

**UNITED STATES  
SECURITIES AND EXCHANGE COMMISSION**

Washington, D.C. 20549

**Form 10-K**

(Mark One)

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

FOR THE FISCAL YEAR ENDED DECEMBER 31, 2016

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

FOR THE TRANSITION PERIOD FROM TO

COMMISSION FILE NUMBER 000-54556

**TROVAGENE, INC.**

(Exact name of registrant as specified in its charter)

**Delaware**

(State or other jurisdiction of  
incorporation or organization)

**27-2004382**

(I.R.S. Employer  
Identification No.)

**11055 Flintkote Avenue, Suite B, San Diego, California 92121**

(Address of principal executive offices) (Zip Code)

Registrant's telephone number, including area code: (858) 952-7570

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

<u>Title of each class</u>	<u>Name of each exchange on which registered</u>
Units, each consisting of two shares of Common Stock and one Warrant to purchase one share of Common Stock	The NASDAQ Capital Market
Common Stock, \$0.0001 par value	The NASDAQ Capital Market
Warrants to purchase Common Stock	The NASDAQ Capital Market

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

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

Indicate by check if the registrant is not required to file reports pursuant to Section 13 or Section 15(d) of the Act. Yes o No x

Indicate by check mark whether the registrant (1) has filed all reports required to be filed by Section 13 or 15(d) of the Securities Exchange Act of 1934 during the preceding 12 months (or for such shorter period that the registrant was required to file such reports), and (2) has been subject to such filing requirements for the past 90 days. Yes x No o

Indicate by check mark whether the registrant has submitted electronically and posted on its corporate Web site, if any, every Interactive Data File required to be submitted and posted pursuant to Rule 405 of Regulation S-T (§ 232.405 of this chapter) during the preceding 12 months (or for such shorter period that the registrant was required to submit and post such files). Yes x No o

Indicate by check mark if disclosure of delinquent filers pursuant to Item 405 of Regulation S-K (§229.405 of this chapter) is not contained herein, and will not be contained, to the best of registrant's knowledge, in definitive proxy or information statements incorporated by reference in Part III of this Form 10-K or any amendment to this Form 10-K.  x

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

Large accelerated filer  o

Accelerated filer  x

Non-accelerated filer  o

Smaller reporting company  o

(Do not check if a smaller reporting company)

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

The aggregate market value of the voting and non-voting common equity held by non-affiliates based on a closing sale price of \$4.53 per share, which was the last sale price of the common stock as of June 30, 2016, the last business day of the registrant's most recently completed second fiscal quarter, was \$118,688,886.

As of February 28, 2017, 30,965,000 shares of the registrant's common stock, \$0.0001 par value per share, were issued and outstanding.

#### **DOCUMENTS INCORPORATED BY REFERENCE**

Portions of the Proxy Statement for the registrant's 2017 Annual Meeting of Stockholders (the "Proxy Statement"), to be filed within 120 days of the end of the fiscal year ended December 31, 2016, are incorporated by reference in Part III hereof. Except with respect to information specifically incorporated by reference in this Form 10-K, the Proxy Statement is not deemed to be filed as part hereof.

---

---

## TABLE OF CONTENTS

	<u>Page</u>	
<u>PART I</u>		
<u>Item 1</u>	<u>Business</u>	<u>3</u>
<u>Item 1A</u>	<u>Risk Factors</u>	<u>21</u>
<u>Item 1B</u>	<u>Unresolved Staff Comments</u>	<u>36</u>
<u>Item 2</u>	<u>Properties</u>	<u>36</u>
<u>Item 3</u>	<u>Legal Proceedings</u>	<u>36</u>
<u>Item 4</u>	<u>Mine Safety Disclosures</u>	<u>36</u>
<u>PART II</u>		
<u>Item 5</u>	<u>Market for Registrant’s Common Equity, Related Stockholder Matters and Issuer Purchases of Equity Securities</u>	<u>37</u>
<u>Item 6</u>	<u>Selected Financial Data</u>	<u>39</u>
<u>Item 7</u>	<u>Management’s Discussion and Analysis of Financial Condition and Results of Operations</u>	<u>40</u>
<u>Item 7A</u>	<u>Quantitative and Qualitative Disclosures About Market Risk</u>	<u>52</u>
<u>Item 8</u>	<u>Financial Statements and Supplementary Data</u>	<u>53</u>
<u>Item 9</u>	<u>Changes In and Disagreements with Accountants on Accounting and Financial Disclosure</u>	<u>53</u>
<u>Item 9A</u>	<u>Controls and Procedures</u>	<u>53</u>
<u>Item 9B</u>	<u>Other Information</u>	<u>56</u>
<u>PART III</u>		
<u>Item 10</u>	<u>Directors, Executive Officers, and Corporate Governance</u>	<u>56</u>
<u>Item 11</u>	<u>Executive Compensation</u>	<u>56</u>
<u>Item 12</u>	<u>Security Ownership of Certain Beneficial Owners and Management and Related Stockholder Matters</u>	<u>56</u>
<u>Item 13</u>	<u>Certain Relationship and Related Transactions, and Director Independence</u>	<u>56</u>
<u>Item 14</u>	<u>Principal Accountant Fees and Services</u>	<u>56</u>
<u>PART IV</u>		
<u>Item 15</u>	<u>Exhibits</u>	<u>57</u>
<u>Item 16</u>	<u>Form 10-K Summary</u>	<u>60</u>
<u>SIGNATURES</u>		<u>61</u>

## PART I

### ITEM 1. BUSINESS

We are a life science company that focuses on the development and commercialization of a proprietary molecular genetic detection technology for use in pharmaceutical development, clinical research and medical testing across a variety of clinical disciplines, including oncology and virology. Our primary focus is utilizing our core technology in measuring circulating tumor DNA (“ctDNA”) in urine and blood, also called a liquid biopsy, with our proprietary platforms and research use only kits and reagents. We look to commercialize our technology by providing testing services from our Clinical Laboratory Improvement Amendments (“CLIA”)/College of American Pathologists (“CAP”) accredited laboratory in San Diego, California, as well as by distributing research use only kits and systems to clinical research laboratories, leading cancer centers and pharmaceutical companies. Other applications for our technologies and intellectual property include infectious disease, transplant medicine and prenatal genetics.

The genetic materials that result when cells in the body die and release their DNA into the bloodstream, are collectively referred to as “cell-free nucleic acids.” The circulating fragments of genetic material can be detected and measured in urine, filtered through the kidney, and blood. Cell-free nucleic acids can be used as genetic markers of disease and the ability to use urine or blood as liquid biopsy sample types allows for simple, noninvasive, or minimally invasive, sample collection methods. We are leveraging our proprietary Precision Cancer Monitoring (“PCM”) technology to extract and enrich the DNA in urine and blood to enable ourselves, through our CLIA-certified/CAP-accredited laboratory, and others, through the distribution of research use kits and systems, to detect and monitor ctDNA in urine and blood. We believe our PCM technology can allow for improved detection and quantitation of oncogene mutations from tumors to help improve disease and cancer patient management.

Our branded Trovera™ liquid biopsy tests are clinical tests performed by our San Diego CLIA/CAP-accredited laboratory for use by physicians, third party clinical laboratories and pharmaceutical companies. The Trovera™ line of tests include Trovera™ *EGFR*, *KRAS* and *BRAF* and are performed using both urine and blood patient samples. We believe all of our Trovera™ tests provide important clinical information beyond the current testing standard of care. At the end of 2016, we analytically validated a multigene panel consisting of 7 oncogenes, including *EGFR*, *KRAS*, *BRAF*, *NRAS*, *PIK3CA*, *HER2*, *KIT*, with over 200 mutation, insertion and deletion variants. This panel is being clinically validated for use in our San Diego based CLIA/CAP-accredited laboratory and will focus on solid tumor cancers such as lung, colorectal, pancreas, and melanoma. We intend to offer this panel as a testing service for pharmaceutical companies, third party reference laboratories and physicians. We also plan to offer research use only (“RUO”) kits, based on these same markers for broad distribution for clinical research purposes.

We have developed significant intellectual property around cell-free nucleic acids in urine, and the extraction of cell-free nucleic acids from urine, as well as novel assay designs, particularly our proprietary non-naturally occurring primers. Through this proprietary technology, we believe that we are at the forefront of a shift in the way diagnostic medicine is practiced, using simple, noninvasive or minimally invasive sampling and analysis of nucleic acids. We believe this will ultimately lead to more effective treatment monitoring, better management of serious illnesses such as cancer, and the ability to detect the success of cancer treatment, the recurrence of cancer, or the progression of cancer, earlier. As of December 31, 2016, our intellectual property portfolio consisted of over 120 issued patents and over 60 pending patent applications in the U.S. and abroad. Our patent estate includes the detection of cell-free nucleic acids from urine and blood, as well as their application in specific disease areas, including oncology, infectious disease, transplantation, and prenatal genetics.

We believe that our proprietary technology platform is uniquely positioned to address a high unmet clinical need in the field of oncology. Our technology is designed to offer better cancer monitoring by tracking and quantifying levels of ctDNA from either urine or blood samples, and is intended to provide important clinical information often missed with traditional diagnostic tools, including tissue biopsy. Using urine as a sample, our cancer monitoring technology enables frequent, noninvasive detection and monitoring of oncogene mutation status, response to therapy, disease progression and disease recurrence. We signed a long-term supply and distribution agreement with Boreal Genomics, Inc. (“Boreal”) in the fourth quarter of 2016, to capitalize on the synergies with Boreal’s mutation enrichment system and our expanding product portfolio of ctDNA markers in urine and blood. We intend to address an unmet need in the liquid biopsy testing market by providing a simple, routine and low-cost urine and blood ctDNA assays for next-generation sequencing (“NGS”) platforms run by laboratories of research institutions, cancer centers, and service facilities around the world.

We believe our technology expertise and extensive patent portfolio around cell-free DNA in urine and blood gives us a competitive advantage to leverage an emerging trend of monitoring cancer using ctDNA as a marker of disease status. Our proprietary sample preparation process includes novel technology for the collection and DNA preservation (“Next™Collect”),

DNA extraction and isolation (“Next™Extract”) of ctDNA from a urine sample, proprietary, non-naturally occurring primers to enrich the sample for mutant alleles, and the ability to detect nucleic acids of interest using NGS. We believe that our quantitative ctDNA detection and monitoring platforms offer industry-leading sensitivity, allowing single-copy detection, a significant advantage over competitive methods.

Recent scientific and clinical publications support the clinical utility of detecting and monitoring cancer with liquid biopsy technologies, which we believe will result in a paradigm shift in the way cancer is diagnosed and treated. Researchers and clinicians are now focused on specific oncogene mutations and alterations that are causal for specific cancers at the molecular level, and, as a result, the pharmaceutical research community has increased developed targeted therapies. As such, there is a need for oncologists to have an ability to detect and track the mutational status of their patients and to assess a given patient’s therapeutic response. We believe that current monitoring tools such as imaging procedures, tissue biopsy and circulating tumor cell testing are insufficient to meet the challenge of monitoring oncogene mutations. Imaging provides an indication of tumor size that is an important diagnostic tool, but provides little practical information to oncologists regarding mutational status and appropriate treatment options, especially for molecular targeted therapies. Tissue biopsy usually involves a surgical procedure and, in many cases, is not repeatable as there are limitations related to access for serial biopsies. In some cases, biopsies may not be available, or may be insufficient for molecular diagnostics, significantly increasing the need to determine mutational status using an alternative method. In addition, tumor heterogeneity is a further confounding factor, as the surgeon may not obtain the proper tissue from the tumor sample. In the case of circulating tumor cells, which are typically measured using blood tests, sensitivity is traditionally low, and such tests can be technically difficult and expensive to conduct.

Targeted therapies are typically very expensive, can have significant side effects, and efficacy can vary by patient. In order to measure effectiveness, repeated monitoring is needed and serial biopsies can be difficult to obtain. If resistance develops, fast and accurate detection of emerging or changing oncogene mutation status is critical. Our technology platforms provide a novel solution for identifying ctDNA in urine and blood, plentiful sample sources, and we are continuing to build a growing body of evidence supporting the clinical utility of our technology to monitor cancer using ctDNA.

Our goal is to improve treatment outcomes for cancer patients using our proprietary technology to detect and quantitatively monitor ctDNA using a urine or blood sample.

### **Developing a Market for Molecular Diagnostic Tests based on Liquid Biopsies using Circulating Tumor DNA**

We intend to develop and expand our cell-free nucleic acid molecular diagnostic technology into a pipeline of potentially groundbreaking commercial molecular detection and monitoring products. Our CLIA-certified, CAP-accredited laboratory in San Diego, California has enabled us to commercialize our testing services and launch our technology platform and associated innovative molecular monitoring tests. Urine- and blood based molecular diagnostics can provide relevant information across multiple therapeutic and clinical areas, and may lead to improvements in patient management.

Our strategy and focus is to further transform oncology and patient care by providing precision medicine solutions. As the only company with technology in both urine and blood, and demonstrating industry-leading sensitivity, we are developing highly sensitive, clinically actionable multigene panels and plan to initiate global distribution of RUO kits and systems in 2017. We will provide these RUO kits and systems to academic institutions, cancer centers and laboratories throughout the world to be used for clinical research purposes. Our initial RUO proprietary kits will include a urine collection and DNA preservation cup (“Next™Collect”), a ctDNA extraction and isolation (“Next™Extract”) kit and a mutation enrichment kit (“ERTHOS™ Select”), along with the ERTHOS™ (“electrophoretic repetitive transient hybridization on substrate”) system. Additionally, we are entering into agreements with Distributors outside of the U.S. to offer our CLIA-developed Trovera™ tests to customers in their respective regions of the world. Our goal is to offer our ERTHOS™ kit and systems to our Distribution partners for dissemination to their customers.

In order to facilitate early availability and use of our products and technologies, in February 2012, we acquired the CLIA laboratory assets of MultiGEN Diagnostics, Inc. (“MultiGEN”), which included CLIA approval and licensing documentation, laboratory procedures, customer lists and marketing materials. A CLIA lab is a clinical reference laboratory that can perform high complexity diagnostic assays (e.g., those requiring polymerase chain reaction (“PCR”) amplification). Through this CLIA laboratory, we are able to offer laboratory developed tests (“LDTs”) in compliance with CLIA guidelines.

Targeting cell-free nucleic acid markers allows for the development of genetic tests that use noninvasive and easy-to-obtain urine samples, as well as blood samples, rather than other more traditional and more invasive, expensive and/or often unreliable methods, such as radiographic imaging and tissue biopsy. These methods include medical imaging, blood testing, and tissue biopsies. We are exploring a broad range of clinical utilities where cell-free nucleic acid technology holds the potential to replace more complex, less robust existing technologies. We are developing more effective, noninvasive

diagnostics, which align with the current industry shift toward highly personalized medicine. Urine- and blood based cell-free nucleic acid molecular tests can make it easier to address important health problems and may lead to significant advancements in patient care.

Our patented technology uses both urine and blood collection, which can be applied to a broad range of testing, including tumor mutation detection and monitoring, infectious disease monitoring, transplantation monitoring and prenatal genetic diagnostics. We believe that our urine-based technology, in particular, is ideally suited to be used in developing molecular diagnostic assays that will allow physicians to provide simple, noninvasive, and convenient screening and monitoring tests for their patients by identifying specific biomarkers involved in a disease process. Our novel urine- and blood based assays can facilitate improved testing compliance, resulting in a more effective use of targeted therapies, earlier detection of disease and disease progression or recurrence, and improvements in both patient outcomes and cost of care.

The material terms of certain of our clinical collaboration, research and development, and technology license agreements that we have entered into are as follows:

In November 2016, we entered into a long-term Supply and Distribution Agreement with Boreal, merging our respective technologies to co-develop urine and blood ctDNA assay kits and systems. Through this partnership, the companies intend to address an unmet need in the liquid biopsy testing market by providing an assay platform to enable simple, routine, low-cost sample processing that could be run by NGS laboratories of research institutions, cancer centers, and service facilities around the world. Trovogene and Boreal have each contributed proprietary technology and methods to enhance ctDNA detection capabilities from urine and blood to develop a series of cancer specific multigene panels planned for launch in 2017. Under the terms of the agreement, we may pay Boreal two milestone payments totaling \$1.0 million for licensing and distribution rights. As of December 31, 2016, we incurred \$500,000 related to this agreement.

In July 2016, we entered into a broad collaboration agreement with the University of Southern California (“USC”) Norris Comprehensive Cancer Center. This collaboration will seek to establish a standardized framework for the use of Trovera™ urine liquid biopsy testing at USC as well as to define practical considerations and best practices for liquid biopsy testing from urine. The collaboration will also explore the development of clinical treatment algorithms through investigational studies to solidify how and when liquid biopsy testing can be employed.

In July 2016, we entered into a multi-phased collaborative research program with the University of Michigan Comprehensive Cancer Center utilizing the Trovera™ KRAS ctDNA liquid biopsy test. As part of this research collaboration, our ctDNA urine and blood tests will be utilized as noninvasive diagnostic tools to enable early detection and rapid monitoring of patient response to therapy. This will allow the investigators to quickly test multiple therapies to determine which one will be most effective in treating an individual patient’s tumor.

In September 2015, we established Trovogene Srl, also known as the Trovogene Research Institute (“TRI”), a European subsidiary focused on expanding the capabilities and adoption of the PCM platform. Concurrent with the establishment of TRI, we entered into a collaboration agreement with the Department of Oncology at the University of Torino, a leading research center in southern Europe. The collaboration seeks to leverage the superior benefits of urine as a specimen for the detection and monitoring of oncogenic mutations, enhance the multi-gene assay methods and analyses we develop, and explore novel applications in liquid biopsy such as methylation biomarkers.

We have had a history of clinical collaborations and research with leading academic and clinical research oncology institutions around the world. These collaborations allowed access for testing matched patient specimens to oncology tumor profiles, among other applications. Our collaborations have included institutions such as Catholic Health Initiatives Center for Translational Research, Dana Farber Cancer Institute, Memorial Sloan Kettering Cancer Center and Robert H. Lurie Comprehensive Cancer Center of Northwestern University.

In December 2011, we entered into an exclusive license agreement with Columbia University pursuant to which they granted to us a license under their patent rights to hairy cell leukemia biomarkers. The license agreement will continue in effect until May 10, 2021, which is the date of the last to expire of the licensed patent rights covering the license product. The license agreement may also be terminated upon a material breach by Columbia University or by us if we determine that it is not commercially or scientifically appropriate to further develop the license product rights.

In October 2011, we entered into an exclusive license agreement with Gianluca Gaidano, Robert Foa and Davide Rossi pursuant to which they granted to us a license under their patent rights to a specific gene mutation with respect to chronic lymphoblastic leukemia. We have an option to purchase the licensed patent rights in the event the licensor decides to sell such licensed patent rights. The license agreement will continue in effect until September 29, 2031, which is the date of the last to

expire of the licensed patent rights covering the license product. The license agreement may also be terminated upon a material breach by any party or by us if it is determined that it is not commercially or scientifically appropriate to further develop the license product rights.

In May 2006, we entered into a license agreement with Drs. Falini and Mecucci, pursuant to which they granted to us an exclusive license under their exclusive rights for the genetic marker for AML with the intention to utilize these rights for the development of new diagnostic tools. In August 2010, we signed an amendment no.1 to the license agreement, pursuant to which we agreed to pay modified royalties to Drs. Brunangelo Falini and Cristina Mecucci. During the years ended December 31, 2016, 2015 and 2014, we recorded royalty expenses of approximately \$21,000, \$22,000 and \$23,000, respectively.

We are a party to various sublicense agreements under which we sublicense certain of our technologies to other academic institutions and companies in exchange for royalty and license fees. Royalty and license fees are generally calculated as a percentage of net revenues, subject to certain minimums, with rates that vary by agreements. During the years ended December 31, 2016, 2015 and 2014, we recorded net royalty and license fee revenues of approximately \$258,000, \$275,000 and \$270,000, respectively.

## **History**

On April 26, 2002, we were incorporated in the State of Florida. In January 2010, we re-incorporated from the State of Florida to the State of Delaware and changed our name to Trovagene, Inc. In June 2012, our common stock was listed on The NASDAQ Capital Market under the ticker symbol TROV.

Our corporate website address is [www.trovagene.com](http://www.trovagene.com). Our annual reports on Form 10-K, quarterly reports on Form 10-Q, proxy statements, current reports on Form 8-K and amendments to those reports filed or furnished pursuant to Section 13(a) or 15(d) of the Securities Exchange Act of 1934, as amended, are available free of charge at [www.trovagene.com](http://www.trovagene.com) as soon as reasonably practicable after electronically filing such reports with the Securities and Exchange Commission. Any information contained on, or that can be accessed through, our website is not incorporated by reference into, nor is it in any way a part of, this Annual Report on Form 10-K.

## **Operating Segment and Geographic Information**

We operate in one business segment, using one measurement of profitability to manage our business. We do not assess the performance of our geographic regions on measures of revenue or comprehensive income or expense. In addition, all of our principal operations, assets and decision-making functions are located in the U.S. We do not produce reports for, or measure the performance of, our geographic regions on any asset-based metrics. Therefore, geographic information is not presented for revenues or long-lived assets.

## **The Basis for Our Urine-based Molecular Diagnostic Technology**

Cell-free nucleic acids have been found in a variety of human bodily fluids, with the nucleic acids isolated from urine having been extensively characterized. Cell-free nucleic acids in urine have been proven to contain mutated DNA and other markers of disease, including microRNA. In contrast to other bodily fluids (e.g., blood plasma), urine allows for truly noninvasive collection of the sample, provides a larger sample size, and allows for frequent collection. Importantly, urine enables the collection of nucleic acid material from the systemic circulation over a period of time, and those DNA and RNA fragments remain stable in urine. These factors, combined with recently developed technologies to sequence, count, and track nucleic acids with low relative abundance, make the development of our noninvasive diagnostics commercially practical and scalable.

In the human body, about  $10^{11}$  -  $10^{12}$  cells die each day primarily as a consequence of natural physiological processes for tissue and organ maintenance, but also as a result of disease. Together, these dead and dying cells contain more than one gram of DNA, which is mostly degraded into short fragments by specific enzymes. A small proportion of these cell-free nucleic acids escapes complete degradation and appears in the bloodstream. Our scientists were the first to discover that circulating cell-free nucleic acids cross the kidney barrier and can be found in the urine as cell-free DNA. This simple yet remarkable discovery that genetic information from various cells throughout the body is present in urine enabled the development of new, noninvasive techniques for molecular diagnostics and genetic testing.

To unlock the full potential of cell-free nucleic acids, we have developed a proprietary method for the isolation of the short fragmented ctDNA that pass through the kidneys, and proprietary “ultra-short” amplicon assays necessary for the efficient

detection of cell-free nucleic acids, which can be analyzed at our San Diego-based CLIA laboratory. Because of the small size of cell-free nucleic acids in urine, having an isolation method that efficiently captures short nucleic acids is critical. We have multiple methods (patents and pending patents) for the isolation of nucleic acids from bodily fluids, including urine. Many nucleic acid isolation methods are not properly suited for the isolation of cell-free nucleic acids in urine. For example, many DNA isolation kits only capture DNA greater than 200 base-pairs (“bp”) in length, with a few claiming 100 bp or longer. When compared to leading kits for the isolation of DNA from bodily fluids, we have observed, by conducting internal studies, that our method is three to twenty times more efficient in isolating short targets of DNA (e.g., 50 bp) target. In addition to our cell-free nucleic acid isolation method, we have developed our technology for detecting ultra-short amplicons (patents pending). By combining our proprietary nucleic acid isolation method with our ultra-short amplicon assays, we are able to detect systemically derived mutations in urine. We believe that these methods are also applicable to other small or fragmented nucleic acids, including cell-free DNA from blood and formalin-fixed, paraffin-embedded samples.

We are addressing a gap between single-gene PCR assays that can be limited by sample availability and expensive, broad, multigene panels hindered by low clinical sensitivity for mutation detection. In 2017, we plan to introduce our first pan-cancer multigene panel and to offer key institutions and cancer centers the opportunity to bring our proprietary technology and RUO kits in-house for mutation testing and analysis.

Determining DNA and RNA signatures using urine as a “systemic biopsy” may provide a more powerful and effective tool for following and uncovering both pre-clinical and clinical changes, which may include:

- monitoring cancer patients to determine therapeutic response or non-response and disease recurrence;
- determining mutational status when tissue biopsy is unavailable or not advisable;
- monitoring for minimal residual disease (“MRD”) after surgical resection of a malignant tumor, following organ transplant status to watch for rejection;
- noninvasively securing samples for the clinical diagnosis of infectious diseases; and
- screening and testing expectant mothers, whose fetuses may be at risk for certain genetic abnormalities.

Currently, these clinical needs are addressed by the use of invasive bone marrow tests, tissue biopsies, and amniocentesis, as well as costly CT, MRI, and PET scans.

This technology we developed in urine can be applied to detection and monitoring in a broad spectrum of diseases and also to a broad spectrum of sample types (blood, CSF, tissue, etc.).

#### ***Characteristics of Urine-based Cell-free Nucleic Acid Testing***

- The kidney acts as a filter, passing cell-free nucleic acids from complex, multicellular, multicomponent blood into urine, a less complex aqueous environment.
- The collection procedure is noninvasive and does not require the involvement of trained medical staff.
- Urine as a sample type supports repeated testing when required and poses no discomfort for the patient.
- Cell-free nucleic acids in urine are stable at room temperature for extended periods of time with the addition of a simple preservative. Many other traditional samples are not.
- Sample processing and tests can often be easily automated.
- Isolation of cell-free markers from large sample volumes increases sensitivity of the tests. This cannot be done as easily or reliably using tissue specimens, which have inherent limitations.
- Blood or sputum samples for detection of infectious diseases may not be easily obtained from certain patients, including small children and the elderly. Urine specimens typically present minimal acquisition concerns.
- Blood and other bodily fluids can be highly infectious by nature, urine is not.



- Blood and other bodily fluids are legally considered biohazardous, urine is not.

### **Clinical Applications**

We believe that our urine- and blood based cell-free molecular diagnostic tests will make it easier to address important health problems worldwide and will lead to significant advances in personalized medicine for improved patient care. We intend to continue amassing clinical evidence for our cancer monitoring tests in three distinct and potentially overlapping stages. Stage 1 studies are qualitative in nature and are designed to determine the mutational status of actionable biomarkers in urine and blood especially when tissue biopsy is not an option or is inadvisable. These studies demonstrate concordance (agreement) of the oncogene mutation status between a urine sample, blood sample and a tumor tissue sample. These studies are considered to have diagnostic value and are designed to prove that urine- and blood based molecular test results closely match tissue biopsy. The clinical utility of such studies validates that mutational status of actionable biomarkers can be determined in urine or blood when a tissue biopsy is not an option or is not feasible. Stage 2 studies are quantitative in nature and are designed to assess patient mutational status in urine or blood, longitudinally (over time), as an indicator of responsiveness to therapy and disease status of the patient. Stage 3 studies are conducted with the goal to demonstrate improved patient outcomes and eventually could lead to changing medical guidelines and establishment of a new clinical standard of care for managing certain cancers. Demonstrated clinical utility includes quantitatively assessing patient mutational status in urine or blood, longitudinally, for mutational status as well as early detection of resistance to therapy as a decision tool for therapy selection. Generating clinical data with our technology that supports better patient outcomes and more efficient use of healthcare resources is a key component of Stage 3.

