earlier, the date of your death, all payments delayed pursuant to this paragraph (whether they would have otherwise been paid or reimbursed to you in a single sum or in installments) shall be paid or reimbursed to you in a single sum and any remaining payments and benefits due to you shall be paid or provided in accordance with the normal dates specified for them in this Agreement or in another agreement between you and the Company. In addition, if any other payments of money or other benefits due to you hereunder could cause the application of an accelerated or additional tax under Section 409A of the Code as determined jointly by you and the Company, such payments or other

benefits shall be deferred if deferral will make such payment or other benefits compliant under Section 409A of the Code, or otherwise such payment or other benefits shall be restructured, to the extent possible, in a manner, determined by the Company, that does not cause such an accelerated or additional tax. To the extent any reimbursements or in-kind benefits due to you under this Agreement or otherwise constitute "deferred compensation" under Section 409A of the Code as determined jointly by you and the Company, any such reimbursements or in-kind benefits shall be paid to you in a manner consistent with Treas. Reg. Section 1.409A-3(i)(1)(iv). Each payment made under this Agreement or otherwise shall be designated as a "separate payment" within the meaning of Section 409A of the Code. References herein to a termination of your employment shall be deemed to refer to the date upon which you have experienced a "separation from service" within the meaning of Code Section 409A. The Company shall consult with you in good faith regarding the implementation of the provisions of this paragraph. The preceding provisions, however, shall not be construed as a guarantee by the Company of any particular tax effect to you under this Agreement.

2. Arbitration

In the event of any dispute or claim solely related to or arising out of the termination of your employment with the Company for any reason (including, but not limited to, any claims for breach of contract, wrongful termination, or age, sex, race, national origin, disability or other discrimination or harassment), you agree that all such disputes will be fully, finally and exclusively resolved by binding arbitration conducted by Judicial Dispute Resolution, LLC (or a similar entity if acceptable to the Company) in San Francisco County, pursuant to the Federal Arbitration Act. You and the Company hereby waive your respective rights to have any such disputes or claims tried by a judge or jury. This section will not apply to any claims for injunctive relief by the Company or you, any claims by the Company or you arising out of or related to proprietary and intellectual property rights, claims pursuant to the National Labor Relations Act, claims under the California Private Attorney General Act, claims under federal discrimination laws, workers compensation claim(s), unemployment compensation benefits claim(s), or any other claims that, as a matter of law, the parties cannot agree to arbitrate.

3. Additional Terms

This Agreement, the Employment Offer, the Employee Confidentiality Agreement, the CoC Agreement and the stock option agreements referred to in your Employment Offer constitute the entire agreement between you and the Company regarding the terms and conditions of your employment, are the complete and exclusive statement of all of the terms and conditions of your employment with the Company, and supersede and replace any and all prior agreements or representations with regard to the subject matter hereof, whether written or oral,.

This Agreement is entered into without reliance on any promise or representation other than those expressly contained herein, and (except for changes reserved to the Company's discretion herein) cannot be modified or amended except in a writing signed by you and a duly authorized Company representative. Whenever possible, each provision of this Agreement will be interpreted in such manner as to be effective and valid under applicable law, but if any provision of this Agreement is held to be invalid, illegal or unenforceable in any respect under any applicable law or rule in any jurisdiction, such invalidity, illegality or unenforceability will not affect any other provision or any other jurisdiction, but this Agreement will be reformed, construed and enforced as if such invalid, illegal or unenforceable provisions had never been contained herein. This Agreement and the terms of your employment with the Company shall be governed in all aspects by the laws of the State of California.

[*Signature page follows.*]

Please sign and date this Agreement on the spaces provided below to acknowledge your acceptance of the terms of this Agreement.

Sincerely,

/s/ Chad Robins
Chad Robins
Chief Executive Officer

I agree to and accept the terms and conditions set forth in this Agreement.

/s/ Lance Baldo, MD
Lance Baldo, MD

Date: April 22, 2019

Exhibit A
Release

[*Separately attached*.]

1551 Eastlake Ave E, Ste 200
Seattle, WA 98102

206.659.0067
adaptivebiotech.com

May 1, 2019

Charles Sang
[address]

Re: Executive Severance Agreement

Dear Charles:

This letter agreement (this "***Agreement***") confirms the terms of your severance rights in connection with your employment with Adaptive Biotechnologies Corporation, a Washington corporation (the "***Company***"), and supplements that certain letter agreement regarding your employment with the Company dated on or about May 1, 2019 (the "***Employment Agreement***"). Capitalized terms used but not otherwise defined herein shall have the meanings ascribed to them in the Employment Agreement.