We believe that there are several specific applications of our PCM platform technology with regard to helping oncologists monitor a patient's mutational status, thereby optimizing the treatment approach and improving outcomes. Our technology can be used to determine a patient's mutational status for the first time when a tissue biopsy is not feasible, or it can be used to monitor changes in mutational load over time to provide information that can be useful to inform treatment decisions. Should a patient have their tumor removed surgically, our technology can be used to broadly search for minimal residual disease, which can confirm a successful procedure or enable early detection of recurrent disease for improved patient management. Treatment-emergent mutations can also be a major problem and may be drivers of resistance to first-line therapy. Examples of this include the emergent mutation *EGFR* T790M in lung cancer or *KRAS* mutations in colorectal cancer. Because our platform can use a noninvasive, easy to obtain sample from the patient, the ability to monitor more accurately and more often, with fewer barriers to doing so, can provide us with key competitive advantages in the marketplace, particularly with regard to monitoring for treatment-emergent mutations.

### **Oncology**

Urine or blood offer an alternative to tissue biopsy and radiographic imaging. By tracking mutations, we can inform medical practice. Our initial studies focused on the *BRAF* mutation because of its link to discreet cancers and associated treatments, as well as the *KRAS* mutation because of its broad applicability in many cancers. Additionally, initial studies focused on *EGFR* and non-small cell lung cancer ("NSCLC"), and specifically the emergence of the resistance mutation T790M, have played a key role in identifying patients who are progressing on 1<sup>st</sup> or 2<sup>nd</sup> generation targeted tyrosine kinase inhibitor ("TKI") therapy, and who may benefit from a 3<sup>rd</sup> generation TKI. We are now developing National Comprehensive Cancer Network guideline driven, clinically actionable multiGENE pan-cancer and resistance panels for a variety of mutations seen in many common cancer types.

During 2015-2016, we had over 20 ongoing clinical studies with leading cancer centers and pharmaceutical companies to demonstrate the qualitative and quantitative clinical utility of our tests. Clinical study sites include MD Anderson Cancer Center, Memorial Sloan Kettering Cancer Center, USC Norris Cancer Center, the University of Michigan Comprehensive Cancer Center, as well as other top cancer centers, US Oncology, the Pancreatic Cancer Action Network, and pharmaceutical collaborators.

In particular, in October 2016, we were selected by the Pancreatic Cancer Action Network, as the liquid biopsy provider to participate in Precision Promise, the first large-scale precision medicine trial designed to transform outcomes for patients with pancreatic cancer. The clinical trials aim to evolve the way diagnostics are used to optimize treatment and improve patient survival. The Pancreatic Cancer Action Network is the leading non-profit organization committed to increasing survival for people diagnosed with pancreatic cancer, and is making an initial investment of \$35 million in the Precision Promise program to accelerate the clinical trial process to bring promising therapies to patients faster. As a founding member of the initial Precision Promise Industry Working Group, we will contribute to sub-study design and future study objectives. We are engaged with the Pancreatic Cancer Action Network to enter into an agreement for the use of our Trovera™

*KRAS* liquid biopsy test as a dynamic tool throughout the course of patient treatment with experimental therapies, conducted through the Precision Promise program.

### ***Clinical proof of concept for EGFR, KRAS and BRAF mutation assays***

The rociletinib (a 3rd generation tyrosine kinase inhibitor) TIGER-X phase 1/2 study, a collaboration with several leading cancer centers and Clovis Oncology (pharmaceutical company), focused on evaluating the clinical utility of a highly sensitive next-generation sequencing platform for detecting the *EGFR* T790M resistance mutation in urine and blood from patients with advanced NSCLC. While lung cancer is one of the most aggressive malignancies, progress has been made in the advancement of therapeutic strategies to combat the disease. In particular, epidermal growth factor receptor tyrosine kinase inhibitors (“*EGFR*-TKIs”), have demonstrated clinical response rates as high as 80% in patients with NSCLC. However; after 6 to 12 months, most tumors develop acquired resistance to these targeted therapies, and the secondary mutation T790M occurs in approximately 60% of patients showing progression on a 1<sup>st</sup> or 2<sup>nd</sup> generation TKI. Results from this study were presented at the annual American Society of Clinical Oncology (“ASCO”) meeting and the International Association for the Study of Lung Cancer (“IASLC”) World Conference on Lung Cancer in 2016. The data demonstrates that mutation enrichment NGS testing of urine and plasma combined identified more T790M positive cases (95%) compared to tissue alone (83%) and cases missed by tissue are likely due to tumor heterogeneity and/or inadequate tissue biopsy. Each sample type identified unique T790M positive patients providing complementary information and detection sensitivity. Sensitivity of T790M detection in urine was not influenced by intra- vs extra-thoracic disease, with a combination of urine and plasma testing identifying the most T790M positive patients irrespective of disease status (intrathoracic = 91%, extrathoracic = 96%). Combined analysis of urine and plasma should be considered before tissue testing in *EGFR* TKI-resistant NSCLC, including patients without extra-thoracic metastases. In July 2016, publication of the preliminary study results, entitled “*A Highly Sensitive and Quantitative Test Platform for Detection of NSCLC EGFR Mutations in Urine and Plasma,*” demonstrating the clinical and analytical validity of the Trovera™ urine- and blood based liquid biopsy tests to assess *EGFR* T790M mutational status, was published in the Journal of Thoracic Oncology.

The MD Anderson Cancer Center clinical study focused on detecting and monitoring *BRAF* and *KRAS* tumor mutations in ctDNA from urine and blood in metastatic cancer patients. *BRAF* mutations are common in colorectal, melanoma, thyroid, and other cancers. Within the U.S., it is estimated that nearly 730,000 patients have tumors with *BRAF* mutations. Several targeted therapies are either on the market or in development for *BRAF*-mutation positive cancers.

Results from the MD Anderson Cancer Center clinical study were presented at the AACR-NCI-EORTC International Conference in October 2013. During the study, urine samples from metastatic cancer patients known to have *BRAF* V600E, *KRAS* G12D or *KRAS* G12V mutations were assessed. Our researchers analyzed the urine samples using our urine-based cell-free molecular diagnostic assays. Results demonstrated high concordance between urine and tissue mutational status. In addition, preliminary results indicate that ctDNA *BRAF* V600E mutation monitoring in urine correlates with clinical response to therapy. The clinical study demonstrated that *BRAF* V600E mutations were detected in urine irrespective of the cancer type, and a multitude of different cancer types, including brain cancer (“glioblastoma”), were included in the initial study results. The *BRAF* V600E assay demonstrated 95% concordance vs. tissue biopsy (both detected and borderline), and also demonstrated that urinary DNA can be used to detect DNA fragments from circulation that harbor tumor mutations. The following cancers were detected during the study: NSCLC, papillary thyroid carcinoma, melanoma, colorectal cancer, glioblastoma, adenocarcinoma of unknown primary, ovarian cancer, and appendiceal cancer. In addition, preliminary results indicate that ctDNA *BRAF* V600E mutation monitoring in urine longitudinally correlates with clinical response to therapy.

The study also evaluated the feasibility of using massively parallel deep sequencing (i.e., NGS) to identify DNA mutations in the urine and blood of metastatic cancer patients harboring known *KRAS* mutations. Leveraging proprietary enrichment methods, our researchers were able to detect mutant ctDNA in the urine of cancer patients with verified *KRAS* mutations. Data from this study was presented at the 2017 Gastrointestinal Cancers Symposium and published in *Clinical Cancer Research* (Fujii, et al, 2017). In a cohort of 71 patients with advanced cancers, the *KRAS* assay had good concordance with tissue testing and changes in urine ctDNA were associated with time to treatment failure

### ***CLIA validated EGFR mutation assays***

In the first quarter of 2015, our urine-based tests for the activating mutations, *EGFR* L858R and *EGFR* Exon 19 Deletions, as well as the resistance mutation, *EGFR* T790M, became available to clinicians through our CLIA/CAP-accredited laboratory. These assays detect and monitor three critical mutations that are believed to drive the progression of NSCLC. The robustness of our ultra-sensitive assays has been demonstrated for the detection of these three *EGFR* mutations from cell-free DNA in urine.

In November 2015, the first targeted treatment for *EGFR* T790M mutation-positive NSCLC, Tagrisso (osimertinib), was approved by the U.S. Food and Drug Administration (“FDA”). Additional drug candidates are in advanced clinical development for this indication. We believe that our noninvasive assays for the detection and monitoring of both activating and resistance *EGFR* mutations have potential to play an important role in the treatment of NSCLC.

An initial clinical study conducted at UC San Diego Moores Cancer Center focused on the determination and monitoring of *EGFR* T790 resistance mutations in lung cancer patients. With new targeted therapies for *EGFR* T790M mutation-positive lung cancer on the market or in late-stage clinical development, detection of this resistance mutation has a direct impact on treatment selection for patients who are progressing on first-line targeted therapy. The primary purpose of this collaborative study was to determine whether *EGFR* T790M mutations can be evaluated in urine to monitor treatment response in patients that are found to be positive for the mutation. We have several ongoing programs to evaluate the detection and monitoring of *EGFR* mutational status in lung cancer patients. A focus of these studies is the emergence of the resistant mutation *EGFR* T790M in these patients, which can be important for informing treatment decisions. Our collaborators for evaluating our technology in NSCLC include Memorial Sloan Kettering Cancer Center, City of Hope Comprehensive Cancer Center, Clovis Oncology, and Genomac Research Institute, among others.

In April 2015, we presented clinical results at the European Lung Cancer Conference demonstrating that our urine-based PCM platform outperformed tissue biopsy for the detection and monitoring of *EGFR* T790M mutations in metastatic lung cancer patients. In an interim analysis of 34 patients from an ongoing clinical study, our PCM platform detected the *EGFR* T790M mutation in all patients who were positive for the mutation in tissue biopsy. Our urine-based assay identified additional patients as *EGFR* T790M-positive, including those who had clinical suspicion of *EGFR* T790M-progressive disease, but were either negative by tissue biopsy or had not yet undergone tissue biopsy for confirmation. Based on the study results, our PCM platform detected *EGFR* T790M resistance mutations months earlier than radiologic detection of progression in patients. Early pharmacodynamic events occurring within hours or days of anti-*EGFR* drug treatment were evaluated in the study by implementing daily monitoring of urinary ctDNA. Initial results demonstrated that immediate changes in *EGFR* mutational load using a urine specimen may identify patients who respond to anti-*EGFR* therapy much earlier than follow-up CT-scans.

In June 2015, we announced the presentation of clinical study results at ASCO. The study was designed to determine the concordance between tissue and urine in patients with metastatic NSCLC with confirmed or suspected T790M resistance mutation. Additionally, the study tested the hypothesis that T790M could be detected in advance of radiographic scan showing disease progression and that early dynamics of T790M mutational load in ctDNA within the first week may provide insight into tumor biology and predict radiographic response to therapy with 2<sup>nd</sup> line TKI therapy. Concordance to urine: *EGFR* T790M mutation was detected in 24 of 35 (69%) patients receiving anti-*EGFR* treatment. Urine T790M detected in 14 out of 14 tissue-positive patients (100% sensitivity). Early acquisition of *EGFR* T790M: T790M mutation was detected as early as 3 months prior to radiological progression. Pharmacodynamics of early response seen in urine: Spikes in ctDNA after daily collection may correlate with early tumor lysis.

In November 2015, we announced the presentation of data at the AACR-NCI-EORTC Meeting, assessing *EGFR* mutation detection in matched urine, plasma and tumor tissue in NSCLC patients treated with an investigational 3<sup>rd</sup> generation TKI. Approximately 60% of patients who receive an *EGFR*-TKI develop the acquired resistance mutation T790M. Acquisition of suitable tumor tissue is a challenge for a considerable fraction of advanced NSCLC patients who require *EGFR* testing. We examined the detection of *EGFR* T790M mutation in ctDNA from urine, assessed urine sample requirements, and compared the results with contemporaneously matched tumor tissue and plasma in TIGER-X, a phase 1/2 clinical study of rociletinib in previously treated patients with advanced NSCLC and mutant *EGFR*. The analysis of ctDNA from urine identified a similar proportion of T790M positive patients as tissue- or plasma based testing, with the highest positive percent agreement (“PPA”) among patients with approximately half of a normal void (90-100 mL, PPA=93%). Urine and tissue tests complement one another; each test identifies cases missed by the other. Discordant samples between urine and tissue that were not identified by the tumor test may be explained by tumor heterogeneity and/or inadequate biopsy. *EGFR* mutation detection from urine should be considered a viable approach, particularly when tumor tissue is not available. Monitoring urine ctDNA T790M mutation levels longitudinally is feasible and is being further explored as a means to inform choice of therapy.

In June 2016, we announced the presentation of data from a large study demonstrating the use of urine testing for the detection of *EGFR* T790M mutations at ASCO. In an oral presentation entitled, “*EGFR* Genotyping of Matched Urine, Plasma, and Tumor Tissue in Non-small Cell Lung Cancer Patients Treated with an *EGFR* Tyrosine Kinase Inhibitor,” we presented data that demonstrated the clinical response to rociletinib was comparable irrespective of whether T790M status was identified by urine, plasma or tissue biopsy.

In December 2016, we announced the presentation of data from a large study entitled “*A Highly Sensitive Next Generation Sequencing Platform for Detection of NSCLC EGFR T790M Detection in Urine and Plasma,*” at the IASLC World

Conference on Lung Cancer. In this study we demonstrated mutation enrichment NGS testing by urine and plasma by Trovera™ testing in combination identified 94.8% of T790M positive cases. Combination of urine and plasma may be considered before tissue testing in *EGFR* TKI resistant NSCLC, including patients without extrathoracic metastases

In December 2016, we announced the presentation of an outcomes and total cost of care analysis using urine ctDNA T790M mutation testing in patients with NSCLC, at the IASLC World Conference on Lung Cancer. The analysis showed that a Urine Testing Strategy (“UTS”) is expected to reduce biopsies and associated risk of complications by 55.6% compared with a Tissue Testing Strategy (“TTS”). Cost savings exceeding \$1,200 are anticipated and may be 2-to 3-fold greater (>\$2,700 per test ordered). UTS increases the likelihood of detecting T790M and treating appropriately. Savings significantly depend on factors including the type of treatment for T790M-negative disease. The actual cost of care is likely higher, as costs vary depending on the setting, thus savings from avoided biopsies and their complications are likely larger than what is reported in the base case. Novel technologies may have detection rates approaching 100%. As shown in this analysis, the UTS care pathway with a detection rate of about 80% is sufficient to realize considerable costs relative to TTS. The rational and efficient use of resources will necessarily put great emphasis on assigning a unit cost to the test in relation to its clinical and economic value. UTS is a dominant care pathway relative to TTS. It saves costs and improves the patient experience.

In December 2016, we announced the presentation of a case series of NSCLC patients and the longitudinal monitoring of ctDNA *EGFR* mutation burden from urine and the correlation with patient response to treatment with TKIs, at the IASLC World Conference on Lung Cancer. The patient cases presented were those in which urinary mutational *EGFR* assessment aided in the diagnostic workup and clinical management of patients. Recent work demonstrated that *EGFR* ctDNA can serve as an early indicator of therapeutic response. This can provide valuable information particularly in the setting of late-stage patients treated with experimental therapies or in patients progressing on therapy. The noninvasive nature of urinary liquid biopsies allows for repeat testing to capture dynamic changes in systemic ctDNA load. The dynamic changes in ctDNA *EGFR* systemic load observed in this patient case series is consistent with previous findings. While further work is needed to characterize ctDNA as a formal tool for disease evaluation (e.g. RECIST), dynamic changes in ctDNA load have emerged as potentially viable biomarkers to monitor disease burden and early response to therapy. The manuscript titled, “*Longitudinal Monitoring of ctDNA EGFR Mutation Burden from Urine Correlates with Patient Response to EGFR TKIs: A Case Series,*” was published in the journal, *Lung Cancer*, in February, 2017.

#### **CLIA validated BRAF mutation assay**

In October 2013, our first urine test for cancer mutation monitoring was made available to clinicians through our CLIA/CAP-accredited laboratory. The robustness of our ultra-sensitive assay procedure has been demonstrated for the detection of the *BRAF* V600E mutation from ctDNA in urine. This mutation commonly occurs in melanoma. Of the more than 70,000 cases of melanoma diagnosed each year in the U.S., up to 70% harbor a *BRAF*-type mutation and of those, 80% may be positive specifically for *BRAF* V600E. There are several approved targeted therapies for the treatment of *BRAF*-positive melanoma, making mutational status monitoring an area of clinical interest among treating physicians.

Our ctDNA *BRAF* test is a laboratory developed test (“LDT”), designed to detect and monitor this mutation in metastatic cancer patients with biopsy-proven V600E *BRAF* mutation in their tumor. It is the first and only commercial assay within our cancer monitoring portfolio performed using a ddPCR platform. Using urine as a noninvasive, systemic sample, the ctDNA *BRAF* test could help physicians monitor changes in mutation status for patients requiring therapy for cancers that have this mutation. For patients with difficult-to-biopsy metastatic tumors, urine-based mutation testing may also provide a viable alternative to gauge mutation status as part of the initial treatment workup.

In April 2014, we announced the presentation of clinical study results at the American Association for Cancer Research (“AACR”) Annual Meeting. Of the 33 patients enrolled in the study, our *BRAF* V600E oncogene mutation assay was able to identify the mutation in 29 patients (88%) at least one time during the study, demonstrating a high level of concordance with tissue biopsy.

Longitudinal analysis was performed in 17 patients who had more than one urine-based test during the monitoring period. Of these patients, 13 (76%) showed a correlation between response to treatment and mutational status observed by the urine-based test. The results were presented by Filip Janku, M.D., Ph.D., University of Texas MD Anderson Cancer Center.

In June 2014, we announced that expanded clinical study results demonstrating the utility of our PCM platform were released at the 50th Annual Meeting of the ASCO. Data from a study in multiple cancer types were published in the 2014 ASCO Annual Meeting Proceedings, a *Journal of Clinical Oncology* by Filip Janku, M.D., Ph.D., University of Texas MD Anderson Cancer. In this study, longitudinal analysis of sequential urine samples demonstrated a statistically significant correlation between changes in the amount of *BRAF* V600E mutation load and treatment response with targeted drug therapy

( $p=0.002$ ), per RECIST 1.1 criteria. Results also demonstrated that patients with a decrease in *BRAF* V600E mutation load had a longer median time to treatment failure compared to those that did not (259 days versus 61 days;  $p=0.002$ ). Patients in the study had melanoma ( $n=7$ ), NSCLC ( $n=3$ ), colorectal cancer ( $n=2$ ) and other forms of cancer ( $n=5$ ). Additionally, clinical results from a study in patients with histiocytic disease were presented by Eli Diamond, M.D., Memorial Sloan Kettering Cancer Center. In this study, our PCM technology demonstrated 93% concordance for identifying the *BRAF* V600E mutation and confirmed the absence of the mutation in the six patients whose biopsies tested negative. Our assay also detected the *BRAF* V600E mutation in two patients for whom tissue biopsy material was inadequate to determine mutational status, and these results were subsequently confirmed with follow-up biopsies. Our PCM platform showed 100% concordance in monitoring response to therapy in six study subjects who tested positive for the mutation and were treated with a *BRAF* inhibitor. Results from this study were published in the journal, *Cancer Discovery*, and in clinical consensus guidelines for the diagnosis and treatment of patients with the histiocytic disease, Erdheim-Chester disease.

#### **CLIA validated KRAS mutation assay**

In March 2014, our urine based test for *KRAS* mutations became available to clinicians through our CLIA laboratory. This assay detects and monitors the seven most commonly encountered mutations of the *KRAS* oncogene and is our first multiplexed oncogene mutation assay utilizing next-generation sequencing as a mutation detection platform. The robustness of our ultra-sensitive assays has been demonstrated for the detection of *KRAS* mutations from cell-free DNA in urine. This mutation commonly occurs in patients diagnosed with either colorectal cancer, pancreatic cancer, or lung cancer. Pancreatic cancer is one of the deadliest human malignancies. According to the American Cancer Association, approximately 53,000 Americans will be diagnosed with pancreatic cancer this year, and roughly 42,000 will die from the disease. Of the more than 1.1 million estimated cases of colorectal cancer in the U.S., up to 40% are estimated to harbor *KRAS* mutations. In pancreatic cancer and lung cancer, approximately 90% and 15% of patient's harbor *KRAS* mutations, respectively. Because of the prevalence of this mutation in several important cancer types, detecting and quantitatively monitoring *KRAS* mutational status is an area of clinical interest among treating physicians.

The clinical study being conducted at the USC Norris Cancer Center is focused on mutation monitoring and the emergence of *KRAS* resistant mutations in colorectal cancer. With multiple targeted therapies for colorectal cancer on the market, detection of *KRAS* mutations in tissue has a direct impact on the initial treatment selection for these patients. The primary purpose of the collaborative study is to determine whether *KRAS* mutations can be evaluated in urine to monitor treatment response in patients that test either positive or negative for the mutation.

The U.S. Oncology clinical study will test detection and monitoring of *KRAS* mutations in pancreatic cancer patients. In addition to the U.S. Oncology Research-affiliated community cancer care sites participating in this study, additional academic research institutions that specialize in oncology have also elected to participate. CT scans and CA19-9 blood levels are currently the only two methods available to clinicians to monitor metastatic pancreatic cancer tumor burden and response to therapy. However, approximately 11%-17% of patients will not display elevated CA 19-9, even with high tumor load. For patients that test negative for CA19-9, our method to follow disease status by detecting and monitoring *KRAS* mutations could be distinctly beneficial.

In November 2015, we presented clinical results at the AACR-NCI-EORTC meeting highlighting our ability to detect and quantitate *KRAS* mutations in blood and urine samples from patients with advanced colorectal cancer. Results showed a highly correlated response. Of the blinded retrospective plasma cell-free DNA samples evaluated, 95% displayed the *KRAS* mutation concordant with tumor tissue, and for evaluable urine samples in the study, 92% displayed the *KRAS* mutation concordant with tumor tissue. The majority of patients in the study underwent surgery and received neo-adjuvant or adjuvant therapy, and serial monitoring of *KRAS* mutations using our assay showed a clear correlation between blood and urine samples. An estimated analytical limit of detection of two copies per ~100,000 genome equivalents, or 0.002% was observed in the study, demonstrating very high analytical sensitivity.

In May 2016 we announced the presentation of data at the AACR Pancreatic Cancer Meeting. Data from this large clinical study in patients with pancreatic cancer demonstrates the high detection rate and ability to monitor *KRAS* mutations. 92.9% of metastatic pancreatic cancer patients were determined to be *KRAS* positive using our *KRAS* liquid biopsy test, which matches the published prevalence of *KRAS* mutations in pancreatic cancer (~90%). While little progress has been made in the treatment of pancreatic cancer over the past several decades, advances in the understanding of the disease's biology provide new potential opportunities for treatment. ctDNA *KRAS* levels can be used to distinguish between locally advanced and metastatic cancer, suggesting an improved biomarker for disease differentiation. Longitudinal monitoring of *KRAS* can be informative in determining responsiveness to therapy and to predict disease progression months in advance of imaging. This dataset is the largest prospective study exploring ctDNA *KRAS* in unresectable pancreatic cancer.

### **Additional mutation assays and clinical programs**

We remain focused on expanding the mutation coverage of our platform to address the relevant clinically actionable driver and resistance mutations in cancers for which the National Comprehensive Cancer Network guidelines recommend targeted therapies, such as lung cancer, colorectal cancer, pancreatic cancer, and melanoma. In addition to our assays for the *BRAF*, *KRAS*, and *EGFR* oncogenes, we are also developing more comprehensive mutation coverage for these other cancers and are adding additional oncogenes with an initial focus on lung and colorectal cancer, as well as targeting clinically validated resistance mutations for gene rearrangements such as *ALK*, *RET*, and *ROS*. The primary objective of our clinical development program is to demonstrate utility for noninvasive, near real-time detection and monitoring of oncogene mutations for any tumor type with our highly sensitive urine- and blood-based platform. Our clinical programs with top-tier cancer centers will continue to drive multiple opportunities for data presentations at key conferences and publications in peer-reviewed journals.

### **Infectious Disease**

Following the completion of a pilot clinical study with a urine-based DNA test for high-risk HPV, our first HPV-HR detection assay became commercially available in March 2013. Initial data from the pilot study showed that our assay provided superior performance to the current leading HPV assay. Our HPV-HR Detection assay showed a sensitivity of 93.0% and specificity of 96.0% for the detection of HPV in a comparative study of 320 high-risk individuals.

In August 2014, we presented results from two clinical studies at the 29th International Papillomavirus conference for our urine-based diagnostic test for the detection of high risk strains of HPV. Results from both pilot studies consistently demonstrated that our urine-based HPV assay had sensitivity greater than 90% for identifying women with high grade cervical intraepithelial neoplasia (“CIN”2/3). Assay performance was comparable to traditional HPV testing with commercially available tests in patient-matched cervical samples. In one of the studies, urine collection was examined to establish standardization of urine as a clinical specimen for high-risk HPV testing.

In February 2015, clinical results from the PREDICTORS 4 trial were presented at the European Research Organization on Genital Infection and Neoplasia (“EUROGIN”) 2015 Congress, which demonstrated high sensitivity for our noninvasive, urine-based HPV assay when determining HPV types and cervical lesions or cervical intraepithelial neoplasia (“CIN”) Grade 2/3. Within the PREDICTORS 4 trial, urine and cervical samples were collected from 501 women, and data from this large patient subset demonstrated that sensitivity with our HPV assay for cervical samples was comparable to established cervical screening tests. Sensitivity of our HPV assay using cervical samples was 96.3% for CIN Grade 3+ and 94.5% for CIN Grade 2+. Sensitivity for urine samples was 91.4% for CIN Grade 3+ and 89.0% for CIN Grade 2+. Furthermore, detection of high risk HPV in urine was not different from cervical samples for all age groups of women in the study (18-29 years, 30-39 years and 40-69 years). The study authors concluded that while there is a small loss of sensitivity in urine, the greater than 90% sensitivity for CIN Grade 3+ is still better than conventional Pap cytology, which makes this assay a good candidate in our efforts to increase adoption of HPV testing, especially for women who are not currently being screened for cervical cancer.

Urine-based HPV testing may offer a significant advantage over the traditional cervical swab sample, which can present a logistic, invasive or privacy concern. A urine-based assay also makes both female and male carrier screening feasible.

Through licensing agreements, we are pursuing commercialization of our HPV-HR Detection test, particularly in those geographies where compliance with cervical cell sampling is problematic.

### **Prenatal Genetics**

The combination of NGS or ddPCR with our proprietary cell-free nucleic acid technology would allow for truly noninvasive prenatal screening of aneuploidies and monogenic disorders. We may pursue the development of our technology for use in prenatal genetics through licensing agreements.

### **Transplant**

Patients who receive solid organ or bone marrow transplants are at risk of rejection, particularly during the first few months following surgery. Noninvasive monitoring of transplant status could replace repeated biopsies and blood tests, while keeping both the patient and the physician informed about potential problems.



## Changing the Molecular Diagnostic Paradigm

Diagnosis and detection of severe and life-threatening diseases are among the most important outcomes of the Human Genome Project (“HGP”). There are four requirements to realize the full benefit of the HGP in relation to advances in the war on cancer: (1) large catalogues of cancer mutations, (2) affordable sequencing of patient samples, (3) detection technologies capable of identifying and quantifying rare instances of mutations at affordable prices, and (4) abundant samples that can be collected easily and frequently in order to monitor an individual’s cancer.

The first requirement has been met through the Sanger Centre’s Catalogue of Somatic Mutations in Cancer database, which has documented more than 233,000 mutations in more than 20,948 genes, and by the National Institutes of Health’s (“NIH”) The Cancer Genome Atlas, which has data on more than 20 cancer types and provides a host of tools for their analysis. The second requirement has been met through the dramatic and continuing decrease in the cost of both conventional sequencing and NGS. NGS and ddPCR, capable of detecting rare mutations among thousands of wild type molecules at a reasonable cost, fulfill the third requirement.

Our proprietary methods provide the fourth and final requirement, the provision of an abundant systemic sample that allows the purification of cell-free nucleic acids in amounts necessary to detect rare mutations. Furthermore, the “liquid biopsy” provided by urine can be collected frequently, is truly noninvasive, and requires no specialized personnel to collect it.

Taken together, these developments will increase the effectiveness of cancer diagnostics, improve healthcare spending efficiency and overall enable better patient care. These developments have made the era of personalized precision medicine in cancer possible.

## The Market

The global molecular diagnostics market is forecast to reach nearly \$8.0 billion by 2018, a compound annual growth rate (“CAGR”) of 9.7%, from 2013-2018. This market is segmented on the basis of application, technology, end user, product, and geography. Based on application, the market is further segmented into infectious diseases, oncology, genetics, blood screening, microbiology, and others. Infectious diseases secured the largest market share, whereas oncology was the fastest growing segment amongst the rest. The driving forces of the molecular diagnostics market include the rising incidences of infectious diseases, genetic disorders, and cancer, as well as technological advancements such as assay improvements, new diagnostic tests with novel clinical utility, and portability of equipment. The technology segment of the molecular diagnostics market is comprised of polymerase chain reaction (“PCR”), Isothermal Nucleic Acid Amplification Technology, hybridization, DNA sequencing and NGS, microarray, and others.

Based on products, the molecular diagnostics market is segmented into instruments, reagents, services and software. Reagents occupy the largest market share and will also register the maximum growth rate in the forecasted period of 2013 to 2018. These reagents include assays that detect and diagnose diseases and are also used as biomarkers that predict the biological properties of potential drug compounds.

North America accounts for the largest share of the market and is poised to grow at a high rate in the forecast period from 2013 to 2018. The growth can be attributed to the rising incidences of infectious diseases, cancer prevalence, and genetic disorders that are further adding to the overall prevalence of chronic diseases. Europe is the second leading contributor to the molecular diagnostics market. However, the growth of this region is expected to be sluggish in the forecast period and is estimated to grow at a lower CAGR than North America, due to factors such as the uneven reimbursement policies and the European economic crisis. Asia is the most promising region for molecular diagnostics in the coming five years. It is expected to grow at a higher CAGR than North America and Europe over the forecast period. The large population base and improved purchasing power of patients are the major drivers of this market.

We believe the liquid biopsy kit market will exceed \$5.0 billion dollars by the year 2020. This market consists of instrument sales, detection and monitoring of prominent mutations in lung and colorectal cancer. There is a strong desire on the part of clinical research pathologists to utilize liquid biopsy testing at their institutions using broad and established next generation sequencing technology. Thirty percent of clinical molecular laboratories currently perform NGS based testing. Our new multigene, clinically actionable and highly sensitive panels and mutation enrichment technology offer industry-leading sensitivities that enable detection and monitoring of driver and resistance mutations associated with many of the common solid tumor cancers. We believe that our broad intellectual property portfolio positions us well within these markets to develop and market molecular diagnostic products. The use of urine as a sample should provide a paradigm shift in screening and monitoring practices as it provides an easier sample to acquire in a truly noninvasive fashion, with more nucleic acid targets

present in the sample leading to greater sensitivity. We believe these modified testing practices will most likely meet with wide physician and patient acceptance in oncology, infectious disease, transplantation, and potentially, prenatal diagnostics.

## Commercial Markets — Internal Focus

### Oncology

Cancer mutation testing and monitoring is the priority area for our scientists and commercial personnel. Early data from ongoing clinical studies have shown that ctDNA analysis may be useful for determining the presence or absence of actionable mutations, and for monitoring therapeutic response and recurrence in solid tumor cancers. Such testing could serve to help physicians make treatment decisions, monitor early and ongoing response to therapy or minimal residual disease after surgery, identify signs of early progression, or see markers of resistance emerge prior to clinical presentation. Once therapy is completed, a simple urine or blood test can be used to monitor for early signs of disease recurrence over time. The market for these tests, which is diagnosed cancer patients possessing mutations known to have clinical or therapeutic importance, is already established. Use of urine- or blood based testing could be disruptive and change the pattern of use of other cancer monitoring tools, including imaging technologies, such as PET, CT and MRI scans.

According to the American Cancer Society's ("ACS") 2015 report, there are approximately 565,000 patients that die every year from cancer, not including cancers of the blood, bone marrow or lymphatic system. Using this number as a proxy for metastatic cancers, it can be assumed that all of these patients are being treated within 12 months of death for their disease. Testing and monitoring these patients for response to therapy or progression while on therapy, or for markers of resistance to therapy (like *EGFR T790M* for lung cancer), would be a natural extension of our technology. The average lung, breast, or colon cancer patient receives between 18-21 radiographic imaging procedures (PET, CT, MRI, etc.) during the two years following their diagnosis. This averages to approximately nine to ten scans per patient per year. Use of a urine- or blood based monitoring test at the start of therapy, at several points in time during therapy, and at the completion of therapy would represent approximately six to ten separate testing events that could occur within a 12-month period. At a reimbursed price of approximately \$1,000 per test, the total available market ("TAM") for treatment response monitoring in the U.S. could be worth between \$3.0 billion and \$5.0 billion annually.

Once patients with cancer, primary or metastatic, have completed therapy, they will require monitoring for possible progression and for the appearance of resistance markers, since many metastatic patients may remain on lower-dose "maintenance therapy" during the remainder of their lives, or until treatment is no longer considered an option. According to the ACS, as of January 2014, there were nearly 14.5 million patients alive in the U.S. who had been treated for cancers that have metastatic potential. Use of a urine- or blood based mutation monitoring test once a year at \$1,000 per test would equate to a TAM for recurrence monitoring in the U.S. of approximately \$14.5 billion annually.

Beyond cancer patients being actively treated or monitored over time, ctDNA testing may eventually emerge as a viable option for pre-cancerous screening. This was recently evaluated in a cancer clinical study at Thomas Jefferson University, funded jointly by the NIH and the National Cancer Institute ("NCI"). The study demonstrated that DNA fragments carrying a specific mutation (*KRAS*), and released from pre-cancerous colon polyps, can be detected in the urine of patients.

Studies have shown that cancer patients who have *KRAS* mutations do not respond successfully to treatment with anti-*EGFR* drugs such as Erbitux, Iressa, Tarceva, Tykerb, and Vectibix.

These anti-*EGFR* agents, particularly Erbitux and Vectibix, are a mainstay of treatment for colorectal cancer. It has been estimated that 17%-25% of all human cancers have been found to harbor *KRAS* mutations, with mutation rates as high as 59%-90% in pancreatic cancers and 35%-40% in colorectal cancers. These tumors have a low probability of responding to anti-*EGFR* drugs. By first testing for *KRAS* mutations, physicians will be able to better manage their patients and avoid costly treatments that are unlikely to have a positive clinical response.

Screening and monitoring for *KRAS* and other key biomarker mutations (i.e. *BRAF*, *EGFR*, *NRAS*, *PIK3CA*, etc.) using urine-based tests would provide a simple, noninvasive, cost-effective, and convenient testing option, versus tissue biopsy, for physicians and patients. Urine samples may even be collected in the patient's home as required, or as requested by the physician.

Simple urine- and blood based assays would likely lead to improved personalized medicine for patients, resulting in the right drug being prescribed for the right patient at the right time. We believe this technology will lead to an improved quality of life for patients and will become part of a new standard of care for those patients and physicians waging the fight on cancer.



## ***Drug Development and Monitoring of Therapeutic Outcomes***

Cell-free DNA diagnostic technology has significant potential as a simple, quick, noninvasive way of monitoring clinical responses to drugs in clinical development and evaluating patient-specific responses to already approved and marketed therapies. Specific target applications include, but are not limited to, the detection of metastasis following tumor surgery, monitoring of response and tumor progression during chemotherapy, immunotherapy, and/or radiation therapy, development of optimal hormonal and chemotherapeutic treatment protocols, and monitoring of transplantation patients on immunosuppressive drugs.

With cancer today, it is often difficult to determine if a particular patient is responding to their current therapeutic regimen. Generally, patients are re-examined periodically to determine if a tumor has grown in size, reduced in size (i.e., partial response), disappeared (i.e. no sign of disease - complete response) or remained the same (stable disease). If the tumor has grown in size or remained the same, treatment may be adjusted. By measuring and monitoring tumor specific genetic markers in a patient's urine pre-, peri- and post-chemotherapy or targeted therapy, it may be possible to more quickly determine whether a patient is responding to therapy. Use of ctDNA diagnostics may permit more rapid and real-time therapeutic decisions on a patient-specific basis. Approximately 1.7 million new cancer cases are diagnosed annually, and there are several hundred companies developing therapeutic agents in the U.S. alone. We believe this indicates a large potential application to use ctDNA diagnostic technology for both drug development and the monitoring of therapeutic outcomes.

One of the largest costs associated with development of a new therapy is the size of human clinical studies required to identify the cohort of responders, and the resulting statistical power required. By measuring specific genetic markers, it may be possible to pre-identify, and subsequently screen, for the most likely responders to the therapy, and to limit patient recruitment to this subset. This strategy could significantly reduce the cost to develop a drug and improve development timelines. We believe that there is a significant commercial potential for our urine-based cell-free molecular diagnostic technology to be incorporated into these clinical trial protocols, and ultimately into post-approval patient identification protocol.

## **Commercial Markets — External Focus**

We will seek to license and/or partner with other companies who have vested interests or commercial strengths in the following areas in order to develop applicable diagnostic and/or monitoring tests using our cell-free molecular diagnostic technology.

### ***Infectious Diseases — HPV***

The rationale for screening for HPV is that high-risk subtypes cause virtually all cases of cervical cancer. We have developed a urine-based HPV test capable of screening for known high-risk HPV types that are associated with the development of cervical cancer. Cervical cancer is the third most commonly diagnosed cancer, and the fourth leading cause of cancer deaths in females, worldwide. Deaths due to cervical cancer are a significant global problem, especially in developing countries where screening practices are inadequate.

According to the ACS, India alone accounts for 27% (77,100) of total worldwide cervical cancer deaths. A recent clinical trial conducted in rural India found that a single round of HPV DNA testing was associated with an approximately 50% reduction in the risk of developing advanced cervical cancer and associated deaths. In the U.S., better patient compliance and screening guidelines reduced cervical cancer death rates to only 4,290 cases in 2011. The major drivers of poor screening in these developing regions are cultural acceptance, limited screening resources and funding, and poor cytology proficiency. Further exacerbating the compliance hurdles is that the primary screening mechanism involves an invasive cervical scraping procedure (e.g., Pap smear). It is generally agreed that the early detection of cervical cancer leads to much higher recovery rates and lower rates of invasive disease.

There is a tremendous unmet need for a new noninvasive, simple, private, and cost effective test to simplify the HPV screening process for patients and, in turn, improve compliance. We believe our urine-based HPV test has the potential to address these market needs.

Other areas beyond HPV detection and monitoring include those infectious diseases caused by viruses, bacteria, fungi, and parasites. Cell-free nucleic acid assays that detect molecular targets in organisms can provide a quick, accurate, simple, and cost effective method for screening and monitoring disease. Specific areas of interest include testing for molecular targets from organisms that cause Lyme disease, John Cunningham Virus, valley fever, and various fungal infections. These organisms

all tend to be difficult to identify with current technology, making differential diagnosis especially challenging, thus delaying the start of potentially curative anti-infective treatment.

### ***Transplantation***

According to government statistics, there are approximately 28,000 solid organ transplants performed in the U.S. annually. Post-transplant monitoring for organ rejection episodes requires a highly invasive tissue biopsy. Approximately ten such biopsies are taken over a period of one year per patient. Because organ rejection is marked by the early death of cells, we believe that an early indication of rejection can be identified by measuring a unique series of genetic markers characteristic of the organ donor that can be easily detected in random urine specimens from the transplant recipient. Providing early evidence of tissue rejection is key to the administration and monitoring of immunosuppressive therapies used to prevent rejection. Given the annual number of transplants performed in the U.S. and the annual number of corresponding biopsies performed per patient, this would equate to a market opportunity in the U.S. of roughly 300,000 urine-based tests per year. Transplantation monitoring with our technology offers opportunities for partnering with companies developing drugs for controlling tissue rejection, developing cell transplantation, or developing novel transplantation technologies. This illustrates the breadth of commercial potential of our cell-free molecular testing platform technology, and we intend to leverage such potential applications to maximize stockholder value.

### ***Technologies for the collection, shipment and storage of urine specimens, and cell-free nucleic acid extraction***

Successful implementation of our cell-free nucleic acid technology in molecular testing is tightly linked to the availability of techniques and procedures for cell-free nucleic acid preservation, purification, and analysis. Our strategic plan includes the allocation of sufficient resources for the creation of robust, feasible, and inexpensive approaches to improve the efficiency of working with urine samples. In November 2016, we entered into a long-term Supply and Distribution Agreement with Boreal, merging our respective technologies to co-develop urine and blood ctDNA assay kits and systems. Through this partnership, we intend to address an unmet need in the liquid biopsy testing market by providing an assay platform to enable simple, routine, low cost sample processing that can be run by NGS laboratories of research institutions, cancer centers, and service facilities around the world. Boreal and our Company have each contributed proprietary technology and methods to enhance ctDNA detection capabilities from urine and blood to develop a series of cancer specific multigene panels planned for launch in 2017.

Our investment in the research and development of new nucleic acid preservatives or methods, which improve the stability of urine as a cell-free nucleic acid specimen led to the development of a new urine collection and DNA preservation cup (“Next™Collect”). We are also developing a DNA extraction and isolation kit (“Next™Extract”) that will make it feasible to further automate extraction and isolation of DNA from urine. Upon the completion of such projects, it is our expectation that a simple and streamlined method can be “kitted” as a stand-alone product to provide academic researchers with reagents that they can purchase and utilize in their own laboratories.

Our research and development program serves three primary purposes: it will (1) accelerate the rate of publications and development of the body of evidence supporting urine as a viable specimen and, therefore, market acceptance of urine-based ctDNA testing, (2) create an RUO product for direct sale, and (3) provide a foundation for our technology transfer programs to partner reference laboratories seeking to bring ctDNA testing technology in-house.

### ***Expansion of Analytically Validated Instrumentation, Systems, and Platforms***

A unique element of our cell-free nucleic acid testing method is its design, which is focused on “counting” the target molecules already enriched through our initial proprietary specimen collection, isolation, and amplification procedures. This molecular counting is currently achieved in our CLIA/CAP-accredited laboratory by using Illumina MiSeq systems as the detection platform; however, this molecular counting is not limited to just this type of system. Alternative NGS systems, Mass Spectrometry-based systems, ddPCR, or MicroArray reading systems may also be used in conjunction with our front-end sample preparation technology. As we expand our menu of targeted biomarker tests, we will also broaden the available platforms that can be used as detectors. When coupled with the RUO kitting program referenced above, the benefit of multiple analytically validated detection systems will increase the addressable market for our technology transfer program and future commercial partnerships.

### ***Our Business Strategy***

We plan to leverage our cell-free nucleic acid technology to develop and market, either independently or in conjunction with partners, molecular diagnostic products in our core market, oncology, as well as other markets including

infectious disease, transplantation, and prenatal diagnostics. Our primary focus is utilizing our core technology in measuring ctDNA in urine and blood with our proprietary platforms, and research use only kits and reagents. We look to commercialize our technology by providing testing services from our CLIA/CAP-accredited laboratory in San Diego, California as well as by distributing RUO kits and systems to clinical research laboratories, leading cancer centers and pharmaceutical companies.

The U.S. Congress passed the CLIA in 1988 to regulate development, evaluation, and use of LDTs. The CLIA states that laboratories must demonstrate how well an LDT performs using certain performance standards. Laboratories that perform testing on human specimens for the diagnosis, prevention, or treatment of disease, or for the assessment of health, must comply with all applicable CLIA regulations. These regulations, which were finalized in 2003, establish standards to help ensure the quality and accuracy of laboratory testing. While most common laboratory tests are commercial tests, manufactured and marketed to multiple laboratories, some new tests are developed, evaluated, and validated within one particular laboratory. These LDTs are used solely within that laboratory and are not distributed or sold to any other laboratories or health care facilities.

We may pursue FDA review and approval for our products in the future. Assuming we receive FDA clearance or approval for our products, we would plan to market such urine- and blood based test kits with clinical claims for use. We also intend to complete business partnerships (out-license agreements) with diagnostic and pharmaceutical companies in the U.S., Europe, Asia Pacific and the rest of the world as appropriate given market conditions and opportunities. This strategy would provide both short-term (license fees) and long-term (royalty) revenue streams. Licensees of our technology will use our platform technology in the clinical development of their products, to monitor patients taking their marketed products (i.e., TNF inhibitors) and in certain situations to develop, market and sell our cell-free molecular diagnostic technology in predefined fields of use and geographic territories. We plan to become a fully vertically integrated business in which we develop, manufacture, register, market, and sell our products.

Beginning in the fourth quarter of 2016, and forming the basis of our business strategy for 2017, we are addressing a gap between single-gene PCR assays that can be limited by sample availability and expensive, broad, multigene panels hindered by low clinical sensitivity for mutation detection. In 2017 we plan to introduce our first pan-cancer multigene panel and to offer key institutions, cancer centers and research laboratories the opportunity to bring our proprietary technology and RUO kits in-house for clinical research purposes. We believe this strategy, coupled with strong clinical results supporting the use of our ctDNA molecular diagnostic technology, will lead to broad market adoption of our technology and kits.

## **Research and Development**

As of December 31, 2016, we had 31 dedicated scientists located in our office in San Diego, California. Our research and development team is composed of researchers and scientists (Ph.Ds.), laboratory associate scientists, and experts in clinical development and regulatory affairs of molecular diagnostics. We plan to introduce new products to the market for use as LDTs testing services from our CLIA lab or as RUO kits for clinical research by third party institutions. Information and documentation systems infrastructure (e.g., design history files and firewalls) must be in place to support the confidentiality of multiple partnering programs and the rigorous scientific and regulatory oversight needed for products in the in-vitro diagnostics markets. Research and development expenses for the years ended December 31, 2016, 2015 and 2014 were approximately \$15.0 million, \$10.6 million and \$6.7 million, respectively.

## **Intellectual Property**

We consider the protection of our proprietary technologies and products to be a critical element in the success of our business. As of December 31, 2016, our wholly-owned and licensed intellectual property included over 120 issued patents and over 60 pending patent applications in the U.S. and abroad. The pending applications include multiple international applications filed under the Patent Cooperation Treaty ("PCT applications") that will be used as the basis for multiple additional patent applications.

One group of patents and patent applications includes seven U.S. patents, with 39 counterpart patents in Japan, China, Hong Kong and Europe, including the major markets of the European countries. These patents are directed to the detection of nucleic acid sequences in urine and nucleic acid modifications and alterations in urine. This patent family includes claims directed to prenatal analysis of fetal DNA, the determination of the sex of a fetus and the detection of diseases such as Down Syndrome caused by genetic alterations. Other patented claims are directed to detecting and monitoring cancer through urine-based testing, nucleic acid screening, and monitoring in cases of transplantation and infectious diseases, including infection by viruses and pathogens, and other potential diagnostic and genetic testing applications. Members of this patent group expire between 2018 and 2026. Additional pending claims are directed to the preparation of cell-free nucleic acids, as well as detection of short cell-free nucleic acid molecules which, if granted, will expire between 2028 and 2033.

A second group is directed to the detection of specific gene mutations and indicators of disease. These include *NPM1* mutations, *BRAF* mutations, *SF3B1* mutations, HPV, AML, and hairy cell leukemia. The detection includes analysis of cell-free nucleic acid molecules. This group includes U.S. patent numbers 8,222,370 B1, 8,501,924 B1, 8,642,261 B1, 9,222,137 B1, and 9,435,265 B1 as well as four pending U.S. patent applications. There are also 19 pending non-U.S. and PCT patent applications. Members of this patent group expire between 2025 and 2034.

A third group is directed to our molecular detection platform utilizing proprietary probe chemistry on optical detectors such as complementary metal-oxide semiconductors (“CMOS”). This platform technology utilizes a conjugated probe and optical detection of analytes in medical diagnostics. This group includes one issued patent in Japan and patents in the major markets of Europe, with pending applications in the U.S. and Hong Kong. Members of this patent group expire beginning in 2022.

Applications are also pending to protect proprietary methods of collecting, extracting, detecting and enriching small concentrations of short nucleic acid sequences, and detecting and monitoring mutations in diseases, such as cancer, over time. Currently, this group includes one issued U.S. Patent with counterparts in the major markets of Europe, and more than 25 pending applications worldwide.

Wherever possible, we seek to protect our inventions by filing U.S. patents as well as foreign counterpart applications in select other countries. Because patent applications in the U.S. are maintained in secrecy for at least eighteen months after the applications are filed, and since publication of discoveries in the scientific or patent literature often lags behind actual discoveries, we cannot be certain that we were the first to make the inventions covered by each of our issued or pending patent applications, or that we were the first to file for protection of inventions set forth in such patent applications. Our planned or potential products may be covered by third-party patents or other intellectual property rights, in which case continued development and marketing of our products would require a license. Required licenses may not be available to us on commercially acceptable terms, if at all. If we do not obtain these licenses, we could encounter delays in product introductions while we attempt to design around the patents, or we could find that the development, manufacture or sale of products requiring such licenses are not possible.

We may rely on trade secrets to protect our technology, which are difficult to protect. We seek to protect our proprietary technology and processes by entering into confidentiality agreements with our employees, consultants, and contractors. These agreements may be breached, we may not have adequate remedies for any breach and our trade secrets may otherwise become known or be independently discovered by competitors. To the extent that our employees or our consultants or contractors use intellectual property owned by others in their work for us, disputes may also arise as to the rights in related or resulting know-how and inventions.

## **Manufacturing and Distribution**

In 2017, we will continue offering laboratory testing services of LDTs from our CLIA/CAP-accredited laboratory. Our primary customers for these LDT’s are pharmaceutical companies and third party laboratories. In addition, we plan to offer our Next™Collect urine collection and DNA preservation cup, Next™Extract DNA extraction and isolation kit, and ERTHOS™ mutation enrichment system and associated pan-cancer multigene panels for RUO. We are working to establish manufacturing, kitting and distribution partners for our proprietary and branded new product offerings.

## **Reimbursement**

Medicare and other third-party payors will independently evaluate our technologies by, among other things, a cost/benefit analysis, assessing other available options and reviewing the published literature with respect to the results obtained from our clinical studies. Currently, CPT codes are available for molecular testing, which we believe will allow our technologies to be billed following completion of a test that has been prescribed by a physician for a patient. We believe that the existence of current CPT codes with applicability to our tests will help facilitate Medicare’s reimbursement process, as well as that for third party insurance providers.

In 2017, we plan to continue developing and publishing clinical evidence around the utility and performance of our testing platform to ensure favorable reimbursement. The reimbursement environment for molecular diagnostics is rapidly evolving and the trend for regulators and payors is to place increased value and emphasis on proprietary, single-source tests with strong evidence of clinical utility. Importantly, under the Protecting Access to Medicare Act of 2014 (“PAMA”), advanced laboratory developed tests, those involving analysis of multiple biomarkers or unique algorithms, will likely receive special treatment under the PAMA reimbursement scheme. Payors will continue to look for three levels of evidence when they decide

whether or not to cover a test. The first is analytical validity, which refers to the accuracy, precision, and reproducibility of the test results. The second is clinical validity, which is the correlation of the test results with the clinical outcomes of interest. The third is clinical utility, which refers to how use of the test influences clinical decision-making and/or improving patient outcomes, which is well-documented in publications of our data.

## **Government Regulation**

Regulation by governmental authorities in the U.S. and other countries will be a significant factor in the development, production and marketing of any products that we may develop. The nature and extent to which such regulation may apply will vary depending on the nature of any such products and the policy of each country. Virtually all of our potential products will require regulatory allowance or approval by governmental agencies prior to commercialization. We may submit and obtain FDA approval or clearance for some or all of our diagnostic products. Pursuing and receiving FDA approval or clearance may be vital to maximizing our customer base and revenue potential for our numerous products.

FDA clearance for our products may be obtained through submission of a 510(k) statement of equivalency. Another regulatory option, albeit more complicated and expensive, is to pursue FDA approval by submitting a Pre-Market Approval (“PMA”) application. A 510(k) submission requires that we show equivalency of results in a clinical study with parallel comparison against an existing and FDA-recognized reference method (predicate device).

The FDA also regulates the sale of certain reagents, including our potential reagents, used by laboratories under the LDT rules to perform tests. The FDA refers to such reagents as Analyte-Specific Reagents (“ASRs”). ASR’s generally do not require FDA pre-market approval or clearance if they are (1) sold to clinical laboratories certified under the CLIA to perform high complexity testing and (2) are labeled in accordance with FDA requirements, including a statement that their analytical and performance characteristics have not been established. Prior to, or in lieu of, FDA approval, we can sell our reagents to laboratories that meet the established criteria. The FDA also regulates all promotional materials and specifically prohibits medical and efficacy claims.

Assuming that FDA approval or clearance is received for our products, a number of other FDA requirements would apply to our manufacturing and distribution efforts. Medical device manufacturers must be registered and their products listed with the FDA, and certain adverse events, such as reagent failures, significant changes in quality control and other events requiring correction and/or replacement or removal of reagents must be documented and reported to the FDA. The FDA also regulates product labeling, promotion and, in some cases, advertising, of medical devices. We must comply with the FDA’s Quality System Regulation that establishes extensive requirements for design control, quality control, validation, and manufacturing. Thus, even with FDA approval or clearance, we must continue to be diligent in maintaining compliance with these various regulations, as failure to do so can lead to enforcement action. The FDA periodically inspects facilities to determine compliance with these and other requirements.

## **Competition**

The medical diagnostic industry is characterized by rapidly evolving technology and intense competition. Our competitors include medical diagnostic companies, many of which have financial, technical, and marketing resources significantly greater than our resources. In addition, there are a significant number of biotechnology companies working on evolving technologies that may supplant our technology or make it obsolete. Academic institutions, government agencies, and other public and private research organizations are also conducting research activities and seeking patent protection and may commercialize products on their own or through joint ventures. We are aware of certain development projects for products to prevent or treat certain diseases targeted by us. The existence of these potential products or other products or treatments of which we are not aware, or products or treatments that may be developed in the future, may adversely affect the marketability of our products or product candidates.

We believe that direct competition in the area of cell-free DNA detection and analysis is precluded by our growing patent estate. However, there are other companies working in the area of cell-free nucleic acids and circulating tumor cell (“CTC”) collection and analysis in blood plasma that could compete in similar clinical areas, including disease detection, therapeutic response monitoring and minimal disease detection. These companies include Roche Cobas, Guradant, Foundation Medicine, Illumina, Inc., Thermo Fisher, Sysmex-Inostics GmbH and numerous other smaller companies, both in the research and development and early commercial development phases. We believe that the advantages of our proprietary enrichment methodologies overcome the challenges of multiplexing broad mutation content while avoiding non-specific wild-type amplification that restricts the limit of detection capability and related sensitivity associated with PCR and Hybrid Capture based technologies.

## Employees

As of February 28, 2017, we had a total of 53 employees, all of whom were full-time. None of our employees are covered by a collective bargaining agreement, and we consider our relations with our employees to be good.