1. Severance

As further detailed in your Employment Agreement, your employment with the Company is "at will"; it is for no specified term, and may be terminated by you or the Company at any time, with or without cause or advance notice.

If (i) you are terminated by the Company for a reason other than for Cause (as defined below), death, or your disability or (ii) you resign for Good Reason (as defined below), then, if you execute a full release of claims in the form of the release attached as Exhibit A (the "***Release***") and such Release becomes effective and irrevocable within sixty (60) days of the effective date of such termination, the Company will pay you a lump sum payment equivalent to three (3) months of your base salary (at the base salary rate then in effect as of your termination date or, if your termination is due to a Good Reason resignation, the greater of the base salary rate then in effect on your termination date or the date immediately prior to the event constituting Good Reason) (the "***Severance Payment***"), payable on the first payroll period after the sixty (60)-day anniversary of your termination date, subject to your continued compliance with the obligations set forth in the Release and the Company's standard form of nondisclosure and assignment agreement.

For purposes of this Agreement, "***Cause***" is defined as: (a) theft or embezzlement by you with respect to the Company or its affiliates; (b) willful misconduct or gross negligence in performance of your duties, including your refusal to comply in any material respect with the directives of the chief executive officer or the Board so long as such directives are not inconsistent with any legal obligation or requirement; (c) dishonest or fraudulent conduct, a deliberate attempt to do an injury to the Company, or other intentional conduct that materially discredits the Company or is materially detrimental to the financial condition or reputation of the Company, including the commission by you of any felony or any crime involving moral turpitude; (d) willful or prolonged absence from work by you (other than by reason of disability due to physical or mental illness) or failure, gross neglect or refusal by the you to perform your duties and responsibilities; (e) continued and habitual use of alcohol by you to an extent which materially impairs your performance of your duties without the same being corrected within fifteen (15) days after being give written notice thereof by the Company; (f) your use of illegal drugs without the same being corrected within thirty (30) days after being given written notice thereof; or (g) your material breach of any element of any agreement between you and the Company, including, without limitation, theft or other misappropriation of the Company's proprietary information, which breach (if determined in good faith by the Board to be curable) is not remedied within ten (10) working days after written notice.

For purposes of this Agreement "***Good Reason***" means, without your written consent, (a) a reduction in your base salary other than in connection with simultaneous reductions in all other senior executives at the vice president

level or above of equal or greater amount in percentage terms, or (b) the relocation of your principal work facility to a location that is more than thirty (30) miles from Seattle, it being understood that significant travel to the Company's San Francisco offices and occasional travel to other cities for conferences and meetings will be expected; provided, however, that for "Good Reason" to be established, you must provide written notice to the Company's general counsel within thirty (30) days immediately following the relevant event described in (a) or (b) above, the Company must fail to remedy such event within thirty (30) days after receipt of such notice, and your resignation must be effective no later than fourteen (14) days after the expiration of such cure period.