## ITEM 1A. RISK FACTORS

*An investment in our securities involves a high degree of risk. An investor should carefully consider the risks described below as well as other information contained in this Annual Report on Form 10-K and our other reports filed with the SEC. The risks and uncertainties described below are not the only ones we face. Additional risks and uncertainties not presently known to us or that we currently believe are immaterial may also impair our business operations. If any of the following risks actually occur, our business, financial condition or results of operations could be materially adversely affected, the value of our securities could decline, and investors in our company may lose all or part of their investment.*

### Risks Related to Our Business

***We are a development stage company and may never earn a profit.***

We are a development stage company and have incurred losses since our formation. As of December 31, 2016, we have an accumulated total deficit of approximately \$148.1 million. For the fiscal year ended December 31, 2016, we had a net loss attributable to common stockholders of approximately \$39.2 million. To date, we have experienced negative cash flow from development of our cell-free molecular diagnostic technology. We have generated limited revenue from operations, and we expect to incur substantial net losses for the foreseeable future as we seek to further develop and commercialize our cell-free molecular diagnostic technology. We cannot predict the extent of these future net losses, or when we may attain profitability, if at all. If we are unable to generate significant revenue from our cell-free molecular diagnostic technology or attain profitability, we will not be able to sustain operations.

Because of the numerous risks and uncertainties associated with developing and commercializing our cell-free molecular diagnostic technology and any future tests, we are unable to predict the extent of any future losses or when we will attain profitability, if ever. We may never become profitable and you may never receive a return on an investment in our common stock. An investor in our common stock must carefully consider the substantial challenges, risks and uncertainties inherent in the attempted development and commercialization of tests in the medical diagnostic industry. We may never successfully commercialize our cell-free molecular diagnostic technology or any future tests we may develop, and our business may not be successful.

***We will need to raise substantial additional capital to commercialize our cell-free molecular diagnostic technology, and our failure to obtain funding when needed may force us to delay, reduce or eliminate our product development programs or collaboration efforts.***

As of December 31, 2016, our cash balance and short-term investments was approximately \$37.9 million and our working capital was approximately \$31.2 million. Due to our recurring losses from operations and the expectation that we will continue to incur losses in the future, we will be required to raise additional capital to complete the development and commercialization of our current product candidates. We have historically relied upon private and public sales of our equity, as well as debt financings to fund our operations. At December 31, 2016, we had \$16.5 million outstanding under debt agreements. In order to raise additional capital, we may seek to sell additional equity and/or debt securities or obtain a credit facility or other loan, which we may not be able to do on favorable terms, or at all. Our ability to obtain additional financing will be subject to a number of factors, including market conditions, our operating performance and investor sentiment. If we are unable to raise additional capital when required or on acceptable terms, we may have to significantly delay, scale back or discontinue the development and/or commercialization of one or more of our product candidates, restrict our operations or obtain funds by entering into agreements on unfavorable terms.

***Our Loan and Security Agreement with Oxford Finance LLC, or Oxford, and Silicon Valley Bank, or SVB, and our Loan and Security Agreement with SVB for equipment, each contain certain covenants that could adversely affect our operations. Additionally, if an event of default were to occur, we could be forced to repay the outstanding indebtedness sooner than expected and possibly at a time when we do not have sufficient capital to meet these obligations, which could materially adversely affect our business, prospects and financial condition.***

We entered into a Loan and Security Agreement, dated as of June 30, 2014, as may be amended from time to time, with Oxford and SVB, or the Lenders, as amended, or the Loan and Security Agreement, for a term loan of \$15.0 million. The

term loan is secured by all of our assets, other than our intellectual property. In addition, we entered into a Loan and Security Agreement, dated as of November 17, 2015, as may be amended from time to time, with SVB that provides for cash borrowings for equipment of up to \$2.0 million, secured by the equipment financed, or the Equipment Line of Credit. The Loan and Security Agreement and the Equipment Line of Credit each contain affirmative and negative covenants that, among other things, restrict our ability to:

- incur additional indebtedness or guarantees;
- incur liens;
- make investments, loans and acquisitions;
- consolidate or merge with or into other entities;
- sell or assign any part of our business or property;
- engage in transactions with affiliates; and
- pay dividends.

Additionally, we may be deemed to be in default under the Loan and Security Agreement and the Equipment Line of Credit upon the occurrence of certain events, including, among other things, payment defaults; breaches of representations, warranties or covenants; certain insolvency events; and the occurrence of certain material adverse changes. Upon the occurrence of an event of default and following any cure period (if applicable), a default interest rate of an additional 5.0% per annum may be applied to the outstanding loan balance, and the Lenders may declare all outstanding obligations immediately due and payable and take certain other actions set forth in the Loan and Security Agreement and the Equipment Line of Credit.

The Loan and Security Agreement and the Equipment Line of Credit could prevent us from taking certain actions without the consent of the Lenders and, if an event of default should occur, we could be required to immediately repay the outstanding indebtedness. If we are unable to repay this debt, the Lenders may elect to foreclose on the secured collateral, including our cash accounts, and take other remedies permitted under the Loan and Security Agreement and the Equipment Line of Credit, as applicable. Even if we are able to repay the indebtedness upon the occurrence of an event of default, the repayment of these sums may significantly reduce our working capital and impair our ability to operate as planned. In addition, the interest rates on our Loan and Security Agreement and the Equipment Line of Credit are variable rates based on the prime rate and any increases in the prime rate would increase our interest rate payments and could adversely impact our financial condition. The occurrence of any of these events could materially adversely affect our business, prospects and financial condition.

***The commercial success of our product candidates will depend upon the degree of market acceptance of these product candidates among physicians, patients, healthcare payors and the medical community and on our ability to successfully market our product candidates.***

Even if approved for sale by the appropriate regulatory authorities, physicians may not order diagnostic tests based upon our cell-free molecular diagnostic technology, in which event we may be unable to generate significant revenue or become profitable. Acceptance of our cell-free molecular diagnostic technology by physicians, patients, healthcare payors and the medical community will depend on a number of factors, including, but not limited to:

- successful integration into clinical practice;
- adequate reimbursement by third parties;
- cost effectiveness;
- potential advantages over alternative treatments; and
- relative convenience and ease of administration.

We will need to make leading physicians aware of the benefits of tests using our technology through published papers, presentations at scientific conferences and favorable results from our clinical studies. In addition, we will need to gain support



from thought leaders who believe that testing a urine specimen in addition to or in lieu of a blood or tissue specimen for molecular markers will provide superior performance. Ideally, we will need these individuals to publish support papers and articles which will be necessary to gain acceptance of our products. There is no guarantee that we will be able to obtain this support. Our failure to be successful in these efforts would make it difficult for us to convince medical practitioners to order cell-free molecular diagnostic tests for their patients and, consequently, would limit our revenue and profitability.

***We currently have limited experience in marketing our products. If we are unable to expand our marketing and sales capabilities or enter into agreements with third parties to market and sell our product candidates, we may not be able to generate product revenue.***

We have limited experience in marketing our products, expanding our in-house marketing organization and sales force, would require significant capital expenditures, management resources and time. We would have to compete with other molecular diagnostic companies to recruit, hire, train and retain marketing and sales personnel.

Alternatively, we may pursue collaborative arrangements for the sales and marketing of our product candidates or future products; however, we may not be able to establish or maintain such collaborative arrangements or, if we are able to do so, we cannot guarantee that any sales force we use through such arrangements will be effective. Any revenue we receive will depend upon the efforts of such third parties, which may not be successful. We may have little or no control over the marketing and sales efforts of such third parties and our revenue from product sales may be lower than if we had commercialized our product candidates internally. We also face competition in our search for third parties to assist us with the sales and marketing of our product candidates, which may negatively impact our ability to enter into favorable collaborative arrangements for the sale and marketing of our product candidates.

***If our potential medical diagnostic tests are unable to compete effectively with current and future medical diagnostic tests targeting similar markets as our product candidates, our commercial opportunities will be reduced or eliminated.***

The medical diagnostic industry is intensely competitive and characterized by rapid technological progress. In each of our potential product areas, we face significant competition from large biotechnology, medical diagnostic and other companies. Certain molecular diagnostics companies have established technologies that may be competitive to our product candidates and any future tests that we develop. Some of these tests may use different approaches or means to obtain diagnostic results, which could be more effective and/or less expensive than our tests for similar indications. Moreover, these and other future competitors have or may have considerably greater resources than we do in terms of technology, sales, marketing, commercialization and capital. These competitors also may have substantial advantages over us in terms of research and development expertise, experience in clinical studies, experience in regulatory issues, brand name exposure and expertise in sales and marketing as well as in operating central laboratory services. Many of these organizations have greater financial, marketing and human resources than we do; therefore, there can be no assurance that we can successfully compete with current or potential competitors, and any such competition could materially adversely affect our business, financial position or results of operations.

Since our cell-free molecular diagnostic technology is under development, we cannot predict the relative competitive position of any product based upon our cell-free molecular diagnostic technology. However, we expect that the following factors, among others, will determine our ability to compete effectively: safety and efficacy; product price; turnaround time; ease of administration; performance; reimbursement; and marketing and sales capabilities.

We believe that many of our competitors spend significantly more on research and development-related activities than we do. Our competitors may discover new diagnostic tools or develop existing technologies to compete with our cell-free molecular diagnostic technology. Our commercial opportunities will be reduced or eliminated if these competing products are more effective, are more convenient and/or are less expensive than our product candidates.

#### ***International expansion of our business creates potential regulatory, financial and business risks***

We continue to expand our international reach, primarily by partnering with distributors to help us commercialize our Trovera™ liquid biopsy tests outside of the United States. Engaging in international business exposes us to a number of risks, any of which could harm our business, including:

- challenges associated with complying with multiple, ever-changing local laws and regulations;
- difficulties in managing international operations;



- logistics and regulations regarding shipping samples;
- lack of intellectual property protection in certain areas;
- and natural disasters, political and economic unrest, and other business restrictions.

***Our failure to obtain human urine and blood samples from medical institutions for our clinical studies will adversely impact the development of our cell-free molecular diagnostic technology.***

We will need to establish relationships with medical institutions in order to obtain urine and blood specimens from patients that test positive for a relevant infectious disease or from patients who have been diagnosed with solid tumors. We must obtain a sufficient number of samples in order to statistically prove the equivalency of the performance of our assays versus existing assays that are already on the market.

Cell-free nucleic acids in urine and blood are stable at room temperature for extended periods of time with the addition of a simple preservative. Successful implementation of our cell-free nucleic acid technology in molecular testing is closely linked to the availability of techniques and procedures for cell-free nucleic acid preservation, purification and analysis. In the event urine and/or blood specimens are not adequately preserved or are improperly stored or contaminated, we may be delayed in pursuing our clinical studies, and we may incur additional costs associated with procuring new human urine and/or blood samples.

***If the validity of an informed consent from a subject was to be challenged, we could be forced to stop using some of our resources, which would hinder our product development efforts.***

We have measures in place to ensure that all clinical data and other samples that we receive from our clinical collaborators have been collected from subjects who have provided appropriate informed consent for the data and samples provided to be used for purposes that include commercial diagnostic product and test development activities. We have measures in place to ensure that data and samples that have been collected by our clinical collaborators are provided to us on a subject de-identified manner. We also have measures in place to ensure that the subjects from whom our data and samples are collected do not retain or have conferred to us any proprietary or commercial rights to the data or any discoveries derived from them. We rely on our clinical collaborators for appropriate compliance with the informed consent provided by each subject and with applicable regulations. A subject's informed consent could be challenged in the future, and any informed consent could prove invalid, unlawful or otherwise inadequate for our purposes. Any findings against us, or our clinical collaborators, could deny us access to or force us to stop using some of our clinical samples, which would hinder our diagnostic product and test development efforts. We could become involved in legal challenges relating to the validity of one or more informed consents from subjects, which could require substantial dedication of time and financial resources.

***If our analytical and clinical studies do not prove that our technologies are superior and demonstrate the clinical utility of our technology, we may never commercialize our product candidates and services.***

The results of our clinical studies may not show that tests using our cell-free molecular diagnostic technology are superior to existing testing methods and may not demonstrate clinical utility. In that event, we will have to devote significant financial and other resources to further research and development, and commercialization of tests using our technologies will be delayed or may never occur. Our earlier clinical studies included samples from high-risk patients. The results from these earlier studies may not be representative of the results we may obtain from any future studies, which will include a larger percentage of normal-risk patients.

***We have limited experience in establishing strong business relationships with leading clinical reference laboratories to perform cell-free molecular diagnostic tests using our technologies, which could limit our revenue growth.***

A key step in our strategy is to sell diagnostic products that use our proprietary technologies to leading clinical reference laboratories that will perform cell-free molecular diagnostic tests. We have limited experience in establishing these business relationships. If we are unable to establish and maintain these business relationships, we may not be able to generate revenue beyond the revenue we can generate from our limited in-house test processing capabilities.

***We depend upon our officers and other key employees, and if we are not able to retain them or recruit additional qualified personnel, the commercialization of our product candidates and any future tests that we develop could be delayed or negatively impacted.***

Our success is largely dependent upon the continued contributions of our officers, especially William J. Welch, our Chief Executive Officer, and other key employees. Our success also depends in part on our ability to attract and retain highly qualified scientific, commercial and administrative personnel. The specialized nature of our industry results in an inherent scarcity of experienced personnel in the field and, in order to pursue our test development and commercialization strategies, we will need to attract, hire and retain, or engage as consultants, additional personnel with specialized experience in a number of disciplines, including assay development, bioinformatics and statistics, laboratory and clinical operations, clinical affairs and studies, government regulation, sales and marketing, billing and reimbursement and information systems. Additionally, there is intense competition for personnel in the fields in which we operate. If we are unable to attract new employees and retain existing employees, the development and commercialization of our product candidates and any tests we may develop in the future could be delayed or negatively impacted.

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

We are a small company with 55 full-time employees as of December 31, 2016. Future growth of our company will impose significant additional responsibilities on members of management, including the need to identify, attract, retain, motivate and integrate highly skilled personnel. We may increase the number of employees in the future depending on the progress of our development of cell-free molecular diagnostic technology. Our future financial performance and our ability to commercialize cell-free molecular diagnostic tests and to compete effectively will depend, in part, on our ability to manage any future growth effectively. To that end, we must be able to:

- manage our clinical studies effectively;
- integrate additional management, administrative, manufacturing and regulatory personnel;
- maintain sufficient administrative, accounting and management information systems and controls; and
- hire and train additional qualified personnel.

There is no guarantee that we will be able to accomplish these tasks, and our failure to accomplish any of them could materially adversely affect our business, prospects and financial condition.

***All of our diagnostic technology and services are performed at a single laboratory, and in the event this facility is affected by a termination of the lease or a man-made or natural disaster, our operations could be severely impaired.***

We are performing all of our diagnostic services in our laboratory located in San Diego, California. Despite precautions taken by us, any future natural or man-made disaster at this laboratory, such as a fire, flood, earthquake or terrorist act, could cause substantial delays in our operations, damage or destroy our equipment and urine samples or cause us to incur additional expenses.

In addition, we are leasing the facilities where our laboratory operates. We are currently in compliance with all of our lease obligations, but should the lease terminate for any reason, or if the laboratory is moved due to conditions outside of our control, it could cause substantial delay in our diagnostics operations, damage or destroy our equipment and biological samples or cause us to incur additional expenses. In the event of an extended shutdown of our laboratory, we may be unable to perform our services in a timely manner or at all and therefore would be unable to operate in a commercially competitive manner. This could materially adversely affect our operating results and financial condition.

Further, if we have to use a substitute laboratory while our facility is closed, we could only use another facility with established state licensure and accreditation under CLIA. We may not be able to find another CLIA-certified facility and comply with applicable procedures, or find any such laboratory that would be willing to perform the tests for us on commercially reasonable terms. Additionally, any new laboratory opened by us would be subject to certification under CLIA and licensure by various states, which would take a significant amount of time and expense and result in delays in our ability to continue our personalized medicine services operations.

***Security threats to our information technology infrastructure and/or our physical buildings could expose us to liability and damage our reputation and business.***

It is essential to our business strategy that our technology and network infrastructure and our physical buildings remain secure and are perceived by our customers and corporate partners to be secure. Despite security measures, however, any network infrastructure may be vulnerable to cyber-attacks by hackers and other security threats. We may face cyber-attacks that attempt to penetrate our network security, sabotage or otherwise disable our research, products and services, misappropriate our or our customers' and partners' proprietary information, which may include personally identifiable information, or cause interruptions of our internal systems and services. Despite security measures, we also cannot guarantee security of our physical buildings. Physical building penetration or any cyber-attacks could negatively affect our reputation, damage our network infrastructure and our ability to deploy our products and services, harm our relationship with customers and partners that are affected, and expose us to financial liability.

Additionally, there are a number of state, federal and international laws protecting the privacy and security of health information and personal data. For example, the Health Insurance Portability and Accountability Act, or HIPAA, imposes limitations on the use and disclosure of an individual's healthcare information by healthcare providers, healthcare clearinghouses, and health insurance plans, or, collectively, covered entities, and also grants individuals rights with respect to their health information. HIPAA also imposes compliance obligations and corresponding penalties for non-compliance on individuals and entities that provide services to healthcare providers and other covered entities. As part of the American Recovery and Reinvestment Act of 2009, or ARRA, the privacy and security provisions of HIPAA were amended. ARRA also made significant increases in the penalties for improper use or disclosure of an individual's health information under HIPAA and extended enforcement authority to state attorneys general. As amended by ARRA and subsequently by the final omnibus rule adopted in 2013, HIPAA also imposes notification requirements on covered entities in the event that certain health information has been inappropriately accessed or disclosed: notification requirements to individuals, federal regulators, and in some cases, notification to local and national media. Notification is not required under HIPAA if the health information that is improperly used or disclosed is deemed secured in accordance with encryption or other standards developed by the U.S. Department of Health and Human Services. Most states have laws requiring notification of affected individuals and/or state regulators in the event of a breach of personal information, which is a broader class of information than the health information protected by HIPAA. Many state laws impose significant data security requirements, such as encryption or mandatory contractual terms, to ensure ongoing protection of personal information. Activities outside of the U.S. implicate local and national data protection standards, impose additional compliance requirements and generate additional risks of enforcement for non-compliance. We may be required to expend significant capital and other resources to ensure ongoing compliance with applicable privacy and data security laws, to protect against security breaches and hackers or to alleviate problems caused by such breaches.

***General economic or business conditions may have a negative impact on our business.***

Continuing concerns over U.S. health care reform legislation and energy costs, geopolitical issues, the availability and cost of credit and government stimulus programs in the U.S. and other countries have contributed to increased volatility and diminished expectations for the global economy. If the economic climate does not improve, or if it deteriorates, our business, including our access to patient samples and the addressable market for tests that we may successfully develop, as well as the financial condition of our suppliers and our third-party payors, could be negatively impacted, which could materially adversely affect our business, prospects and financial condition.

***We incur significant costs as a result of operating as a public company and our management expects to continue to devote substantial time to public company compliance programs.***

As a public company, we incur significant legal, accounting and other expenses due to our compliance with regulations and disclosure obligations applicable to us, including compliance with the Sarbanes-Oxley Act of 2002, or the Sarbanes-Oxley Act, as well as rules implemented by the Securities and Exchange Commission, or the SEC, and The NASDAQ Stock Market LLC. The SEC and other regulators have continued to adopt new rules and regulations and make additional changes to existing regulations that require our compliance. For example, in July 2010, the Dodd-Frank Wall Street Reform and Consumer Protection Act, or the Dodd-Frank Act, was enacted. There is significant corporate governance and executive compensation related provisions in the Dodd-Frank Act that have required the SEC to adopt additional rules and regulations in these areas. Stockholder activism, the current political environment and the current high level of government intervention and regulatory reform may lead to substantial new regulations and disclosure obligations, which may lead to additional compliance costs and impact (in ways we cannot currently anticipate) the manner in which we operate our business. Our management and other personnel devote a substantial amount of time to these compliance programs and monitoring of public company reporting obligations and, as a result of the new corporate governance and executive compensation related

rules, regulations and guidelines prompted by the Dodd-Frank Act and further regulations and disclosure obligations expected in the future, we will likely need to devote additional time and costs to comply with such compliance programs and rules. These rules and regulations will continue to cause us to incur significant legal and financial compliance costs and will make some activities more time-consuming and costly.

***We may become subject to federal and state tax assessments, penalties and interest with respect to past compensation paid to certain of our executives.***

During our internal review process, contingencies were identified regarding various federal and state tax exposures with respect to past compensation paid to certain of our executives. We have not recorded any accrued liabilities related to the potential federal and state tax exposure. If we become subject to any material tax assessment, penalties and interest by federal and state tax authorities in the future, our results of operations, financial performance and cash flows could be materially adversely affected.

### **Risks Related to Our Regulatory Environment**

***Our ability to successfully commercialize our technology will depend largely upon the extent to which third-party payors reimburse our current and future tests.***

Physicians and patients may decide not to order our products unless third-party payors, such as managed care organizations, as well as government payors such as Medicare and Medicaid, pay a substantial portion of the test price.

Reimbursement by a third-party payor may depend on a number of factors, including a payor's determination that our product candidates are:

- not experimental or investigational;
- effective;
- medically necessary;
- appropriate for the specific patient;
- cost-effective;
- supported by peer-reviewed publications; and
- included in clinical practice guidelines.

Market acceptance, sales of products based upon our cell-free molecular diagnostic technology, and our profitability may depend on reimbursement policies and healthcare reform measures. Several entities conduct technology assessments of medical tests and devices and provide the results of their assessments for informational purposes to other parties. These assessments may be used by third-party payors and healthcare providers as grounds to deny coverage for a test or procedure. The levels at which government authorities and third-party payors, such as private health insurers and health maintenance organizations, may reimburse the price patients pay for such products could affect whether we are able to commercialize our product candidates. Our product candidates may receive negative assessments that may impact our ability to receive reimbursement for our current and future tests. Since each payor makes its own decision as to whether to establish a policy to reimburse a test, seeking these approvals may be a time-consuming and costly process. We cannot be sure that reimbursement in the U.S. or elsewhere will be available for any of our product candidates in the future. If reimbursement is not available or is limited, we may not be able to commercialize our product candidates.

In addition, if we, or others, are unable to obtain reimbursement approval from private payors and Medicare and Medicaid programs for our product candidates, or if the amount reimbursed is inadequate, our ability to generate revenues could be limited. Even if we are able to obtain reimbursement for our tests, insurers may withdraw their coverage policies or cancel their contracts with us at any time, stop paying for our tests or reduce the payment rate for our tests, each of which would reduce our revenue. Moreover, we may depend upon a limited number of third-party payors for a significant portion of our test revenues and if these or other third-party payors stop providing reimbursement or decrease the amount of reimbursement for our tests, our revenues could decline.

***If we do not receive regulatory approvals, we may not be able to develop and commercialize our cell-free molecular diagnostic technology.***

We may need approval from the FDA, to market products based on our cell-free molecular diagnostic technology for diagnostic uses in the U.S. and approvals from foreign regulatory authorities to market products based on our cell-free molecular diagnostic technology outside the U.S. We have not yet filed an application with the FDA to obtain approval to market any of our proposed products. If we fail to obtain regulatory approval for the marketing of products based on our cell-free molecular diagnostic technology, we will be unable to sell such product candidates and will not be able to sustain operations.

We believe the estimated molecular diagnostics market for many diseases in Europe is approximately as large as that of the U.S. If we seek to market products or services in Europe, we will need to receive a CE Mark. If we do not obtain a CE Mark for such products and services, we will be unable to sell this product candidate in Europe and countries that recognize the CE Mark.

The regulatory review and approval process, which may include evaluation of preclinical studies and clinical studies of product candidates based on our cell-free molecular diagnostic technology, as well as the evaluation of manufacturing processes and contract manufacturers' facilities, is lengthy, expensive and uncertain. Securing regulatory approval for products based on our cell-free molecular diagnostic technology may require the submission of extensive preclinical and clinical data and supporting information to regulatory authorities to establish such product candidates' safety and effectiveness for each indication. We have limited experience in filing and pursuing applications necessary to gain regulatory approvals.

Regulatory authorities generally have substantial discretion in the approval process and may either refuse to accept one or more of our applications or may decide after review of an application that the data submitted is insufficient to allow for approval of any product based upon our cell-free molecular diagnostic technology. If regulatory authorities do not accept or approve our applications, they may require that we conduct additional preclinical, clinical or manufacturing studies and submit that data before regulatory authorities will reconsider such application. We may need to expend substantial resources to conduct further studies to obtain data that regulatory authorities believe is sufficient. Depending on the extent of these studies, approval of applications may be delayed by several years or may require us to expend substantially more resources than we had budgeted for such applications. It is also possible that additional studies may not suffice in helping us obtain approval of our applications. If any of these outcomes occur, we may be forced to abandon our applications for approval, which may force us to cease or curtail operations.

***Complying with numerous regulations pertaining to our business is an expensive and time-consuming process, and any failure to comply could result in substantial penalties.***

The establishment and operation of our laboratory is subject to regulation by numerous federal, state and local governmental authorities in the U.S. Our laboratory holds a CLIA certificate of compliance and is licensed by every state (other than the State of New York) and the District of Columbia, as required, which enables us to provide testing services to residents of almost every state. Failure to comply with state regulations or changes in state regulatory requirements could result in a substantial curtailment or even prohibition of the operations of our laboratory and could materially adversely affect our business. CLIA is a federal law that regulates clinical laboratories that perform testing on human specimens for the purpose of providing information for the diagnosis, prevention or treatment of disease. To renew CLIA certification, laboratories are subject to survey and inspection every two years. Moreover, CLIA inspectors may make unannounced inspections of these laboratories. If we were to lose our CLIA certification or our state licenses, whether as a result of a revocation, suspension or limitation of our license, we would no longer be able to continue our testing operations, which would materially adversely affect our business, prospects and financial condition. Potential sanctions for violations of these statutes and regulations also include significant fines, the suspension or loss of various licenses, certificates and authorizations, or product suspension or recalls.

We are subject to other regulation in the United States by both the federal government and the states in which we conduct our business, as well as in other jurisdictions outside of the United States, including:

- Medicare billing and payment regulations applicable to clinical laboratories;
- the Federal Anti-kickback Law and state anti-kickback prohibitions;
- the Federal physician self-referral prohibition, commonly known as the Stark Law, and the state equivalents;

- the Federal Health Insurance Portability and Accountability Act of 1996;
- the Medicare civil money penalty and exclusion requirements;
- the Federal False Claims Act civil and criminal penalties and state equivalents; and
- the Foreign Corrupt Practices Act, the United Kingdom Anti-bribery Act and the European Data Protection Directive, all of which apply to our international activities.

We have adopted policies and procedures designed to comply with these laws. In the ordinary course of our business, we conduct internal reviews of our compliance with these laws. Our compliance is also subject to governmental review. The growth of our business and our expansion outside of the United States may increase the potential of violating these laws or our internal policies and procedures. The risk of our being found in violation of these or other laws and regulations is further increased by the fact that many of them have not been fully interpreted by the regulatory authorities or the courts, and their provisions are open to a variety of interpretations. Any action brought against us for violation of these or other laws or regulations, even if we successfully defend against it, could cause us to incur significant legal expenses and divert our management's attention from the operation of our business. If our operations are found to be in violation of any of these laws and regulations, we may be subject to any applicable penalty associated with the violation, including civil and criminal penalties, damages and fines, we could be required to refund payments received by us, and we could be required to curtail or cease our operations. Any of the foregoing consequences could seriously harm our business and our financial results.

***If we use biological and hazardous materials in a manner that causes injury, we could be liable for damages.***

Our activities currently require the controlled use of potentially harmful biological materials and chemicals. We cannot eliminate the risk of accidental contamination or injury to employees or third parties from the use, storage, handling or disposal of these materials. In the event of contamination or injury, we could be held liable for any resulting damages, and any liability could exceed our resources or any applicable insurance coverage we may have. Additionally, we are subject to, on an ongoing basis, federal, state and local laws and regulations governing the use, storage, handling and disposal of these materials and specified waste products. The cost of compliance with these laws and regulations may become significant and could materially adversely affect our business, prospects and financial condition. Moreover, in the event of an accident or if we otherwise fail to comply with applicable regulations, we could lose our permits or approvals or be held liable for damages or penalized with fines.

***Changes in healthcare policy could subject us to additional regulatory requirements that may delay the commercialization of our tests and increase our costs.***

The U.S. government and other governments have shown significant interest in pursuing healthcare reform. Any government-adopted reform measures could adversely impact the pricing of our diagnostic products and tests in the U.S. or internationally and the amount of reimbursement available from governmental agencies or other third party payors. The continuing efforts of the U.S. and foreign governments, insurance companies, managed care organizations and other payors of healthcare services to contain or reduce healthcare costs may adversely affect our ability to set prices for our products and services that we believe are fair, which may impact our ability to generate revenues and achieve and maintain profitability.

New laws, regulations and judicial decisions, or new interpretations of existing laws, regulations and judicial decisions, that relate to healthcare availability, methods of delivery or payment for products and services, or sales, marketing or pricing, may limit our potential revenue or force us to revise our research and development programs. The pricing and reimbursement environment may change in the future and become more challenging for several reasons, including policies advanced by the current executive administration in the U.S., new healthcare legislation or fiscal challenges faced by government health administration authorities. Specifically, in both the U.S. and certain foreign jurisdictions, there have been a number of legislative and regulatory proposals to change the healthcare system in ways that could affect our ability to sell our products profitably.

For example, the Patient Protection and Affordable Care Act, as amended by the Health Care and Education Reconciliation Act, or the PPACA, has substantially changed the way healthcare is financed by both government health plans and private insurers. The PPACA contains a number of provisions that are expected to impact our business and operations in ways that may negatively affect our revenues in the future. While it is too early to predict all the specific effects the PPACA or any future healthcare reform legislation will have on our business, such provisions could materially adversely affect our business, prospects and financial condition.

The Food and Drug Administration Amendments Act of 2007 gives the FDA enhanced post-marketing authority, including the authority to require post-marketing studies and clinical studies of products, labeling changes based on new safety information, and compliance with risk evaluations and mitigation strategies approved by the FDA. The FDA's exercise of this authority could result in delays or increased costs during product development, clinical studies and regulatory review, increased costs to assure compliance with post-approval regulatory requirements, and potential restrictions on the sale and/or distribution of approved products, all of which could materially adversely affect our business, prospects and financial condition.

***If the FDA were to begin regulating LDTs or RUO kits, or if we decide to market our product candidates as a medical device rather than a LDT or RUO kit, we could be forced to delay commercialization of our current product candidates, experience significant delays in commercializing any future tests, incur substantial costs and time delays associated with meeting requirements for pre-market clearance or approval and/or experience decreased demand for or reimbursement of our test.***

We intend to develop products that are considered to be medical devices and are subject to federal regulations, including, but not limited to, those covering the FDA's Quality System Regulation, or QSR, and Medical Device Reporting, or MDR.

The QSR includes requirements related to the methods used in and the facilities and controls used for designing, purchasing, manufacturing, packaging, labeling, storing, installing and servicing of medical devices. Manufacturing facilities undergo FDA inspections to assure compliance with the QSR. The quality systems for FDA-regulated products are known as current good manufacturing practices, or cGMPs, as described in the Code of Federal Regulations, part 820 (21 CFR part 820). Among the cGMP requirements are those requiring manufacturers to have sufficient appropriate personnel to implement required design controls and other portions of the QSR guidelines.

Design controls include procedures that describe the product design requirements (design goals) and compare actual output to these requirements, including documented Design Reviews. Required Design History Files, or DHFs, for each device will document the records necessary to demonstrate that the design was developed in accordance with the approved design plan and the requirements of the QSR.

The QSR also includes stipulation for control of all documents used in design and production, including history of any changes made. Production and process controls include stipulations to ensure products are in fact produced as specified by controlled documents resulting from the controlled design phase, using products and services purchased under controlled purchasing procedures.

Incidents in which a device may have caused or contributed to a death or serious injury must be reported to the FDA under the MDR program. In addition, certain malfunctions must also be reported. The MDR regulation is a mechanism for the FDA and manufacturers to identify and monitor significant adverse events involving medical devices. The goals of the MDR regulation are to detect and correct problems in a timely manner.

We are subject to MDR through two routes. As a manufacturer of products for sale within the U.S., we are required to report to the FDA any deaths, serious injuries, malfunctions or events requiring remedial action to prevent an unreasonable risk of substantial harm to the public health. Our CLIA laboratory, which offers services for sale, is already currently required to report suspected medical device related deaths to both the FDA and the relevant manufacturers of products we purchase and use.

Clinical laboratory tests like our current product offerings are regulated in the U.S. under CLIA as well as by applicable state laws. RUO kits are intended to be used for research purposes only and not for clinical diagnostic applications. Such RUO kits are likely not subject to FDA review and approval. However, the FDA could determine that such RUO kits, either by virtue of their design or use by end customers, are medical devices which are subject to FDA review, regulation and approval. Diagnostic kits that are sold and distributed through interstate commerce are regulated as medical devices by the FDA. Most LDTs currently are not subject to FDA regulation, although reagents or software provided by third parties and used to perform LDTs may be subject to regulation. If we decide to market our product candidates as a diagnostic kit rather than as a LDT or RUO kit, our products would be subject to FDA regulation as a medical device. Further, the container we expect to provide for collection and transport of blood and urine samples from a pathology laboratory to our clinical reference laboratory for use as part of our LDT may be a medical device subject to FDA regulation, and while we expect that it will be exempt from pre-market review by the FDA, there is no certainty in that respect.

We cannot provide any assurance that FDA regulation, including pre-market review, will not be required in the future for our LDT product candidates or our RUO kits, either through new policies adopted by the FDA or new legislation enacted by Congress. It is possible that legislation that results in increased regulatory burdens for us to offer or continue to offer our



product as a clinical laboratory service will be signed into law, which could materially adversely affect our business, prospects and financial condition.

If pre-market review is required, our business could be negatively impacted until such review is completed and clearance to market or approval is obtained, and the FDA could require that we stop selling our product. If pre-market review of our LDTs or our RUO kits is required by the FDA, there can be no assurance that our product offerings will be cleared or approved on a timely basis, if at all. Ongoing compliance with FDA regulations, such as the QSR and MDR, would increase the cost of conducting our business and subject us to inspection by the FDA and penalties for failure to comply with these requirements. We may also decide voluntarily to pursue FDA pre-market review of our product offerings if we determine that doing so would be appropriate. Some competitors may develop competing tests cleared for marketing by the FDA. There may be a marketing differentiation or perception that an FDA-cleared test is more desirable than our product offerings, and that could discourage adoption and reimbursement of our test.

***We may be required to conduct clinical studies and we may find it difficult to enroll patients in such clinical studies, which could delay or prevent clinical studies of our product candidates.***

If the FDA decides to regulate our LDTs or our RUO kits, it may require that we conduct extensive pre-market clinical studies prior to submitting a regulatory application for commercial sales. If we are required to conduct pre-market clinical studies, whether using retrospectively collected and banked samples or prospectively collected samples, delays in the commencement or completion of clinical studies could significantly increase our test development costs and delay commercialization. Many of the factors that may cause or lead to a delay in the commencement or completion of clinical studies may also ultimately lead to delay or denial of regulatory clearance or approval. The commencement and completion of clinical trials may be delayed by factors such as unforeseen safety issues, lack of effectiveness during clinical trials, inability to monitor patients adequately during or after testing and slower than expected rates of patient recruitment.

Insufficient patient enrollment is a function of many factors, including the size of the patient population, the nature of the protocol, the proximity of patients to clinical sites and the eligibility criteria for the clinical trial. We may find it necessary to engage contract research organizations to perform data collection and analysis and other aspects of our clinical studies, which may increase the cost of the studies. We will also depend on clinical investigators, medical institutions and contract research organizations to perform the studies properly. If these parties do not successfully carry out their contractual duties or obligations or meet expected deadlines, or if the quality, completeness or accuracy of the clinical data they obtain is compromised due to failure to adhere to our clinical protocols or FDA requirements, or for other reasons, our clinical studies may have to be extended, delayed or terminated. Many of these factors could be beyond our control. We may not be able to enter into replacement arrangements without undue delays or considerable expenditures. If there are delays in testing as a result of the failure to perform by third parties, our research and development costs would increase and we may not be able to obtain regulatory clearance or approval for our test. In addition, we may not be able to establish or maintain relationships with these parties on favorable terms, if at all. Each of these outcomes would harm our ability to market our test or to become profitable.

In addition, in the event we are required to conduct clinical trials, it may be very expensive and difficult to design and implement clinical trials due to the rigorous regulatory requirements to which clinical trials are subject. Clinical trials are also time consuming and there is no certainty as to when we may be able to complete the clinical trial process.

***The testing, manufacturing and marketing of medical diagnostic devices entails an inherent risk of product liability and personal injury claims.***

To date, we have experienced no product liability or personal injury claims, but any such claims arising in the future could materially adversely affect our business, prospects and financial condition. Potential product liability or personal injury claims may exceed the amount of our insurance coverage or may be excluded from coverage under the terms of our policy or limited by other claims under our umbrella insurance policy. Additionally, we may not be able to renew our existing insurance at a cost and level of coverage comparable to that presently in effect, if at all. In the event that we are held liable for a claim against which we are not insured or for damages exceeding the limits of our insurance coverage, such claim could negatively impact our cash flow and materially adversely affect our business, prospects and financial condition.

***Our business could be adversely impacted by adoption of new coding for molecular genetic tests.***

Reimbursement from our LDTs is available under the current procedural terminology, or CPT, codes, for molecular-based testing. The American Medical Association CPT® Editorial Panel is continuing its process of establishing analyte specific billing codes to replace codes that describe procedures used in performing molecular testing. The adoption of analyte specific codes will allow payors to better determine tests being performed. This could lead to limited coverage decisions or payment



denials for our product candidates or products we may develop in the future, which could materially adversely affect our business, prospects and financial condition.

## **Risks Related to Our Intellectual Property**

***If we are unable to protect our intellectual property effectively, we may be unable to prevent third parties from using our technologies, which would impair our competitive advantage.***

We rely on patent protection as well as a combination of trademark, copyright and trade secret protection, and other contractual restrictions, to protect our proprietary technologies, all of which provide limited protection and may not adequately protect our rights or permit us to gain or keep any competitive advantage. We may not be successful in defending challenges made in connection with our patents and patent applications. If we fail to protect our intellectual property, we will be unable to prevent third parties from using our technologies and they will be able to compete more effectively against us.

In addition to our patents, we rely on contractual restrictions to protect our proprietary technology. We require our employees and third parties to sign confidentiality agreements and our employees are also required to sign agreements assigning to us all intellectual property arising from their work for us. Nevertheless, we cannot guarantee that these measures will be effective in protecting our intellectual property rights. Any failure to protect our intellectual property rights could materially adversely affect our business, prospects and financial condition.

Our currently pending or future patent applications may not result in issued patents and any patents issued to us may be challenged, invalidated or held unenforceable. Furthermore, we cannot be certain that we were the first to make the invention claimed in our issued patents or pending patent applications in the U.S., or that we were the first to file for protection of the inventions claimed in our foreign issued patents or pending patent applications. In addition, there are numerous recent changes to the patent laws and proposed changes to the rules of the U.S. Patent and Trademark Office, or the PTO, which may have a significant impact on our ability to protect our technology and enforce our intellectual property rights. For example, in September 2011, the U.S. enacted sweeping changes to the U.S. patent system under the Leahy-Smith America Invents Act, including changes that would transition the U.S. from a “first-to-invent” system to a “first-to-file” system and alter the processes for challenging issued patents. These changes could increase the uncertainties and costs surrounding the prosecution of our patent applications and the enforcement or defense of our issued patents. In addition, we may become subject to interference proceedings conducted in the patent and trademark offices of various countries to determine our entitlement to patents, and these proceedings may conclude that other patents or patent applications have priority over our patents or patent applications. It is also possible that a competitor may successfully challenge our patents through various proceedings and those challenges may result in the elimination or narrowing of our patents, and therefore reduce our patent protection. Accordingly, rights under any of our issued patents, patent applications or future patents may not provide us with commercially meaningful protection for our products or afford us a commercial advantage against our competitors or their competitive products or processes.

***The patents issued to us may not be broad enough to provide any meaningful protection, one or more of our competitors may develop more effective technologies, designs or methods without infringing our intellectual property rights and one or more of our competitors may design around our proprietary technologies.***

If we are not able to protect our proprietary technology, trade secrets and know-how, our competitors may use our inventions to develop competing products. We own certain patents relating to our cell-free molecular diagnostic technology. However, these patents may not protect us against our competitors, and patent litigation is very expensive. We may not have sufficient cash available to pursue any patent litigation to its conclusion because we currently do not generate revenues other than licensing, milestone and royalty income.

We cannot rely solely on our current patents to be successful. The standards that the PTO and foreign patent offices use to grant patents, and the standards that U.S. and foreign courts use to interpret patents, are not the same, are not always applied predictably or uniformly and can change, particularly as new technologies develop. As such, the degree of patent protection obtained in the U.S. may differ substantially from that obtained in various foreign countries. In some instances, patents have been issued in the U.S. while substantially less or no protection has been obtained in Europe or other countries.

We cannot be certain of the level of protection, if any, that will be provided by our patents if they are challenged in court, where our competitors may raise defenses such as invalidity, unenforceability or possession of a valid license. In addition, the type and extent of any patent claims that may be issued to us in the future are uncertain. Any patents that are issued may not contain claims that will permit us to stop competitors from using similar technology.

***We may incur substantial costs as a result of litigation or other proceedings relating to patent and other intellectual property rights and we may be unable to protect our rights to, or use, our cell-free molecular diagnostic technology.***

Third parties may challenge the validity of our patents and other intellectual property rights, resulting in costly litigation or other time-consuming and expensive proceedings, which could deprive us of valuable rights. If we become involved in any intellectual property litigation, interference or other judicial or administrative proceedings, we will incur substantial expenses and the attention of our technical and management personnel will be diverted. An adverse determination may subject us to significant liabilities or require us to seek licenses that may not be available from third parties on commercially favorable terms, if at all. Further, if such claims are proven valid, through litigation or otherwise, we may be required to pay substantial monetary damages, which can be tripled if the infringement is deemed willful, or be required to discontinue or significantly delay development, marketing, selling and licensing of the affected products and intellectual property rights. In our European patent that covers using microRNAs to detect in vivo cell death, an anonymous third party has recently filed an opposition against the claims in the patent. Oppositions against the patentability of claims in a European patent are considered by a panel of examiners at the European Patent Office, and we are considering the full range of options available for defending against the opposition.

Our competitors may have filed, and may in the future file, patent applications covering technology similar to ours. Any such patent application may have priority over our patent applications and could further require us to obtain rights to issued patents covering such technologies. There may be third-party patents, patent applications and other intellectual property relevant to our potential products that may block or compete with our potential products or processes. If another party has filed a U.S. patent application on inventions similar to ours, we may have to participate in an interference proceeding declared by the PTO to determine priority of invention in the U.S. The costs of these proceedings could be substantial, and it is possible that such efforts would be unsuccessful, resulting in a loss of our U.S. patent position with respect to such inventions. In addition, we cannot assure you that we would prevail in any of these suits or that the damages or other remedies that we are ordered to pay, if any, would not be substantial. Claims of intellectual property infringement may require us to enter into royalty or license agreements with third parties that may not be available on acceptable terms, if at all. We may also be subject to injunctions against the further development and use of our technology, which could materially adversely affect our business, prospects and financial condition.

Some of our competitors may be able to sustain the costs of complex patent litigation more effectively than we can because they have substantially greater resources. In addition, any uncertainties resulting from the initiation and continuation of any litigation could materially adversely affect our ability to raise the funds necessary to continue our operations.

***Certain rights that we in-license from third-parties are not within our control, and we may be negatively impacted if we lose those rights.***

We license some of the technology that is necessary for our products and services from third. In connection with such in-licenses, we may agree to pay the licensor royalties based on sales of our products, which become a cost of product revenues and impact the margins on our products and services. We may need to in-license other technologies in the future to commercialize on our products and services. We may also need to negotiate licenses after launching our products and services. Our business may suffer if any such licenses terminate, if the licensors fail to abide by the terms of the license, if the licensed patents or other rights are found to be invalid, or if we are unable to enter into necessary licenses on acceptable terms.

### **Risks Related to Ownership of Our Common Stock**

***If we discover material weaknesses and other deficiencies in our internal control and accounting procedures, our stock price could decline significantly and raising capital could be more difficult.***

If we fail to comply with the rules under the Sarbanes-Oxley Act, related to disclosure controls and procedures, or if we discover additional material weaknesses and other deficiencies in our internal control and accounting procedures, our stock price could decline significantly and raising capital could be more difficult. Moreover, effective internal controls are necessary for us to produce reliable financial reports and are important in helping prevent financial fraud. If we cannot provide reliable financial reports or prevent fraud, our business and operating results could be harmed, investors could lose confidence in our reported financial information, and the trading price of our common stock could drop significantly. We previously identified a material weakness in our internal control over financial reporting as of December 31, 2012, which was remedied in the year ended December 31, 2013. We cannot be certain that additional material weaknesses or significant deficiencies in our internal controls will not be discovered in the future.

***The rights of the holders of our common stock may be impaired by the potential issuance of preferred stock.***

Our certificate of incorporation gives our board of directors the right to create one or more new series of preferred stock. As a result, the board of directors may, without stockholder approval, issue preferred stock with voting, dividend, conversion, liquidation or other rights that could adversely affect the voting power and equity interests of the holders of our common stock. Preferred stock, which could be issued with the right to more than one vote per share, could be used to discourage, delay or prevent a change of control of our company, which could materially adversely affect the price of our common stock. Without the consent of the holders of the outstanding shares of our Series A Convertible Preferred Stock, we may not adversely alter or change the rights of the holders of the Series A Convertible Preferred Stock or increase the number of authorized shares of Series A Convertible Preferred Stock, create a class of stock that is senior to or on parity with the Series A Convertible Preferred Stock, amend our certificate of incorporation in breach of these provisions or agree to any of the foregoing.

***Our common stock price may be volatile and could fluctuate widely in price, which could result in substantial losses for investors.***

The market price of our common stock historically has been, and we expect will continue to be, subject to significant fluctuations over short periods of time. For example, during the year ended December 31, 2016, the closing price of our common stock ranged from a low of \$2.00 to a high of \$6.88. These fluctuations may be due to various factors, many of which are beyond our control, including:

- technological innovations or new products and services introduced by us or our competitors;
- clinical trial results relating to our tests or those of our competitors;
- announcements or press releases relating to the industry or to our own business or prospects;
- coverage and reimbursement decisions by third party payors, such as Medicare and other managed care organizations;
- regulation and oversight of our product candidates and services, including by the FDA, Centers for Medicare & Medicaid Services and comparable foreign agencies;
- the establishment of partnerships with clinical reference laboratories;
- healthcare legislation;
- intellectual property disputes;
- additions or departures of key personnel;
- sales of our common stock;
- our ability to integrate operations, technology, products and services;
- our ability to execute our business plan;
- operating results below expectations;
- loss of any strategic relationship;
- industry developments;
- economic and other external factors; and
- period-to-period fluctuations in our financial results.

In addition, market fluctuations, as well as general political and economic conditions, could materially adversely affect the market price of our securities. Because we are a development stage company with no revenue from operations to date, other

than licensing, milestone and royalty income, you should consider any one of these factors to be material. Our stock price may fluctuate widely as a result of any of the foregoing.

***Because certain of our stockholders control a significant number of shares of our common stock, they may have effective control over actions requiring stockholder approval.***

As of December 31, 2016, our directors, executive officers and principal stockholders, and their respective affiliates, beneficially owned approximately 17.9% of our outstanding shares of common stock. As a result, these stockholders, acting together, would have the ability to control the outcome of matters submitted to our stockholders for approval, including the election of directors and any merger, consolidation or sale of all or substantially all of our assets. In addition, these stockholders, acting together, would have the ability to control the management and affairs of our company. Accordingly, this concentration of ownership may harm the market price of our common stock by:

- delaying, deferring or preventing a change in control of our company;
- impeding a merger, consolidation, takeover or other business combination involving us; or
- discouraging a potential acquirer from making a tender offer or otherwise attempting to obtain control of us.

***We have not paid dividends on our common stock in the past and do not expect to pay dividends on our common stock for the foreseeable future. Any return on investment may be limited to the value of our common stock.***

We have never paid any cash dividends on our common stock. We expect that any income received from operations will be devoted to our future operations and growth. We do not expect to pay cash dividends on our common stock in the near future. Payment of dividends would depend upon our profitability at the time, cash available for those dividends, and other factors that our board of directors may consider relevant. If we do not pay dividends, our common stock may be less valuable because a return on an investor's investment will only occur if our stock price appreciates. In addition, under the terms of our Loan and Security Agreement and the Equipment Line of Credit, we are precluded from paying cash dividends without the prior written consent of the Lenders, and the terms of the Series A Convertible Preferred Stock prohibit us from paying dividends to the holders of our common stock so long as any dividends due on the Series A Convertible Preferred Stock remain unpaid. Investors in our common stock should not rely on an investment in our company if they require dividend income.

***If securities or industry analysts do not publish research or reports about our business, or if they adversely change their recommendations regarding our stock, our stock price and trading volume could decline.***

The trading market for our common stock will be influenced by the research and reports that industry or securities analysts publish about us or our business. If one or more of the analysts who cover us downgrade our stock or publish inaccurate or unfavorable research about our business, our stock price would likely decline. In addition, if our operating results fail to meet the forecast of analysts, our stock price would likely decline. If one or more of these analysts cease coverage of our company or fail to publish reports on us regularly, we could lose visibility in the financial markets, which in turn could cause our stock price or trading volume to decline.

***Delaware law and our corporate charter and bylaws contain anti-takeover provisions that could delay or discourage takeover attempts that stockholders may consider favorable.***

Provisions in our certificate of incorporation and bylaws may have the effect of delaying or preventing a change of control of our company or changes in our management. For example, our board of directors has the authority to issue up to 20,000,000 shares of preferred stock in one or more series and to fix the powers, preferences and rights of each series without stockholder approval. The ability to issue preferred stock could discourage unsolicited acquisition proposals or make it more difficult for a third party to gain control of our company, or otherwise could materially adversely affect the market price of our common stock.

Furthermore, because we are incorporated in Delaware, we are governed by the provisions of Section 203 of the General Corporation Law of the State of Delaware. This provision may prohibit or restrict large stockholders, in particular those owning 15% or more of our outstanding voting stock, from merging or combining with us, which could discourage potential takeover attempts, reduce the price that investors may be willing to pay for shares of our common stock in the future and result in our market price being lower than it would without these provisions.

***A sale of a substantial number of shares of our common stock may cause the price of our common stock to decline and may impair our ability to raise capital in the future.***

Our common stock is traded on The NASDAQ Capital Market and could be considered “thinly-traded,” meaning that the number of investors interested in purchasing our common stock at or near bid prices at any given time may be relatively small or non-existent. Finance transactions resulting in a large amount of newly issued shares that become readily tradable, or other events that cause current stockholders to sell shares, could place downward pressure on the trading price of our common stock. In addition, the lack of a robust resale market may require a stockholder who desires to sell a large number of shares of common stock to sell the shares in increments over time to mitigate any adverse impact of the sales on the market price of our stock.

If our stockholders sell, or the market perceives that our stockholders may sell for various reasons, including the ending of restriction on resale, substantial amounts of our common stock in the public market, including shares issued upon the exercise of outstanding options or warrants, the market price of our common stock could fall. Sales of a substantial number of shares of our common stock may make it more difficult for us to sell equity or equity-related securities in the future at a time and price that we deem reasonable or appropriate.

***We may be subject to stockholder litigation, thereby diverting our resources, which could materially adversely affect our profitability and results of operations.***

The market for our common stock is characterized by significant price volatility, and we expect that our share price will continue to be at least as volatile for the indefinite future. In the past, plaintiffs have often initiated securities class action litigation against a company following periods of volatility in the market price for its securities. In addition, stockholders may bring actions against companies relating to past transactions or other matters. Any such actions could give rise to substantial damages and thereby materially adversely affect our consolidated financial position, liquidity or results of operations. Even if an action is not resolved against us, the uncertainty and expense associated with stockholder actions could materially adversely affect our business, prospects and financial condition. Litigation can be costly, time-consuming and disruptive to business operations. The defense of lawsuits could also result in diversion of our management’s time and attention away from business operations, which could harm our business.

#### **ITEM 1B. UNRESOLVED STAFF COMMENTS**

None.

#### **ITEM 2. PROPERTIES**

We currently lease approximately 26,100 square feet of laboratory and office space for our headquarters in San Diego, California under a lease agreement, as amended from time to time, that expires in December 2021. In November 2015, we also leased approximately 2,300 square feet of lab and office space in Torino, Italy under a lease agreement that expires December 31, 2018. We believe that our facilities are adequate for our needs for the immediate future and that, should it be needed, suitable additional space will be available to accommodate expansion of our operations on commercially reasonable terms.

#### **ITEM 3. LEGAL PROCEEDINGS**

From time to time, we may become involved in litigation relating to claims arising out of its operations in the normal course of business. We are not involved in any pending legal proceeding or litigation and, to the best of our knowledge, no governmental authority is contemplating any proceeding to which we are a party or to which any of our properties is subject, which would reasonably be likely to have a material adverse effect on us, except for the following: On March 28, 2016 we filed a complaint in the Superior Court of the State of California for the County of San Diego against Dr. Antonius Schuh, our former Chief Executive Officer (“CEO”) and Mr. Stephen Zaniboni, our former Chief Financial Officer (“CFO”), for, among other things, breach of fiduciary duty for failing to present a lucrative corporate opportunity to us concerning promising new therapeutics in the field of precision medicine and instead taking that opportunity for their own personal benefit. The complaint asks that Dr. Schuh and Mr. Zaniboni be required to turn over their interests in these new therapeutics to us. Dr. Schuh and Mr. Zaniboni filed a cross complaint in the Superior Court of the State of California for the County of San Diego against us on May 23, 2016 for, among other things, breach of contract. The parties are currently engaged in the discovery process.

#### **ITEM 4. MINE SAFETY DISCLOSURES**

Not applicable.

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

Our common stock has traded on The NASDAQ Capital Market ("NASDAQ") under the symbol "TROV" since May 30, 2012.

Our common stock was traded over the counter on the pink sheets under the symbol TROV.PK from June 15, 2007 until May 29, 2012. From July 27, 2004 until June 14, 2007, our common stock was quoted on the OTC Bulletin Board under the symbol "XNOM.OB". Prior to July 27, 2004, our common stock was quoted on the OTC Bulletin Board under the symbol "UKAR.OB", but never traded. The following table sets forth the range of high and low per share sales prices of our common stock during the periods indicated, as reported on NASDAQ.