To the extent that payments and benefits in this Agreement are subject to Section 409A of the Internal Revenue Code of 1986, as amended (the "***Code***"), this Agreement is intended to comply with and will be interpreted in a manner intended to comply with Section 409A of the Code. To the extent that any provision in this offer is ambiguous as to its compliance with Section 409A of the Code, the provision shall be read in such a manner so that no payments due under this Agreement shall be subject to an "additional tax" as defined in Section 409(a)(1)(B) of the Code. Notwithstanding anything herein to the contrary, if at the time of your separation from service from the Company you designated as a "specified employee" as defined in Section 409A of the Code (and any related regulations or other pronouncements thereunder) and the deferral of the commencement of any payments or benefits otherwise payable hereunder as a result of such separation from service is necessary in order to prevent any accelerated or additional tax under Section 409A of the Code, then the Company will defer the commencement of the payment of any such payments or benefits hereunder (without any reduction in such payments or benefits ultimately paid or provided to you) until the expiration of the six-month period measured from the date of your separation from service with the Company (or the earliest date as is permitted under Section 409A of the Code). On the first day of the seventh month following the date of your separation from service, or if earlier, the date of your death, all payments delayed pursuant to this paragraph (whether they would have otherwise been paid or reimbursed to you in a single sum or in installments) shall be paid or reimbursed to you in a single sum and any remaining payments and benefits due to you shall be paid or provided in accordance with the normal dates specified for them in this Agreement or in another agreement between you and the Company. In addition, if any other payments of money or other benefits due to you hereunder could cause the application of an accelerated or additional tax under Section 409A of the Code as determined jointly by you and the Company, such payments or other benefits shall be deferred if deferral will make such payment or other benefits compliant under Section 409A of the Code, or otherwise such payment or other benefits shall be restructured, to the extent possible, in a manner, determined by the Company, that does not cause such an accelerated or additional tax. To the extent any reimbursements or in-kind benefits due to you under this Agreement or otherwise constitute "deferred compensation" under Section 409A of the Code as determined jointly by you and the Company, any such reimbursements or in-kind benefits shall be paid to you in a manner consistent with Treas. Reg. Section 1.409A-3(i)(1)(iv). Each payment made under this Agreement or otherwise shall be designated as a "separate payment" within the meaning of Section 409A of the Code. References herein to a termination of your employment shall be deemed to refer to the date upon which you have experienced a "separation from service" within the meaning of Code Section 409A. The Company shall consult with you in good faith regarding the implementation of the provisions of this paragraph. The preceding provisions, however, shall not be construed as a guarantee by the Company of any particular tax effect to you under this Agreement.

2. Arbitration

In the event of any dispute or claim solely related to or arising out of the termination of your employment with the Company for any reason (including, but not limited to, any claims for breach of contract, wrongful termination, or age, sex, race, national origin, disability or other discrimination or harassment), you agree that all such disputes will be fully, finally and exclusively resolved by binding arbitration conducted by Judicial Dispute Resolution, LLC (or a similar entity if acceptable to the Company) in King County, Washington, pursuant to the Federal Arbitration Act. You and the Company hereby waive your respective rights to have any such disputes or claims tried by a judge or jury. This

section will not apply to any claims for injunctive relief by the Company or you, any claims by the Company or you arising out of or related to proprietary and intellectual property rights, claims pursuant to the National Labor Relations Act, claims pursuant to the Washington State Law Against Discrimination, claims under federal discrimination laws, workers compensation claim(s), unemployment compensation benefits claim(s), or any other claims that, as a matter of law, the parties cannot agree to arbitrate.

3. Additional Terms

This Agreement, the Employment Agreement, the Nondisclosure and Assignment Agreement, the Existing Awards and the CIC Agreement (as defined below) constitute the entire agreement between you and the Company regarding the terms and conditions of your employment are the complete and exclusive statement of all of the terms and conditions of your employment with the Company, and supersede and replace any and all prior agreements or representations with regard to the subject matter hereof, whether written or oral, including that certain employment letter agreement by and between you and the Company dated on or about March 17, 2016, and that certain change of control agreement between you and the Company dated on or about August 7, 2017. However, this Agreement shall not supersede the change in control agreement between you and the Company dated on or about May 1, 2019 ("***CIC Agreement***").

This Agreement is entered into without reliance on any promise or representation other than those expressly contained herein, and (except for changes reserved to the Company's discretion herein) cannot be modified or amended except in a writing signed by you and a duly authorized Company representative. Whenever possible, each provision of this Agreement will be interpreted in such manner as to be effective and valid under applicable law, but if any provision of this Agreement is held to be invalid, illegal or unenforceable in any respect under any applicable law or rule in any jurisdiction, such invalidity, illegality or unenforceability will not affect any other provision or any other jurisdiction, but this Agreement will be reformed, construed and enforced as if such invalid, illegal or unenforceable provisions had never been contained herein. This Agreement and the terms of your employment with the Company shall be governed in all aspects by the laws of the State of Washington.

[*Signature page follows.*]

Please sign and date this Agreement on the spaces provided below to acknowledge your acceptance of the terms of this Agreement.

Sincerely,

/s/ Chad Robins
Chad Robins
Chief Executive Officer

I agree to and accept the terms and conditions set forth in this Agreement.

/s/ Charles Sang
Charles Sang

Date: May 1, 2019

Exhibit A
Release

[*Separately attached*.]