	2016		2015	
	High	Low	High	Low
First Quarter	\$ 6.93	\$ 2.85	\$ 8.04	\$ 4.33
Second Quarter	\$ 6.67	\$ 3.31	\$ 13.58	\$ 6.50
Third Quarter	\$ 5.98	\$ 4.25	\$ 10.46	\$ 4.85
Fourth Quarter	\$ 4.75	\$ 1.78	\$ 7.18	\$ 4.21

The closing price of our common stock on NASDAQ on February 28, 2017 was \$1.95 per share.

**Number of Stockholders**

As of February 28, 2017, we had approximately 56 stockholders of record of our common stock.

**Dividend Policy**

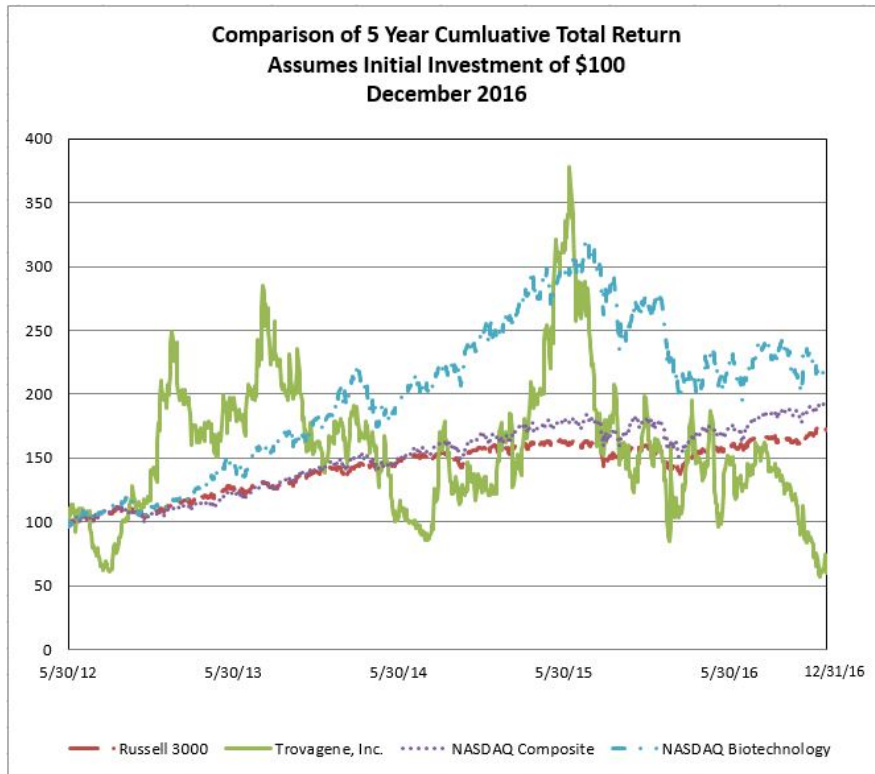
Historically, we have not paid any dividends to the holders of shares of our common stock and we do not expect to pay any such dividends in the foreseeable future as we expect to retain our future earnings for use in the operation and expansion of our business. Pursuant to the terms of our outstanding shares of Series A Convertible Preferred Stock, dividends cannot be paid to the holders of shares of our common stock so long as any dividends due on the Series A Convertible Preferred Stock remain unpaid.

**Corporate Performance Graph**

The following corporate performance graph and related information shall not be deemed "soliciting material" or to be "filed" with the Securities and Exchange Commission, nor shall such information be incorporated by reference into any future filing under the Securities Act of 1933, as amended, or the Securities Exchange Act of 1934, as amended, except to the extent that we specifically incorporate it by reference into such filing.

The following corporate performance graph compares our total stockholder returns from May 30, 2012 through December 31, 2016 against the NASDAQ Stock Market (U.S.), the NASDAQ Pharmaceutical Index and the Russell 3000 Index, assuming a \$100 investment made on May 30, 2012. Each of the comparative measures of cumulative total return assumes reinvestment of dividends. The corporate performance shown on the graph below is not necessarily indicative of future price performance.

**COMPARISON OF CUMULATIVE TOTAL RETURN  
Among the NASDAQ Stock Market (U.S.),  
The NASDAQ Pharmaceutical Index, the Russell 3000 Index  
and Trovogene, Inc.**



**ITEM 6. SELECTED FINANCIAL DATA**

The following tables set forth our selected consolidated financial data and have been derived from our audited consolidated financial statements. Consolidated balance sheets as of December 31, 2016 and 2015, as well as consolidated statements of operations for the years ended December 31, 2016, 2015, and 2014, and the reports thereon are included elsewhere in this Annual Report on Form 10-K. The information should be read in conjunction with our audited consolidated financial statements and the notes to such statements, included below in Item 8 “Financial Statements and Supplementary Data”, and “Management’s Discussion and Analysis of Financial Condition and Results of Operations” included in Item 7. Historical results are not necessarily indicative of the results to be expected in the future.

	Year ended December 31,				
	2016	2015	2014	2013	2012
(in thousands, except for share and per share data)					
<b>Consolidated Statement of Operations Data:</b>					
Revenues	\$ 381	\$ 313	\$ 280	\$ 259	\$ 450
Costs and Expenses:					
Cost of revenues	1,730	629	15	—	—
Research and development	15,007	10,594	6,665	3,948	1,920
Selling and marketing	11,523	6,444	2,735	1,530	506
General and administrative	11,476	7,920	5,810	5,472	2,873
Restructuring charges	790	—	—	—	—
Total operating expenses	40,526	25,587	15,225	10,950	5,299
Loss from operations	(40,145)	(25,274)	(14,945)	(10,691)	(4,849)
Other income (loss), net	(145)	(3)	25	(23)	4
Net interest expense	(1,376)	(1,468)	(831)	(13)	—
Gain (loss) on change in fair value of derivative financial instruments—warrants	2,462	(726)	1,426	(1,084)	(6,721)
Net loss	(39,204)	(27,471)	(14,325)	(11,811)	(11,566)
Preferred stock dividends	(24)	(24)	(23)	(30)	(38)
Net loss attributable to common stockholders	\$ (39,228)	\$ (27,495)	\$ (14,348)	\$ (11,841)	\$ (11,604)
Net loss per common share — basic	\$ (1.30)	\$ (1.05)	\$ (0.76)	\$ (0.70)	\$ (0.89)
Net loss per common share — diluted	\$ (1.37)	\$ (1.21)	\$ (0.88)	\$ (0.70)	\$ (0.89)
Weighted average shares outstanding — basic*	30,174,838	26,201,713	18,904,280	16,978,212 *	13,066,600 *
Weighted average shares outstanding — diluted*	30,281,263	26,452,165	19,071,112	16,978,212 *	13,066,600 *

(\*) Weighted average shares outstanding reflects retroactive change of a one for six (1:6) reverse stock split effective on May 29, 2012

	December 31,				
	2016	2015	2014	2013	2012
(\$ in thousands)					
<b>Consolidated Balance Sheet Data:</b>					
Cash and cash equivalents	\$ 13,915	\$ 67,493	\$ 27,294	\$ 25,837	\$ 10,820
Working capital	31,153	60,180	23,232	24,060	10,318
Total assets	43,950	71,446	28,897	27,156	11,665
Total stockholders’ equity	19,768	48,701	8,350	20,392	2,169



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

### Forward-Looking Statements

The information in this report contains forward-looking statements. All statements other than statements of historical fact made in this report are forward looking. In particular, the statements herein regarding industry prospects and future results of operations or financial position are forward-looking statements. These forward-looking statements can be identified by the use of words such as "believes," "estimates," "could," "possibly," "probably," "anticipates," "projects," "expects," "may," "will," or "should" or other variations or similar words. No assurance can be given that the future results anticipated by the forward-looking statements will be achieved. Forward-looking statements reflect management's current expectations and are inherently uncertain. Our actual results may differ significantly from management's expectations.

The following discussion and analysis should be read in conjunction with our financial statements, included herewith. This discussion should not be construed to imply that the results discussed herein will necessarily continue into the future, or that any conclusion reached herein will necessarily be indicative of actual operating results in the future. Such discussion represents only the best present assessment of our management.

### Overview

We are focused on developing and commercializing our precision cancer monitoring technology, which can inform oncologists and guide treatment decisions by determining a tumor's mutational status and enabling physicians to track therapeutic response and resistance over time.

We are expanding the body of clinical evidence supporting our urine-based cell-free molecular diagnostic platform through collaborations with major cancer treatment centers and integrated healthcare networks. We expect that the benefits of our precision cancer monitoring technology will become more apparent in terms of its clinical utility and impact on patient outcomes. Our intellectual property estate protecting our technology includes methods of extracting, purifying, preparing, and detecting cell-free DNA and RNA mutations in urine.

Through December 31, 2016, our cumulative total deficit was \$148,115,202. To date, we have generated minimal revenues and expect to incur additional losses to perform further research and development activities and commercial expansion. During 2016, we advanced our business with the following activities:

- Entered into preferred provider agreements with Blue Cross Blue Shield Illinois, Stratos, Inc., Multiplan, Inc., Three Rivers Provider Network, Fortified Provider Network, FedMed, Inc., American's Choice Provider Network, and Galaxy Health Network. These combined agreements represent in-network coverage for approximately 168 million covered lives.
- Presented clinical study results at the 2016 AACR Annual Meeting that demonstrated ctDNA assay performance for detection and monitoring *KRAS* mutations in urine from patients with advanced cancers.
- Appointed William J. Welch, as our Chief Executive Officer, after announcing the departure of Matthew Posard, Chief Commercial Officer and the termination of Antonius Schuh and Stephen Zaniboni as our previous CEO and CFO, respectively.
- Presented clinical study results for our Trovera™ ctDNA tests at the 2016 ASCO Annual Meeting. Results demonstrated highly sensitive detection of *EGFR* T790M mutations and validated urine ctDNA testing as an alternative to tissue and plasma.
- Entered into a clinical collaboration with the University of Michigan for monitoring and early detection of pancreatic cancer utilizing the Trovera™ *KRAS* ctDNA liquid biopsy test.
- Entered into a clinical collaboration with the USC Norris Comprehensive Cancer Center to standardize the use of Trovera™ ctDNA liquid biopsy test in patient care.
- Published study results in the *Journal of Thoracic Oncology* that demonstrate the clinical and analytical validity of the Trovera™ urine and blood-based liquid biopsy tests to assess *EGFR* T790M mutational status. The data shows that the Trovera™ test successfully identifies *EGFR* mutations, and has high concordance with tumor tissue.

- Presented clinical study results for our Trovera™ tests at the 3rd Annual Precision Medicine Congress. The presentation highlighted Trovera's™ clinical utility in identifying driver mutations as well as the potential benefits of liquid biopsies, including: patient response to therapy, progression monitoring, and early detection.
- Published study results in *Experimental Hematology & Oncology* that illustrates the clinical utility of using Trovera™ urine liquid biopsy to confirm the presence of *EGFR* T790M mutational status in a patient with late-stage non-small cell lung cancer. The study concluded that ctDNA analysis should be considered a valuable diagnostic tool in treatment decision-making.
- Invited to present four abstracts at the IASLC 17th World Conference on Lung Cancer. The presentation will focus on the clinical utility of Trovera™ in detection and monitoring of the *EGFR* T790M resistance mutation in non-small cell lung cancer. The presentation will also include first health outcomes and a total cost of care analysis, demonstrating that a urine-testing strategy shows improved cost-savings and patients' experiences compared to a tissue-testing strategy.
- Invited to present at the 31st International Papillomavirus Conference. Two abstracts will be presented. The first demonstrates clinical performance of urine and cervical samples in a Chinese screening population. These results support the utility of urine testing for cervical cancer screening among this population. The second abstract describes the analytical performance of the Trovagene HPV-UR urine test.
- Entered into a long-term Supply and Distribution Agreement with Boreal, merging our respective technologies to co-develop and commercialize multigene urine and blood ctDNA liquid biopsy assay kits for global distribution.
- Announced a strategic restructuring plan to accelerate global distribution of liquid biopsy technology. The restructuring will reduce expenses and will allow us to concentrate on the distribution of kits and systems to be utilized by Research Institutions, Cancer Centers, and clinical service facilities for research use around the world.

Our product development and commercialization efforts are in their early stages, and we cannot make estimates of the costs or the time that our development efforts will take to complete, or the timing and amount of revenues related to the sale of our tests or our diagnostic services and revenues related to our license agreements. The risk of completion of any program is high because of the many uncertainties involved in bringing new diagnostic products to market including the long duration of clinical testing, the specific performance of proposed products under stringent clinical trial protocols and/or CLIA requirements, extended regulatory approval and review cycles, our ability to raise additional capital, the nature and timing of research and development expenses, and competing technologies being developed by organizations with significantly greater resources.

## **CRITICAL ACCOUNTING POLICIES**

Financial Reporting Release No. 60 requires all companies to include a discussion of critical accounting policies or methods used in the preparation of financial statements. Our accounting policies are described in Item 8. Financial Statements—Note 2 *Basis of Presentation and Summary of Significant Accounting Policies* in this Annual Report on Form 10-K. The preparation of financial statements in conformity with accounting principles generally accepted in the United States of America requires management to make estimates and assumptions that affect the reported amounts of assets and liabilities and disclosure of contingent assets and liabilities at the date of the financial statements and the reported amounts of expenses during the reporting period. Actual results could differ from those estimates. We believe that the following discussion represents our critical accounting policies.

### *Revenue Recognition*

Historically, our revenues have been generated from royalty, license and milestones related to agreements we have with other healthcare companies, medical laboratories and biotechnology partners. We also have revenues from our diagnostic services and clinical research services.

We recognize revenues when persuasive evidence that an arrangement exists, delivery has occurred, the price is fixed or determinable, and collection is reasonably assured.

### *Milestone, Royalty and License Revenues*

We license and sublicense our patent rights to healthcare companies, medical laboratories and biotechnology partners. These agreements may involve multiple elements such as license fees, royalties and milestone payments. Revenue is recognized when the criteria described above have been met as well as the following:

- Up-front nonrefundable license fees pursuant to agreements under which we have no continuing performance obligations are recognized as revenues on the effective date of the agreement and when collection is reasonably assured.
- Minimum royalties are recognized as earned, and royalties are earned based on the licensee's use. The Company is unable to predict licensee's sales and thus revenue is recognized upon receipt of notification from licensee and payment when collection is assured. Notification is generally one quarter in arrears.
- Milestone payments are recognized when both the milestone is achieved and the related payment is received.

### *Diagnostic Service Revenue*

Diagnostic service revenue, which consists of fees for clinical laboratory tests may come from several sources, including commercial third-party payors, such as insurance companies and health maintenance organizations, government payors, such as Medicare and Medicaid in the U.S., patient self-pay and, in some cases, from hospitals or referring laboratories who, in turn, bill third-party payors for testing.

Diagnostic service revenue will be recognized when the criteria described above has been met as well as upon cash collection until we can reliably estimate the amount that will be ultimately collected for our LDTs, at which time we will recognize revenues on an accrual basis.

### *Clinical Research Services Revenue*

Revenue from clinical research services consists primarily of revenue from the sale of urine and blood collection supplies under agreements with our clinical research and business development partners. Revenue is recognized when supplies are delivered.

### *Derivative Financial Instruments—Warrants*

Our derivative financial instruments—warrants liabilities are related to warrants issued in connection with financing transactions and are therefore not designated as hedging instruments. All derivatives are recorded on our consolidated balance sheet at fair value in accordance with current accounting guidelines for such complex financial instruments.

We have issued common stock warrants in connection with the execution of certain equity financings. Such warrants are classified as derivative liabilities under the provisions of the Financial Accounting Standards Board ("FASB") Accounting Standards Codification ("ASC") Topic 815, *Derivatives and Hedging* ("ASC 815") and are recorded at their fair market value as of each reporting period. Such warrants do not meet the exemption that a contract should not be considered a derivative instrument if it is (1) indexed to its own stock and (2) classified in stockholders' equity. Changes in fair value of derivative liabilities are recorded in the consolidated statement of operations under the caption "Gain (loss) from change in fair value of derivative financial instruments—warrants."

The fair value of warrants is determined using the Black-Scholes option-pricing model using assumptions regarding volatility of our common stock price, remaining life of the warrant, and risk-free interest rates at each period end. Therefore we use model-derived valuations where inputs are observable in active markets to determine the fair value and accordingly classify such warrants in Level 3 per ASC Topic 820, *Fair Value Measurements and Disclosures* ("ASC 820"). At December 31, 2016 and 2015, the fair value of such warrants was \$834,940 and \$3,297,077, respectively, and was recorded as a liability under the caption "Derivative financial instruments—warrants" on the consolidated balance sheet.

*Cost of Revenue*

Cost of revenue represents the cost of materials, personnel costs and costs associated with processing specimens including pathological review, quality control analyses, and delivery charges necessary to render an individualized test result. Costs associated with performing tests are recorded as the tests are processed. However, the revenue on diagnostic services is recognized on a cash collection basis resulting in costs incurred before the collection of related revenue.

*Research and Development*

Research and development expense, which includes expenditures in connection with an in-house research and development laboratory, salaries and staff costs, application and filing for regulatory approval of proposed products, regulatory and scientific consulting fees and clinical samples, as well as clinical collaborators and insurance, are accounted for in accordance with FASB ASC Topic 730-10-55-2, *Research and Development*. Also, as prescribed by this guidance, patent filing and maintenance expenses are considered legal in nature and therefore classified as general and administrative expense. We are providing the following summary of our research and development expense to supplement the more detailed discussions under “Results of Operations” below. Costs are not allocated to projects as the majority of the costs relate to employees and facilities costs and we do not track employees’ hours by project or allocate facilities costs on a project basis.

	For the years ended December 31,		
	2016	2015	2014
Salaries and staff costs	\$ 7,698,632	\$ 5,365,045	\$ 3,465,211
Outside services, consultants and lab supplies	5,573,362	4,211,251	2,435,917
Facilities	1,434,101	748,466	628,535
Other	300,547	269,107	135,243
<b>Total research and development</b>	<b>\$ 15,006,642</b>	<b>\$ 10,593,869</b>	<b>\$ 6,664,906</b>

While certain of our research and development costs may have future benefits, our policy of expensing all research and development expenditures is predicated on the fact that we have no history of successful commercialization of molecular diagnostic products to base any estimate of the number of future periods that would be benefited.

FASB ASC Topic 730, *Research and Development* requires that non-refundable advance payments for goods or services that will be used or rendered for future research and development activities be deferred and capitalized. As the related goods are delivered or the services are performed, or when the goods or services are no longer expected to be provided, the deferred amounts are recognized as an expense.

*Stock-based Compensation*

We rely heavily on incentive compensation in the form of stock options and restricted stock units (“RSUs”) to recruit, retain and motivate directors, executive officers, employees and consultants. Incentive compensation in the form of stock options, RSUs and warrants is designed to provide long-term incentives, develop and maintain an ownership stake and conserve cash. Stock-based compensation expense related to stock options for employees and directors is recognized in the consolidated statement of operations based on estimated amounts, including the grant date fair value and the expected service period. We estimate the grant date fair value using a Black-Scholes model. Stock-based compensation recorded in our consolidated statement of operations is based on awards expected to ultimately vest and has been reduced for estimated forfeitures. We recognize the value of the awards on a straight-line basis over the awards’ requisite service periods. The requisite service period is generally the time over which our stock-based awards vest. Compensation expense for RSUs is measured at the grant date and recognized ratably over the vesting period in the consolidated statement of operations. The fair value of RSUs is determined based on the closing market price of the Company’s common stock on the grant date.

We account for equity instruments granted to non-employees in accordance with FASB ASC Topic 505-50 “*Equity-Based Payment to Non-Employees*”, where the value of the stock-based compensation is based upon the measurement date as determined at either: (1) the date at which a performance commitment is reached, or (2) the date at which the necessary performance to earn the equity instruments is complete. Accordingly, the fair value of these options is being “marked to market” quarterly until the measurement date is determined.

*Fair Value of Financial Instruments*

Financial instruments consist of cash and cash equivalents, short-term investments, accounts receivable, accounts payable, debt and derivative liabilities. We have adopted ASC 820 for financial assets and liabilities that are required to be measured at fair value and non-financial assets and liabilities that are not required to be measured at fair value on a recurring basis. These financial instruments are stated at their respective historical carrying amounts, which approximate fair value due to their short term nature as they reflect current market interest rates. Debt is stated at its respective historical carrying amounts, which approximate fair value as balances reflect current market interest rates.

ASC 820 provides that the measurement of fair value requires the use of techniques based on observable and unobservable inputs. Observable inputs reflect market data obtained from independent sources, while unobservable inputs reflect our market assumptions. The inputs create the following fair value hierarchy:

- Level 1 — Quoted prices for identical instruments in active markets.
- Level 2 — Quoted prices for similar instruments in active markets; quoted prices for identical or similar instruments in markets that are not active; and model-derived valuations where inputs are observable or where significant value drivers are observable.
- Level 3 — Instruments where significant value drivers are unobservable to third parties.

**Off-Balance Sheet Arrangements**

As of December 31, 2016, we did not have any off-balance sheet arrangements as described by Item 303(a)(4) of Regulation S-K.

**Recent Accounting Pronouncements**

See Item 8. Financial Statements—Note 2 *Basis of Presentation and Summary of Significant Accounting Policies* in this Annual Report on Form 10-K for a discussion of recent accounting pronouncements.

**Results of Operations****YEARS ENDED DECEMBER 31, 2016 AND 2015****Revenues**

Our total revenues were \$381,072 and \$312,812 for the years ended December 31, 2016 and 2015, respectively. Total revenues consisted of the following:

	For the years ended December 31,		
	2016	2015	(Decrease)/Increase
Royalty income	\$ 258,062	\$ 274,648	\$ (16,586)
Diagnostic service revenue	86,137	13,789	72,348
Clinical research services	\$ 36,873	\$ 24,375	\$ 12,498
Total revenues	<u>\$ 381,072</u>	<u>\$ 312,812</u>	<u>\$ 68,260</u>

The \$16,586 decrease in royalty income in the year ended December 31, 2016 is primarily a result of less royalty payments earned in excess of minimum royalty payments in the current year compared to the year ended December 31, 2015. According to our revenue recognition policy, we do not record royalty revenues in excess of minimum royalty amounts until we have received payment of such royalties.

Diagnostic service revenue is recognized when payment is received for the test results as long as all the other revenue criteria are completed. The number of tests billed and payments received were higher in the year ended December 31, 2016 as compared to the prior year.

Revenue from clinical research services consists primarily of revenue from the sale of urine and blood collection supplies and sample processing under agreements with our clinical research and business development partners. Revenue is recognized when supplies are delivered. We sold and delivered more test results at a higher average selling price and a fewer supplies at a higher average selling price during the year ended December 31, 2016 as compared to the year ended December 31, 2015.

We expect our royalty income to fluctuate as the royalties are based on the minimum royalty payments as well as the timing of when payments are received for royalties in excess of minimum royalties. Our diagnostic service revenue will be impacted by our shift in focus to the distribution of kits and systems. In addition, we expect revenue from clinical research services to fluctuate based on timing of delivery of supplies under agreements.

### **Cost of Revenues**

Our total cost of revenues was \$1,730,512 in the year ended December 31, 2016, as compared to \$629,191 in the year ended December 31, 2015. Cost of revenues mainly relates to the costs of our diagnostic service revenues and these costs are recognized at the completion of testing. Due to revenue being recognized when cash is received, costs incurred in one period may relate to revenue recognized in a later period. Gross margins are negative as we begin to build test volume to cover costs associated with running our diagnostic tests as well as inefficiencies in realizing capacity-related issues. The increase in cost of revenues in the year ended December 31, 2016 compared to the prior year is primarily due to an increase in the volume of tests processed of approximately 1,715 partially offset by a decreased average cost per test of approximately \$900.

### **Research and Development Expenses**

Research and development expenses consisted of the following:

	For the years ended December 31,		
	2016	2015	Increase/(Decrease)
Salaries and staff costs	\$ 5,277,936	\$ 3,866,036	\$ 1,411,900
Stock-based compensation	2,420,696	1,499,009	921,687
Outside services, consultants and lab supplies	5,573,362	4,211,251	1,362,111
Facilities	1,434,101	748,466	685,635
Travel and scientific conferences	213,419	228,490	(15,071)
Other	87,128	40,617	46,511
<b>Total research and development expenses</b>	<b>\$ 15,006,642</b>	<b>\$ 10,593,869</b>	<b>\$ 4,412,773</b>

Research and development expenses increased by \$4,412,773 to \$15,006,642 for the year ended December 31, 2016 from \$10,593,869 for the year ended December 31, 2015. The increase in our costs is primarily due to an increase in the average number of our internal research and development personnel and increased consulting and outside services. We utilize clinical studies to provide data that supports our technology for the monitoring of responsiveness to therapy and the status of diseases. The number of samples processed in connection with our research and development clinical studies increased for the year ended December 31, 2016 as compared to the prior year. We were party to thirty active collaborations or studies during the year ended December 31, 2016; while during the year ended December 31, 2015, we were party to twenty-six collaborations or studies. To date our research and development expenses mainly have related to validating our tests and supporting clinical collaborations as well as development of our urine collection kits. We expect a reduction of research and development costs that relate to CLIA services as a result of our transition of business focus; however, other costs may increase as we complete the development of our urine collection, DNA extraction, and assay kits and multigene panels.

**Selling and Marketing Expenses**

Selling and marketing expenses consisted of the following:

	For the years ended December 31,		
	2016	2015	Increase/(Decrease)
Salaries and staff costs	\$ 5,336,941	\$ 2,628,822	\$ 2,708,119
Stock-based compensation	2,111,366	768,146	1,343,220
Outside services and consultants	1,260,354	932,237	328,117
Facilities and insurance	496,881	283,809	213,072
Trade shows, conferences and marketing	1,312,749	1,282,059	30,690
Travel	889,265	449,294	439,971
Other	115,588	99,211	16,377
Total selling and marketing expenses	<u>\$ 11,523,144</u>	<u>\$ 6,443,578</u>	<u>\$ 5,079,566</u>

Selling and marketing expenses increased by \$5,079,566 to \$11,523,144 for the year ended December 31, 2016, from \$6,443,578 for the year ended December 31, 2015. The significant components of the increase were primarily related to an increase in salaries and staff costs, stock-based compensation, and travel expenses. For the year ended December 31, 2016, we increased the number of our field sales, customer support and marketing personnel thereby bringing our average headcount from thirteen to nineteen to support our sales and marketing activities. This resulted in an increase in salaries and staff costs, stock-based compensation, and related travel expenses. We expect decreases in personnel and related costs due to the reduction in force in December 2016 as a result of our strategic restructuring activities; however, selling and marketing expenses may increase in future periods due to commercial introduction of new product offerings, such as our urine collection, DNA extraction, and assay kits and multigene panels.

**General and Administrative Expenses**

General and administrative expenses consisted of the following:

	For the years ended December 31,		
	2016	2015	Increase/(Decrease)
Personnel and outside services costs	\$ 4,058,213	\$ 3,509,844	\$ 548,369
Stock-based compensation	2,910,156	1,639,196	1,270,960
Board of Directors' fees	456,498	457,865	(1,367)
Legal and accounting fees	2,916,508	1,182,427	1,734,081
Facilities and insurance	641,715	524,763	116,952
Travel	184,217	266,410	(82,193)
Fees, licenses, taxes and other	308,640	339,321	(30,681)
Total general and administrative expenses	<u>\$ 11,475,947</u>	<u>\$ 7,919,826</u>	<u>\$ 3,556,121</u>

General and administrative expenses increased by \$3,556,121 to \$11,475,947 for the year ended December 31, 2016 from \$7,919,826 for the year ended December 31, 2015. This increase was primarily due to an increase in personnel and outside services costs, stock-based compensation, and legal and accounting fees. We have increased our average internal headcount from seven to ten to support our growth in both research and development and sales and marketing during the year ended December 31, 2016 as compared to the prior year. We also increased the utilization of outside services related to information technology to support our overall headcount growth and increased outside services to support our investor relations activities as our investor base has grown, resulting in the increase in personnel and outside services costs. The increase in legal and accounting fees primarily resulted from the lawsuit against the Company's former CEO and CFO. Stock-based compensation, a non-cash expense, will fluctuate based on the timing and amount of options and restricted stock units granted, forfeitures as well as the fair value of the options and restricted stock units at the time of grant. Our general and administrative costs may increase in future periods in order to support fundraising activities, on-going litigation, general business activities, and our sales and marketing and research and development teams as we continue to develop and introduce new product offerings.



**Restructuring**

On December 13, 2016, we announced a strategic restructuring plan that allows us to concentrate on the distribution of kits and systems to be utilized by research institutions, cancer centers, and clinical service facilities for research use around the world. The restructuring plan included a reduction in force and has been completed as of December 31, 2016. Restructuring charges of approximately \$790,000 were incurred and have been included as a component of operating loss for the year ended December 31, 2016. Of the total restructuring charges, approximately \$358,000 was related to termination of employees. The remaining restructuring charges of approximately \$432,000 were related to the impairment of an abandoned software development project.

**Net Interest Expense**

Net interest expense was \$1,375,512 and \$1,468,221 for the years ended December 31, 2016 and 2015, respectively. The decrease in the year ended December 31, 2016 is primarily due to an increase in interest income of approximately \$242,000 resulting from short-term investments which have a higher average yield, offset by an increase in interest expense of approximately \$149,000 as a result of our debt refinancing. We expect net interest expense to fluctuate due to the potential changes in the variable interest rate of our long-term debt.

**Change in Fair Value of Derivative Financial Instruments—Warrants**

We have issued warrants to purchase shares of our common stock that are accounted for as derivative liabilities. As of December 31, 2016, the derivative financial instruments—warrants liabilities related to securities issued were revalued to \$834,940, resulting in a decrease in value of \$2,462,137 from December 31, 2015, based primarily upon the change in our stock price from \$5.40 at December 31, 2015 to \$2.10 at December 31, 2016, and the changes in the expected term, volatility and risk-free interest rates for the expected term. The decrease in value was recorded as non-operating gain for the year ended December 31, 2016.

**Net Loss**

Net loss and per share amounts were as follows:

	For the years ended December 31,		
	2016	2015	Increase/(Decrease)
Net loss attributable to common stockholders	\$ (39,227,959)	\$ (27,495,334)	\$ 11,732,625
Net loss per common share — basic	\$ (1.30)	\$ (1.05)	\$ 0.25
Net loss per common share — diluted	\$ (1.37)	\$ (1.21)	\$ 0.16
Weighted-average shares outstanding — basic	30,174,838	26,201,713	3,973,125
Weighted-average shares outstanding — diluted	30,281,263	26,452,165	3,829,098

The increase in net loss attributable to common stockholders of \$11,732,625 to \$39,227,959 for the year ended December 31, 2016 from \$27,495,334 for the year ended December 31, 2015 resulted primarily from an increase in operating expenses, partially offset by a gain from the change in the fair value of derivative financial instruments—warrants. Basic and diluted net loss per share for the year ended December 31, 2016 were impacted by the increase in both basic and diluted weighted-average shares outstanding resulting from the sale and issuance of approximately 422,000 shares of common stock through a controlled equity offering through our agreement with Cantor Fitzgerald & Co., and issuance of approximately 537,000 shares of common stock in connection with the exercise of stock options and warrants as well as the vesting of restricted stock units.

**YEARS ENDED DECEMBER 31, 2015 AND 2014****Revenues**

Our total revenues were \$312,812 and \$280,178 for the years ended December 31, 2015 and 2014, respectively. Total revenues consisted of the following:

	Years ended December 31,		
	2015	2014	Increase/(Decrease)
Royalty income	\$ 274,648	\$ 270,178	\$ 4,470
License fees	—	10,000	(10,000)
Diagnostic service revenue	\$ 13,789	\$ —	13,789
Clinical research services	\$ 24,375	\$ —	24,375
<b>Total revenues</b>	<b>\$ 312,812</b>	<b>\$ 280,178</b>	<b>\$ 32,634</b>

The \$4,470 increase in royalty income in the year ended December 31, 2015 is primarily a result of certain licensees' payments exceeding their minimum royalties as compared to the year ended December 31, 2014. According to our revenue recognition policy, we do not record royalty revenues in excess of minimum royalty amounts until we have received payment of such royalties.

In the year ended December 31, 2014, we received a \$10,000 license fee related to a licensing agreement signed in the second quarter of 2014. There were no license fees earned during the year ended December 31, 2015.

Diagnostic service revenue is recognized when payment is received for the test results. We received \$13,789 in diagnostic service revenue in the year ended December 31, 2015, primarily as a result of our clinical laboratory tests. There was no diagnostic service revenue for the year ended December 31, 2014 as no payments were received.

Clinical research services revenue consists primarily of revenue from the sale of urine and blood collection supplies under agreements with our clinical research and business development partners. Revenue was recognized when supplies were delivered. There was no such revenue for the year ended December 31, 2014.

**Cost of Revenues**

Our total cost of revenues was \$629,191 in the year ended December 31, 2015, compared to \$15,441 in the year ended December 31, 2014. The increase in cost of revenues in the year ended December 31, 2015 compared to the year ended December 31, 2014 is primarily due to an increase in the volume of tests processed. Cost of revenues primarily relates to the costs of our diagnostic service revenue. The costs are recognized at the completion of testing. Due to revenue being recognized when cash is received, costs incurred in one period may relate to revenue recognized in a later period. Gross margins are negative as we begin to build test volume to cover costs associated with running our diagnostic tests as well as inefficiencies in realizing capacity related issues.

**Research and Development Expenses**

Research and development expenses consisted of the following:

	For the years ended December 31,		
	2015	2014	Increase/(Decrease)
Salaries and staff costs	\$ 3,866,036	\$ 2,669,203	\$ 1,196,833
Stock-based compensation	1,499,009	796,008	703,001
Outside services, consultants and lab supplies	4,211,251	2,435,917	1,775,334
Facilities	748,466	628,535	119,931
Travel and scientific conferences	228,490	119,562	108,928
Other	40,617	15,681	24,936
<b>Total research and development expenses</b>	<b>\$ 10,593,869</b>	<b>\$ 6,664,906</b>	<b>\$ 3,928,963</b>

Research and development expenses increased by \$3,928,963 to \$10,593,869 for the year ended December 31, 2015 from \$6,664,906 for the year ended December 31, 2014. Substantially all of the increase resulted from an increased number of samples processed and validated in connection with our clinical collaborations. We utilize our clinical collaborations to provide data that summarizes the accuracy of our tests to detect certain types of cancer in urine samples. We also enter into clinical studies to provide data that supports our technology for the monitoring of responsiveness to therapy and the status of diseases. We were party to twenty-six active collaborations or studies during the year ended December 31, 2015, while during the year ended December 31, 2014, we were party to twenty-three collaborations or studies. To support the expansion of our collaboration efforts, we increased the average number of our internal research and development personnel from seventeen to twenty-two, and purchased additional laboratory equipment, lab supplies and clinical samples.

***Selling and Marketing Expenses***

Selling and marketing expenses consisted of the following:

	For the years ended December 31,		
	2015	2014	Increase/(Decrease)
Salaries and staff costs	\$ 2,628,822	\$ 1,139,855	\$ 1,488,967
Stock-based compensation	768,146	145,240	622,906
Outside services and consultants	932,237	902,181	30,056
Facilities and insurance	283,809	115,713	168,096
Marketing	1,282,059	258,658	1,023,401
Travel	449,294	139,710	309,584
Fees, licenses, taxes and other	99,211	33,546	65,665
Total sales and marketing expenses	<u>\$ 6,443,578</u>	<u>\$ 2,734,903</u>	<u>\$ 3,708,675</u>

Selling and marketing expenses increased by \$3,708,675 to \$6,443,578 for the year ended December 31, 2015 from \$2,734,903 for the year ended December 31, 2014. The significant components of the increase were primarily increased salaries and staff costs, stock-based compensation, and trade shows, conferences and marketing costs. For the year ended December 31, 2015, we increased our average internal headcount in this functional area from five to thirteen to support our sales and marketing activities, resulting in the increase in salaries and staff costs. In addition to the increased trade shows and conferences costs, costs related to our clinical experience program, where we offer new clinicians a series of tests for no charge, are included in marketing expenses.

***General and Administrative Expenses***

General and administrative expenses consisted of the following:

	For the years ended December 31,		
	2015	2014	Increase/(Decrease)
Personnel and outside services costs	\$ 3,509,844	\$ 2,245,801	\$ 1,264,043
Stock-based compensation	1,639,196	1,128,948	510,248
Board of Directors' fees	457,865	328,184	129,681
Legal and accounting fees	1,182,427	1,314,960	(132,533)
Facilities and insurance	524,763	336,154	188,609
Travel	266,410	208,651	57,759
Fees, licenses, taxes and other	339,321	247,389	91,932
Total general and administrative expenses	<u>\$ 7,919,826</u>	<u>\$ 5,810,087</u>	<u>\$ 2,109,739</u>

General and administrative expenses increased by \$2,109,739 to \$7,919,826 for the year ended December 31, 2015 from \$5,810,087 for the year ended December 31, 2014. This increase was primarily due to an increase in personnel and outside services costs and stock-based compensation, partially offset by a decrease in legal and accounting fees. We have increased our average internal headcount from four to seven, as well as utilized outside services and consultants, to support our growth in both research and development and sales and marketing, resulting in the increase in personnel and outside services

costs during the year ended December 31, 2015 as compared to the prior year. Stock-based compensation, a non-cash expense, will fluctuate based on the timing and amount of options granted, as well as the fair value of the options at the time of grant or remeasurement.

**Net Interest Expense**

Net interest expense was \$1,468,221 and \$831,020 for the years ended December 31, 2015 and 2014, respectively. The increase in net expense for the year ended December 31, 2015 resulted primarily from the \$15.0 million term loan we entered into in June 2014. We paid twelve months of interest only payments in the year ended December 31, 2015 as compared to six months of interest only payments in the year ended December 31, 2014.

**Change in Fair Value of Derivative Financial Instruments—Warrants**

We have issued warrants to purchase shares of our common stock that are accounted for as derivative liabilities. As of December 31, 2015, the derivative financial instruments—warrants liabilities related to securities issued were revalued to \$3,297,077, resulting in a net increase in value of \$291,056 from December 31, 2014, based primarily upon the change in our stock price from \$4.30 at December 31, 2014 to \$5.40 at December 31, 2015, and the changes in the expected term, volatility and risk-free interest rates for the expected term, offset by fair value of warrants reclassified from a liability to additional paid-in capital upon exercise of warrants. The increase in value was recorded as non-operating loss for the year ended December 31, 2015.

**Net Loss**

Net loss and per share amounts were as follows:

	For the years ended December 31,		
	2015	2014	Increase/(Decrease)
Net loss and comprehensive loss attributable to common stockholders	\$ (27,495,334)	\$ (14,348,499)	\$ 13,146,835
Net loss per common share — basic	\$ (1.05)	\$ (0.76)	\$ 0.29
Net loss per common share — diluted	\$ (1.21)	\$ (0.88)	\$ 0.33
Weighted-average shares outstanding — basic	26,201,713	18,904,280	7,297,433
Weighted-average shares outstanding — diluted	26,452,165	19,071,112	7,381,053

The increase in net loss attributable to common stockholders of \$13,146,835 to \$27,495,334 for the year ended December 31, 2015 from \$14,348,499 for the year ended December 31, 2014 resulted primarily from an increase in operating expenses, interest expense, and loss from the change in fair value of derivative liabilities, partially offset by a slight increase in revenues. Basic and diluted net loss per share for the year ended December 31, 2015 were impacted by the increase in both basic and diluted weighted-average shares outstanding resulting from the sale and issuance of approximately 10.0 million shares of common stock through underwritten public offerings and a controlled equity offering through our agreement with Cantor Fitzgerald & Co., as well as the issuance of approximately 838,000 shares of common stock in connection with the exercise of stock options and warrants.

**Liquidity and Capital Resources**

As of December 31, 2016, we had \$13,915,094 in cash and cash equivalents and \$23,978,022 in short-term investments. Net cash used in operating activities for the year ended December 31, 2016 was \$31,039,855, compared to \$22,119,025 for the year ended December 31, 2015. Our use of cash was primarily a result of the net loss of \$39,203,719 for the year ended December 31, 2016, adjusted for non-cash items related to stock-based compensation of \$7,504,316, depreciation and amortization of \$1,069,547 and gain from the change in fair value of derivatives of \$2,462,137. The changes in our operating assets and liabilities consisted primarily of higher accrued expenses, more specifically an increase in accrued compensation and accrued research agreement expenses as well as an increase in other assets. At our current and anticipated levels of operating losses, we expect to continue to incur an operating cash outflow for the next several years. As of December 31, 2016 and 2015, we had working capital of \$31,152,936 and \$60,179,971, respectively. The decrease in working capital is primarily due to the decrease in cash and cash equivalents. During 2015, we had underwritten public offerings and a

controlled equity offering of approximately 10.0 million shares of common stock with net proceeds of approximately \$61.2 million, which significantly increased our cash and cash equivalents balance as compared to 2016.

Investing activities consisted of purchases for capital equipment and net purchase of short-term investments that used \$24,833,649 in cash during the year ended December 31, 2016, compared to \$2,233,466 for the year ended December 31, 2015.

Net cash provided by financing activities was \$2,301,376 during the year ended December 31, 2016, compared to \$64,551,740 during the year ended December 31, 2015. Financing activities during the year ended December 31, 2016 included \$2,285,415 from the sales of common stock, net of expenses, \$366,966 from proceeds related to the exercise of options, and \$740,076 from net borrowings on equipment lines of credit, offset by \$1,091,018 of net repayment on long-term debt. Financing activities during the year ended December 31, 2015 consisted primarily of proceeds from the sale of our common stock in underwritten public offerings of \$61,215,399.

As of February 28, 2017, our cash, cash equivalents and short-term investments balance was approximately \$32.6 million and our working capital was approximately \$25.9 million.

Our working capital requirements will depend upon numerous factors including but not limited to, the nature, cost and timing of our research and development programs and ramp up of our sales and marketing function. To date, our sources of cash have been primarily limited to the sale of debt and equity securities and debt financing. We cannot be certain that additional funding will be available on acceptable terms, or at all. To the extent that we can raise additional funds by issuing equity securities, our stockholders may experience significant dilution. Any debt financing, if available, may involve restrictive covenants that impact our ability to conduct our business.

On March 15, 2017, we announced a restructuring in connection with the addition of precision medicine therapeutics to our business. We estimate that this restructuring will reduce annual pre-tax expenses by approximately \$8.0 million per year (excluding one-time separation costs), primarily through a reduction of approximately 30 employees and expenses primarily linked to research, clinical studies, and operations.

We plan to continue providing access to our ctDNA collection, extraction and analysis technology in urine and blood to strategic accounts, including pharmaceutical companies and third party reference laboratories, by internal strategic executives. We intend to maintain our CLIA/CAP-certified laboratory for clinical testing services for pharmaceutical companies, third party reference laboratories and physicians and for internal programs.

If we are unable to raise additional capital when required or on acceptable terms, we may have to significantly delay, scale back or discontinue the development and/or commercialization of one or more of our product candidates. We may also be required to:

- Seek collaborators for product candidates at an earlier stage than otherwise would be desirable and on terms that are less favorable than might otherwise be available; and
- Relinquish licenses or otherwise dispose of rights to technologies, product candidates or products that we would otherwise seek to develop or commercialize ourselves.

We are evaluating the following options to both raise additional capital as well as reduce costs, in an effort to strengthen our liquidity position:

- Raising capital through public and private equity offerings;
- Adding capital through short-term and long-term borrowings;
- Introducing operation and business development initiatives to bring in new revenue streams;
- Reducing operating costs by identifying internal synergies;
- Engaging in strategic partnerships; and
- Taking actions to reduce or delay capital expenditures.

[Table of Contents](#)

We continually assess any spending plans, including a review of our discretionary spending in connection with certain strategic contracts, to effectively and efficiently address our liquidity needs.

*Controlled Equity Offering and Public Offerings*

On January 25, 2013, we filed a Registration Statement on Form S-3 (the "Registration Statement") to offer and sell in one or more offerings any combination of common stock, preferred stock, warrants, or units having an aggregate initial offering price of up to \$150,000,000. If issued, the preferred stock, warrants, and units would be convertible, exercisable or exchangeable for common stock, preferred stock or other securities. The Registration Statement was declared effective on February 4, 2013. In addition, in connection with the Registration Statement, we entered into an agreement with Cantor Fitzgerald & Co. ("Agent") on January 25, 2013 to issue and sell up to \$30,000,000 of shares of common stock. As payment for its services, the Agent is entitled to a 3% commission on gross proceeds on sales of our securities. During the year ended December 31, 2015, we received gross proceeds of approximately \$2.8 million from the sale of 285,421 shares of our common stock at a weighted-average price of \$9.66 under the agreement with the Agent. During the year ended December 31, 2015, we received gross proceeds of approximately \$63.2 million from the sale of 9,711,110 shares of our common stock through underwritten public offerings in February 2015 and July 2015.

On May 27, 2016 we filed a Form S-3 Registration Statement to offer and sell in one or more offerings, any combination of common stock, preferred stock, debt securities, warrants, or units having an aggregate initial offering price not exceeding \$250,000,000. The preferred stock, debt securities, warrants, and units may be convertible or exercisable or exchangeable for common stock or preferred stock or other securities. This Registration Statement was declared effective on June 13, 2016. Gross proceeds of \$2.4 million from the sale of 421,810 shares of our common stock at a weighted-average price of \$5.61 under the agreement with the Agent have been raised since the date of effectiveness of the Form S-3 on June 13, 2016.

**Contractual Obligations and Commitments**

The following table is a summary of contractual obligations that existed as of December 31, 2016, and is based on information appearing in the notes to Consolidated Financial Statements included elsewhere in this Annual Report on Form 10-K.

	Payments Due by period				
	Total	Less than 1 Year	1-3 Years	3-5 Years	More than 5 Years
Operating leases	\$ 4,612,538	\$ 896,050	\$ 1,825,630	\$ 1,890,858	\$ —
Research agreements (1)	1,244,453	1,244,453	—	—	—
Long-term debt (2)	20,451,242	3,822,157	14,494,397	2,134,688	—
Purchase obligations - major vendors (3)	618,906	218,706	400,200	—	—
License agreement	500,000	500,000	—	—	—
Total obligations	<u>\$ 27,427,139</u>	<u>\$ 6,681,366</u>	<u>\$ 16,720,227</u>	<u>\$ 4,025,546</u>	<u>\$ —</u>

(1) Payments under research agreements are based on the completion of activities as specified in the research agreement. The amounts in the table above assume the successful completion of the research activities contemplated by the agreements.

(2) Represents long-term debt and interest.

(3) Represents amounts that will become due upon future delivery of supplies and services from various suppliers under open purchase orders as of December 31, 2016.

**ITEM 7A. QUANTITATIVE AND QUALITATIVE DISCLOSURES ABOUT MARKET RISK***Interest Rate Risk*

Our primary exposure to market risk due to changes in interest rates is with the interest expense related to our long term debt agreements. All of our long term debt is subject to variable interest rates as of December 31, 2016. We also have

interest rate risk related to the increase or decrease in the value of debt securities, commercial paper and U.S. treasury securities in our short-term investment portfolio.

Due to the short-term duration of our investment portfolio and the relatively low risk profile of our investments, a sudden change in interest rates would not have a material effect on the fair market value of our portfolio, nor our operating results or cash flows.

We do not believe our cash and cash equivalents or short-term investments have significant risk of default or liquidity issues, however, we maintain significant amounts of cash and cash equivalents at one or more financial institutions that are in excess of federally insured limits. Given the current stability of financial institutions, we believe that we will not experience losses on these deposits.

Under our current policies, we do not use interest rate derivative instruments to manage exposure to interest rate changes. We attempt to increase the safety and preservation of our invested principal funds by limiting default risk, market risk, and reinvestment risk. We mitigate default risk by investing in investment grade securities. Changes in interest rates over time will increase or decrease our interest income.

Borrowings under our long-term debt and equipment line of credit bear interest at floating rates. Changes in interest rates could affect the amounts of interest that we pay in the future.

#### *Foreign Currency Risk*

Our foreign currency exchange risk arises from our operations in Italy. Our functional and reporting currency is the United States dollar. We translate our foreign operations' assets and liabilities denominated in foreign currencies into U.S. dollars at current rates of exchange as of the balance sheet date and income and expense items at the average exchange rate for the reporting period. Translation adjustments resulting from exchange rate fluctuations are recorded in the cumulative translation account, a component of consolidated accumulated other comprehensive income. Gains or losses from foreign currency transactions are included in other expense (income), net.

#### *Effects of Inflation*

We do not believe that inflation and changing prices during the years ended December 31, 2016, 2015, and 2014 had a significant impact on our results of operations.

### **ITEM 8. FINANCIAL STATEMENTS AND SUPPLEMENTARY DATA**

All financial information required by this Item is attached hereto at the end of this report beginning on page F-1 and is hereby incorporated by reference.

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

None.

### **ITEM 9A. CONTROLS AND PROCEDURES**

#### ***Disclosure Controls and Procedures***

Our chief executive officer and principal financial officer evaluated the effectiveness of our disclosure controls and procedures as of December 31, 2016. The term "disclosure controls and procedures," as defined in Rules 13a-15(e) and 15d-15(e) under the Securities Exchange Act of 1934, as amended, or the Exchange Act, means controls and other procedures of a company that are designed to ensure that information required to be disclosed by a company in the reports that it files or submits under the Exchange Act is recorded, processed, summarized and reported, within the time periods specified in the Securities and Exchange Commission's rules and forms. Management recognizes that any controls and procedures, no matter how well designed and operated, can provide only reasonable assurance of achieving their objectives and management necessarily applies its judgment in evaluating the cost-benefit relationship of possible controls and procedures. Disclosure controls and procedures include, without limitation, controls and procedures designed to ensure that information required to be disclosed by a company in the reports that it files or submits under the Exchange Act is accumulated and communicated to the company's management, including its principal executive and principal financial officers, as appropriate to allow timely



decisions regarding required disclosure. Based on that evaluation, our principal executive officer and principal financial officer concluded that our disclosure controls and procedures were effective as of the end of the period covered by this Annual Report on Form 10-K.

***Management's Report on Internal Control Over Financial Reporting***

Our management is responsible for establishing and maintaining adequate internal control over financial reporting as such term is defined in Exchange Act Rule 13a-15(f). Internal control over financial reporting is a process designed under the supervision and with the participation of our management, including our principal executive officer and principal financial officer, to provide reasonable assurance regarding the reliability of financial reporting and the preparation of financial statements for external purposes in accordance with accounting principles generally accepted in the United States of America. All internal control systems, no matter how well designed, have inherent limitations. Therefore, even those systems determined to be effective can provide only reasonable assurance with respect to financial statement preparation and presentation.

As of December 31, 2016, under the supervision and with the participation of our management, including our principal executive officer and principal financial officer, we conducted an evaluation of the effectiveness of our internal control over financial reporting based on the Committee of Sponsoring Organizations of the Treadway Commission in Internal Control-Integrated Framework - 2013. Based on this assessment, our management concluded that, as of December 31, 2016, our internal control over financial reporting was effective based on those criteria.

The effectiveness of our internal control over financial reporting as of December 31, 2016 has been audited by BDO USA, LLP, an independent registered public accounting firm, as stated in their report which is included herein.

***Changes in Internal Control Over Financial Reporting***

There has been no change in our internal control over financial reporting during the quarter ended December 31, 2016 that has materially affected, or is reasonably likely to materially affect, our internal control over financial reporting.

**Report of Independent Registered Public Accounting Firm**

Board of Directors and Stockholders  
Trovagene, Inc.  
San Diego, California

We have audited Trovagene, Inc.'s internal control over financial reporting as of December 31, 2016, based on criteria established in *Internal Control - Integrated Framework (2013)* issued by the Committee of Sponsoring Organizations of the Treadway Commission (the COSO criteria). Trovagene, Inc.'s management is responsible for maintaining effective internal control over financial reporting and for its assessment of the effectiveness of internal control over financial reporting, included in the accompanying Item 9A, Management's Report on Internal Control Over Financial Reporting. Our responsibility is to express an opinion on the company's internal control over financial reporting based on our audit.

We conducted our audit in accordance with the standards of the Public Company Accounting Oversight Board (United States). Those standards require that we plan and perform the audit to obtain reasonable assurance about whether effective internal control over financial reporting was maintained in all material respects. Our audit included obtaining an understanding of internal control over financial reporting, assessing the risk that a material weakness exists, and testing and evaluating the design and operating effectiveness of internal control based on the assessed risk. Our audit also included performing such other procedures as we considered necessary in the circumstances. We believe that our audit provides a reasonable basis for our opinion.

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

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

In our opinion, Trovagene, Inc. maintained, in all material respects, effective internal control over financial reporting as of December 31, 2016, based on the COSO criteria.

We also have audited, in accordance with the standards of the Public Company Accounting Oversight Board (United States), the consolidated balance sheets of Trovagene, Inc. as of December 31, 2016 and 2015, and the related consolidated statements of operations and comprehensive loss, stockholders' equity, and cash flows for each of the three years in the period ended December 31, 2016 and our report dated March 15, 2017 expressed an unqualified opinion thereon.

/s/ BDO USA, LLP

San Diego, California  
March 15, 2017

**ITEM 9B. OTHER INFORMATION**

None.

**PART III**

**ITEM 10. DIRECTORS, EXECUTIVE OFFICERS AND CORPORATE GOVERNANCE**

The information required by this item is incorporated by reference from the information contained in our Definitive Proxy Statement to be filed with the Securities and Exchange Commission in connection with the Annual Meeting of Stockholders to be held in 2017 (the "2017 Proxy Statement"), under the headings "Election of Directors-Information with Respect to Director Nominees," "Section 16(a) Beneficial Ownership Reporting Compliance," "Election of Directors-Information Regarding the Board of Directors and Corporate Governance" and "Executive Officers".

**ITEM 11. EXECUTIVE COMPENSATION**

The information required by this item is incorporated by reference from the information contained in the 2017 Proxy Statement under the headings "Executive Compensation," "Summary Compensation Table," "Grants of Plan-Based Awards During Fiscal Year 2016," "Outstanding Equity Awards at Fiscal Year-End," "Option Exercises and Stock Vested," "Pension Benefits-Non-Qualified Defined Contribution and Other Nonqualified Deferred Compensation," "Potential Payments Upon Termination or Change in Control," "Director Compensation" and "Election of Directors-Information Regarding the Board of Directors and Corporate Governance".

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

The information required by this item is incorporated by reference from the information contained in the 2017 Proxy Statement under the headings "Security Ownership of Certain Beneficial Owners and Management" and "Securities Authorized for Issuance Under Equity Compensation Plans".

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

The information required by this item is incorporated by reference from the information contained in the 2017 Proxy Statement under the headings "Certain Relationships and Related Transactions" and "Election of Directors-Information Regarding the Board of Directors and Corporate Governance".

**ITEM 14. PRINCIPAL ACCOUNTING FEES AND SERVICES**

The information required by this item is incorporated by reference from the information contained in the 2017 Proxy Statement under the heading "Proposal 2: Ratification of the Appointment of Our Independent Registered Public Accounting Firm for Fiscal Year Ending December 31, 2017".

**PART IV****ITEM 15. EXHIBITS, FINANCIAL STATEMENT SCHEDULES**

<b>Exhibit Number</b>	<b>Description of Exhibit</b>
<b>(a)(1) Financial Statements</b>	
The financial statements required by this item are submitted in a separate section beginning on page F-1 of this Annual Report on Form 10-K.	
<b>(b) Exhibits</b>	
<b>Exhibit Number</b>	<b>Description</b>
1.2	Controlled Equity Offering <sup>SM</sup> Sales Agreement dated January 25, 2013 by and between Trovogene, Inc. and Cantor Fitzgerald & Co. (incorporated by reference to Exhibit 1.2 to the Company's Form S-3 filed on January 25, 2013).
3.1	Amended and Restated Certificate of Incorporation of Trovogene, Inc. (incorporated by reference to Exhibit 3.1 to the Company's Form 10-12G filed on November 25, 2011).
3.2	Certificate of Amendment of Amended and Restated Certificate of Incorporation of Trovogene, Inc. (incorporated by reference to Appendix B to the Company's Proxy Statement on Schedule 14A filed on March 20, 2012).
3.3	By-Laws of Trovogene, Inc. (incorporated by reference to Exhibit 3.2 to the Company's Form 10-12G filed on November 25, 2011).
4.1	Form of Common Stock Certificate of Trovogene, Inc. (incorporated by reference to Exhibit 4.1 to the Company's Form 10-12G filed on November 25, 2011).
4.2+	2004 Stock Option Plan (incorporated by reference to Exhibit 4.3 to the Company's Current Report on Form 8-K filed on July 19, 2004)
4.3	Form of Warrant Agency Agreement by and between Trovogene, Inc. and Broadridge Corporate Issuer Solutions, Inc. and Form of Warrant Certificate (incorporated by reference to Exhibit 4.5 to the Company's Amendment No. 3 to Form S-1 filed on May 22, 2012).
4.4	Form of Unit Agency Agreement by and between Trovogene, Inc. and Broadridge Corporate Issuer Solutions, Inc. (incorporated by reference to Exhibit 4.6 to Amendment No. 3 to the Company's Form S-1 filed on May 22, 2012).
4.5	Form of Warrant (incorporated by reference to Exhibit 4.2 to the Company's Current Report on Form 8-K filed on November 28, 2012).
4.6	Form of Warrant to Purchase Common Stock (incorporated by reference to Exhibit 4.2 to the Company's Current Report on Form 8-K filed on July 1, 2014).
4.7+	Trovogene, Inc. 2014 Equity Incentive Plan (incorporated by reference to Appendix A to the Company's Definitive Proxy Statement on Schedule 14A filed on July 23, 2014).
4.8	Form of Warrant to Purchase Common Stock (Incorporated by reference to Exhibit 4.8 to Form 8-K filed on July 26, 2016).

[Table of Contents](#)

- 10.1 Summary of Terms of Lease Agreement dated as of October 28, 2009 between Trovagene, Inc. and BMR-Sorrento West LLC (incorporated by reference to Exhibit 10.3 to the Company's Form 10-12G/A filed on February 15, 2012).
- 10.2 Form of First Amendment to Standard Industrial Net Lease dated September 28, 2011 between Trovagene, Inc. and BMR-Sorrento West LLC (incorporated by reference to Exhibit 10.4 to the Company's Form 10-12G/A filed on February 15, 2012).
- 10.3 Form of Second Amendment to Standard Industrial Net Lease dated October 2011 between Trovagene, Inc. and BMR-Sorrento West LLC (incorporated by reference to Exhibit 10.5 to the Company's Form 10-12G/A filed on February 15, 2012).
- 10.4 Form of Third Amendment to Standard Industrial Net Lease dated October 22, 2012 between Trovagene, Inc. and BMR-Sorrento West, LP. (incorporated by reference to Exhibit 10.6 to the Company's Annual Report on Form 10-K filed on March 12, 2015).
- 10.5 Form of Fourth Amendment to Standard Industrial Net Lease dated December 2, 2013 between Trovagene, Inc. and BMR-Coast 9 LP. (incorporated by reference to Exhibit 10.7 to the Company's Annual Report on Form 10-K filed on March 12, 2015).
- 10.6 Form of Fifth Amendment to Standard Industrial Net Lease dated May 14, 2014 between Trovagene, Inc. and BMR-Coast 9 LP. (incorporated by reference to Exhibit 10.8 to the Company's Annual Report on Form 10-K filed on March 12, 2015).
- 10.7 Sixth Amendment to Standard Industrial Net Lease dated June 11, 2015 between Trovagene, Inc. and BMR-Coast 9 LP (incorporated by reference to Exhibit 10.1 to the Company's Quarterly Report on Form 10-Q filed on August 10, 2015).
- 10.8 Co-Exclusive Sublicense Agreement dated October 22, 2007 between Trovagene, Inc. and Asuragen, Inc. (incorporated by reference to Exhibit 10.6 to the Company's Form 10-12G/A filed on February 15, 2012).
- 10.9 Amendment to Co-Exclusive Sublicense Agreement dated June 1, 2010 between Trovagene, Inc. and Asuragen, Inc. (incorporated by reference to Exhibit 10.7 to the Company's Form 10-12G/A filed on February 15, 2012).
- 10.10 Sublicense Agreement dated as of August 27, 2007 between Trovagene, Inc. and Ipsogen SAS (incorporated by reference to Exhibit 10.8 to the Company's Form 10-12G/A filed on February 15, 2012).
- 10.11 Amendment to Co-Exclusive Sublicense Agreement dated as of September 1, 2010 between Trovagene, Inc. and Ipsogen SAS (incorporated by reference to Exhibit 10.9 to the Company's Form 10-12G/A filed on February 15, 2012).
- 10.12 Sublicense Agreement dated as of July 20, 2011 between Trovagene, Inc. and Fairview Health Services (incorporated by reference to Exhibit 10.11 to the Company's Form 10-12G/A filed on February 15, 2012).
- 10.13 Sublicense Agreement dated as of December 1, 2008 by and between Trovagene, Inc. and InVivoScribe Technologies, Inc. (incorporated by reference to Exhibit 10.13 to the Company's Form 10-12G/A filed on February 15, 2012).
- 10.14 Sublicense Agreement dated as of August 25, 2008 by and between Trovagene, Inc. and Laboratory Corporation of America Holdings (incorporated by reference to Exhibit 10.14 to the Company's Form 10-12G/A filed on February 15, 2012).

[Table of Contents](#)

10.15	Form of Sublicense Agreement effective as of February 8, 2011 by and between Trovogene, Inc. and MLL Munchner Leukamielabor GmbH (incorporated by reference to Exhibit 10.15 to the Company's Form 10-12G/A filed on February 15, 2012).
10.16	Sublicense Agreement effective as of June 15, 2010 by and between Trovogene, Inc. and Skyline Diagnostics BV (incorporated by reference to Exhibit 10.16 to the Company's Form 10-12G/A filed on February 15, 2012).
10.17	Exclusive License Agreement effective as of December 12, 2011 by and between Columbia University and Trovogene, Inc. (incorporated by reference to Exhibit 10.20 to the Company's Form 10-12G/A filed on February 15, 2012).
10.18	Form of Exclusive License Agreement effective as of October 2011 by and between Gianluca Gaidano, Robert Foa and Davide Rossi and Trovogene, Inc. (incorporated by reference to Exhibit 10.21 to the Company's Form 10-12G/A filed on February 15, 2012).
10.19	Exclusive License Agreement effective as of May 2006 by and between Brunangelo Falini, Cristina Mecucci and Trovogene, Inc. (incorporated by reference to Exhibit 10.23 to the Company's Form 10-12G/A filed on February 15, 2012).
10.20	Form of First Amendment to Exclusive License Agreement effective as of August 2010 by and among Brunangelo Falini, Cristina Mecucci and Trovogene, Inc. (incorporated by reference to Exhibit 10.24 to the Company's Form 10-12G/A filed on February 15, 2012).
10.21	Loan and Security Agreement dated as of June 30, 2014 by and among Oxford Finance LLC, Silicon Valley Bank, Trovogene, Inc. and Etherogen, Inc. (incorporated by reference to Exhibit 10.1 to the Company's Current Report on Form 8-K filed on July 1, 2014).
10.22	First Amendment to Loan and Security Agreement dated as of December 18, 2014 by and among Oxford Finance LLC, Silicon Valley Bank, Trovogene, Inc. and Etherogen, Inc. (incorporated by reference to Exhibit 10.2 to the Company's Quarterly Report on Form 10-Q filed on August 10, 2015).
10.23	Second Amendment to Loan and Security Agreement dated as of May 6, 2015 by and among Oxford Finance LLC, Silicon Valley Bank, Trovogene, Inc. and Etherogen, Inc. (incorporated by reference to Exhibit 10.3 to the Company's Quarterly Report on Form 10-Q filed on August 10, 2015).
10.24+	Form of Indemnification Agreement to be entered into between the Company and its directors and executive officers (incorporated by reference to Exhibit 10.1 to the Company's Current Report on Form 8-K filed on December 15, 2015).
10.25*	Patent Assignment and License Agreement dated April 23, 2014 between Trovogene, Inc. and GenSignia IP Ltd. (incorporated by reference to Exhibit 10.1 to the Company's Quarterly Report on Form 10-Q filed on May 12, 2014).
10.26+	Employment Agreement, effective January 1, 2016, by and between the Company and Antonius Schuh, Ph.D. (incorporated by reference to Exhibit 10.28 to the Company's Annual Report on Form 10-K filed on March 10, 2016).
10.27+	Employment Agreement, effective January 1, 2016, by and between the Company and Stephen Zaniboni (incorporated by reference to Exhibit 10.29 to the Company's Annual Report on Form 10-K filed on March 10, 2016).
10.28+	Employment Agreement, dated February 18, 2016, by and between the Company and Mark Erlander (incorporated by reference to Exhibit 10.33 to the Company's Quarterly Report on Form 10-Q filed on May 10, 2016).

[Table of Contents](#)

10.29+	Offer Letter and General Employment Terms & Conditions, dated February 9, 2015, by and between the Company and Matthew L. Posard (incorporated by reference to Exhibit 10.34 to the Company's Quarterly Report on Form 10-Q filed on May 10, 2016).
10.31+	Employment Agreement dated as of May 6, 2016 by and between the Company and William J. Welch (incorporated by reference to Exhibit 10.35 to the Company's Quarterly Report on Form 10-Q filed on May 10, 2016).
10.31	Loan and Security Agreement dated as of November 17, 2015 by and between the Company and Silicon Valley Bank (incorporated by reference to Exhibit 10.32 to the Company's Quarterly Report on Form 10-Q filed on May 10, 2016).
10.32	Fifth Amendment to Loan and Security Agreement dated as of July 20, 2016 by and among Oxford Finance LLC, Silicon Valley Bank, Trovogene, Inc. (Incorporated by reference to Exhibit 10.32 to Form 8-K filed on July 26, 2016).
10.33	Form of Seventh Amendment to Standard Industrial Net Lease dated April 4, 2016 between Trovogene, Inc. and BMR-Coast 9 LP (incorporated by reference to Exhibit 10.2 to the Company's Quarterly Report on Form 10-Q filed on August 4, 2016).
10.34**	License Agreement dated as of March 13, 2017 between Nerviano Medical Sciences S.r.l. and Trovogene, Inc.
21	List of Subsidiary.
23.1	Consent of BDO USA, LLP
24	Power of Attorney (included on signature page hereto).
31.1	Certification of Chief Executive Officer and Principal Financial Officer required under Rule 13a-14(a)/15d-14(a) under the Exchange Act.
32.1	Certification of Chief Executive Officer and Principal Financial Officer pursuant to 18 U.S.C. Section 1350, as adopted pursuant to Section 906 of the Sarbanes-Oxley Act of 2002.
101	Financial statements from the Annual Report on Form 10-K of Trovogene for the year ended December 31, 2016, formatted in Extensible Business Reporting Language (XBRL): (i) the Consolidated Balance Sheets, (ii) the Consolidated Statements of Operations and Comprehensive Loss, (iii) the Consolidated Statement of Stockholders' Equity (Deficiency), (iv) the Consolidated Statements of Cash Flows, and (v) the Notes to Consolidated Financial Statements.

---

+ Indicates a management contract or compensatory plan or arrangement.

\* The U.S. Securities and Exchange Commission (SEC) has granted confidential treatment with respect to certain portions of this exhibit. Omitted portions have been filed separately with the SEC.

\*\* Portions of this exhibit were omitted and will be filed separately with the U.S. Securities and Exchange Commission pursuant to a request for confidential treatment.

**ITEM 16. FORM 10-K SUMMARY**

None.



**SIGNATURES**

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

TROVAGENE, INC.

/s/ William J. Welch

March 15, 2017

Chief Executive Officer (Principal Executive Officer and Principal Financial Officer)

**POWER OF ATTORNEY**

KNOW ALL PERSONS BY THESE PRESENTS, that each person whose signature appears below hereby constitutes and appoints William J. Welch as his attorney-in-fact, with full power of substitution and resubstitution, for him in any and all capacities, to sign any and all amendments to this Annual Report on Form 10-K, and to file the same, with exhibits thereto and other documents in connection therewith, with the Securities and Exchange Commission, granting unto said attorney-in-fact full power and authority to do and perform each and every act and thing requisite and necessary to be done in connection therewith as fully to all intents and purposes as he might or could do in person, hereby ratifying and confirming all that said attorney-in-fact, or his substitute or substitutes, may lawfully do or cause to be done by virtue hereof.

Pursuant to the requirements of the Securities Exchange Act of 1934, this Report has been signed below by the following persons on behalf of the Registrant and in the capacities and on the dates indicated.

<u>SIGNATURE</u>	<u>TITLE</u>	<u>DATE</u>
<u>/s/ William J. Welch</u> William J. Welch	Chief Executive Officer and Director (Principal Executive Officer and Principal Financial Officer)	March 15, 2017
<u>/s/ Thomas H. Adams</u> Thomas H. Adams	Chairman of the Board	March 15, 2017
<u>/s/ John P. Brancaccio</u> John P. Brancaccio	Director	March 15, 2017
<u>/s/ Gary S. Jacob</u> Gary S. Jacob	Director	March 15, 2017
<u>/s/ Paul Billings</u> Paul Billings	Director	March 15, 2017
<u>/s/ Stanley Tennant</u> Stanley Tennant	Director	March 15, 2017
<u>/s/ Rodney S. Markin</u> Rodney S. Markin	Director	March 15, 2017

**TROVAGENE, INC.**  
**Index to Consolidated Financial Statements**

<a href="#">Report of Independent Registered Public Accounting Firm</a>	<a href="#">F-2</a>
<a href="#">Consolidated Balance Sheets</a>	<a href="#">F-3</a>
<a href="#">Consolidated Statements of Operations</a>	<a href="#">F-4</a>
<a href="#">Consolidated Statements of Comprehensive Loss</a>	<a href="#">F-5</a>
<a href="#">Consolidated Statement of Stockholders' Equity</a>	<a href="#">F-6</a>
<a href="#">Consolidated Statements of Cash Flows</a>	<a href="#">F-8</a>
<a href="#">Notes to Consolidated Financial Statements</a>	<a href="#">F-9</a>

Report of Independent Registered Public Accounting Firm

Board of Directors and Stockholders  
Trovagene, Inc.  
San Diego, California

We have audited the accompanying consolidated balance sheets of Trovagene, Inc. and Subsidiary (“Trovagene”) as of December 31, 2016 and 2015 and the related consolidated statements of operations and comprehensive loss, stockholders’ equity, and cash flows for each of the three years in the period ended December 31, 2016. These financial statements are the responsibility of the Company’s management. Our responsibility is to express an opinion on these financial statements based on our audits.

We conducted our audits in accordance with the standards of the Public Company Accounting Oversight Board (United States). Those standards require that we plan and perform the audit to obtain reasonable assurance about whether the financial statements are free of material misstatement. An audit includes examining, on a test basis, evidence supporting the amounts and disclosures in the financial statements, assessing 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.

In our opinion, the consolidated financial statements referred to above present fairly, in all material respects, the financial position of Trovagene, Inc. and Subsidiary at December 31, 2016 and 2015, and the results of its operations and its cash flows for each of the three years in the period ended December 31, 2016, in conformity with accounting principles generally accepted in the United States of America.

We also have audited, in accordance with the standards of the Public Company Accounting Oversight Board (United States), Trovagene’s internal control over financial reporting as of December 31, 2016, based on criteria established in *Internal Control — Integrated Framework (2013)* issued by the Committee of Sponsoring Organizations of the Treadway Commission (COSO) and our report dated March 15, 2017 expressed an unqualified opinion thereon.

/s/ BDO USA, LLP  
San Diego, California  
March 15, 2017

**Trovagene, Inc. and Subsidiary  
Consolidated Balance Sheets**

	<u>December 31, 2016</u>	<u>December 31, 2015</u>
<b>Assets</b>		
Current assets:		
Cash and cash equivalents	\$ 13,915,094	\$ 67,493,047
Short-term investments	23,978,022	—
Accounts receivable	100,460	98,736
Prepaid expenses and other assets	956,616	789,285
Total current assets	<u>38,950,192</u>	<u>68,381,068</u>
Property and equipment, net	3,826,915	2,690,579
Other assets	1,173,304	374,004
Total Assets	<u>\$ 43,950,411</u>	<u>\$ 71,445,651</u>
<b>Liabilities and Stockholders' Equity</b>		
Current liabilities:		
Accounts payable	\$ 1,130,536	\$ 1,040,868
Accrued liabilities	4,021,365	1,903,797
Deferred rent	285,246	30,614
Current portion of long-term debt	2,360,109	5,225,818
Total current liabilities	<u>7,797,256</u>	<u>8,201,097</u>
Long-term debt, less current portion	14,176,359	11,246,188
Derivative financial instruments—warrants	834,940	3,297,077
Deferred rent, net of current portion	1,373,717	—
Total liabilities	<u>24,182,272</u>	<u>22,744,362</u>
Commitments and contingencies (Note 10)		
Stockholders' equity		
Preferred stock, \$0.001 par value, 20,000,000 shares authorized, 60,600 shares outstanding at each of December 31, 2016 and 2015, designated as Series A Convertible Preferred Stock with liquidation preference of \$606,000 at each of December 31, 2016 and 2015	60	60
Common stock, \$0.0001 par value, 150,000,000 shares authorized at December 31, 2016 and 2015; 30,696,791 and 29,737,601 issued and outstanding at December 31, 2016 and 2015, respectively	3,070	2,974
Additional paid-in capital	167,890,984	157,585,498
Accumulated other comprehensive loss	(10,773)	—
Accumulated deficit	<u>(148,115,202)</u>	<u>(108,887,243)</u>
Total stockholders' equity	<u>19,768,139</u>	<u>48,701,289</u>
Total Liabilities and Stockholders' Equity	<u>\$ 43,950,411</u>	<u>\$ 71,445,651</u>

The accompanying notes are an integral part of these consolidated financial statements.

**Trovogene, Inc. and Subsidiary**  
**Consolidated Statements of Operations**

	Year Ended December 31,		
	2016	2015	2014
<b>Revenues:</b>			
Royalties	\$ 258,062	\$ 274,648	\$ 270,178
License fees	—	—	10,000
Diagnostic services	86,137	13,789	—
Clinical research services	36,873	24,375	—
Total revenues	<u>381,072</u>	<u>312,812</u>	<u>280,178</u>
<b>Costs and expenses:</b>			
Cost of revenue	1,730,512	629,191	15,441
Research and development	15,006,642	10,593,869	6,664,906
Selling and marketing	11,523,144	6,443,578	2,734,903
General and administrative	11,475,947	7,919,826	5,810,087
Restructuring charges	790,438	—	—
Total operating expenses	<u>40,526,683</u>	<u>25,586,464</u>	<u>15,225,337</u>
Loss from operations	<u>(40,145,611)</u>	<u>(25,273,652)</u>	<u>(14,945,159)</u>
Net interest expense	(1,375,512)	(1,468,221)	(831,020)
Other income (loss), net	(144,733)	(2,800)	24,845
Gain (loss) from change in fair value of derivative financial instruments—warrants	2,462,137	(726,421)	1,425,850
Net loss	<u>(39,203,719)</u>	<u>(27,471,094)</u>	<u>(14,325,484)</u>
Preferred stock dividend	(24,240)	(24,240)	(23,015)
Net loss attributable to common stockholders	<u>\$ (39,227,959)</u>	<u>\$ (27,495,334)</u>	<u>\$ (14,348,499)</u>
Net loss per common share — basic	<u>\$ (1.30)</u>	<u>\$ (1.05)</u>	<u>\$ (0.76)</u>
Net loss per common share — diluted	<u>\$ (1.37)</u>	<u>\$ (1.21)</u>	<u>\$ (0.88)</u>
Weighted-average shares outstanding — basic	<u>30,174,838</u>	<u>26,201,713</u>	<u>18,904,280</u>
Weighted-average shares outstanding — diluted	<u>30,281,263</u>	<u>26,452,165</u>	<u>19,071,112</u>

The accompanying notes are an integral part of these consolidated financial statements.

**Trovagene, Inc. and Subsidiary**  
**Consolidated Statements of Comprehensive Loss**

	Year Ended December 31,		
	2016	2015	2014
Net loss	\$ (39,203,719)	\$ (27,471,094)	\$ (14,325,484)
Other comprehensive loss:			
Foreign currency translation loss	(1,708)	—	—
Unrealized loss on securities available-for-sale	(9,065)	—	—
Total other comprehensive loss	(10,773)	—	—
Total comprehensive loss	(39,214,492)	(27,471,094)	(14,325,484)
Preferred stock dividend	(24,240)	(24,240)	(23,015)
Comprehensive loss attributable to common stockholders	\$ (39,238,732)	\$ (27,495,334)	\$ (14,348,499)

The accompanying notes are an integral part of these consolidated financial statements.

**Trovagene, Inc. and Subsidiary**  
**Consolidated Statements of Stockholders' Equity**

	Preferred Stock Shares	Preferred Stock Amount	Common Stock Shares	Common Stock Amount	Additional Paid-In Capital	Accumulated other comprehensive loss	Accumulated Deficit	Total Stockholders' Equity
Balance, January 1, 2014	60,600	\$ 60	18,902,782	\$ 1,890	\$ 87,433,460	\$ —	\$ (67,043,410)	\$20,392,000
Stock-based compensation	—	—	—	—	2,070,195	—	—	2,070,195
Issuance of warrant in connection with debt agreement	—	—	—	—	235,857	—	—	235,857
Issuance of common stock upon net exercise of warrant	—	—	13,011	1	(1)	—	—	—
Preferred stock dividend	—	—	—	—	—	—	(23,015)	(23,015)
Net loss	—	—	—	—	—	—	(14,325,484)	(14,325,484)
Balance, December 31, 2014	60,600	60	18,915,793	1,891	89,739,511	—	(81,391,909)	8,349,553
Sale of common stock, net of expenses	—	—	9,996,531	1,000	61,214,399	—	—	61,215,399
Stock based compensation	—	—	—	—	3,946,027	—	—	3,946,027
Derivative financial instruments— Warrants liability reclassified to additional paid-in capital	—	—	—	—	435,365	—	—	435,365
Issuance of common stock upon exercise of stock options	—	—	265,166	27	860,825	—	—	860,852
Issuance of common stock upon net exercise of warrant	—	—	277,136	28	(28)	—	—	—
Issuance of common stock upon exercise of warrants	—	—	282,975	28	1,389,399	—	—	1,389,427
Preferred stock dividend	—	—	—	—	—	—	(24,240)	(24,240)
Net loss	—	—	—	—	—	—	(27,471,094)	(27,471,094)
Balance, December 31, 2015	60,600	\$ 60	29,737,601	\$ 2,974	\$157,585,498	—	\$(108,887,243)	\$48,701,289



**Trovagene, Inc. and Subsidiary**  
**Consolidated Statements of Stockholders' Equity**

	Preferred Stock Shares	Preferred Stock Amount	Common Stock Shares	Common Stock Amount	Additional Paid-In Capital	Accumulated other comprehensive loss	Accumulated Deficit	Total Stockholders' Equity
Sale of common stock, net of expenses	—	—	421,810	42	2,285,373	—	—	2,285,415
Stock-based compensation	—	—	—	—	7,504,316	—	—	7,504,316
Issuance of warrant in connection with debt agreement	—	—	—	—	148,885	—	—	148,885
Issuance of common stock upon net exercise of stock options	—	—	341,333	34	(34)	—	—	—
Issuance of common stock upon exercise of stock options	—	—	98,396	10	366,956	—	—	366,966
Issuance of common stock upon net exercise of warrant	—	—	2,651	—	—	—	—	—
Issuance of common stock upon vesting of restricted stock units	—	—	95,000	10	(10)	—	—	—
Unrealized loss from foreign currency translation	—	—	—	—	—	(1,708)	—	(1,708)
Unrealized loss on securities available-for-sale	—	—	—	—	—	(9,065)	—	(9,065)
Preferred stock dividend	—	—	—	—	—	—	(24,240)	(24,240)
Net loss	—	—	—	—	—	—	(39,203,719)	(39,203,719)
Balance, December 31, 2016	60,600	\$ 60	30,696,791	\$ 3,070	\$167,890,984	\$ (10,773)	\$(148,115,202)	\$19,768,139

The accompanying notes are an integral part of these consolidated financial statements.

**Trovagene, Inc. and Subsidiary**  
**Consolidated Statements of Cash Flows**

	Year ended December 31,		
	2016	2015	2014
<b>Operating activities</b>			
Net loss	\$ (39,203,719)	\$ (27,471,094)	\$ (14,325,484)
Adjustments to reconcile net loss to net cash used in operating activities:			
Loss (gain) on disposal of assets	577,314	4,562	(24,845)
Depreciation and amortization	1,069,547	378,711	234,813
Stock-based compensation expense	7,504,316	3,946,027	2,070,194
Accretion of final fee premium	390,548	346,157	248,799
Amortization of discount on debt	173,803	88,123	57,117
Amortization of premiums on short-term investments	107,261	—	—
Deferred rent	(201,037)	—	—
Interest income accrued on short-term investments	(84,182)	—	—
Change in fair value of derivative financial instruments—warrants	(2,462,137)	726,421	(1,425,850)
Changes in operating assets and liabilities:			
Increase in other assets	(789,739)	(37,296)	(258)
(Increase) decrease in accounts receivable	(1,724)	(42,042)	22,300
Increase in prepaid expenses	(277,327)	(420,026)	(216,470)
Increase in accounts payable and accrued expenses	2,157,221	361,432	632,299
Net cash used in operating activities	(31,039,855)	(22,119,025)	(12,727,385)
<b>Investing activities</b>			
Capital expenditures	(823,483)	(2,241,066)	(363,290)
Proceeds from disposals of capital equipment	—	7,600	63,500
Maturities of short-term investments	13,750,000	—	—
Purchases of short-term investments	(37,760,166)	—	—
Net cash used in investing activities	(24,833,649)	(2,233,466)	(299,790)
<b>Financing activities</b>			
Proceeds from sale of common stock, net of expenses	2,285,415	61,215,399	—
Proceeds from exercise of warrants	—	1,389,427	—
Proceeds from exercise of options	366,966	860,852	—
Borrowings under equipment line of credit	792,251	1,086,062	—
Repayments under equipment line of credit	(52,175)	—	(515,964)
Borrowings under long-term debt, net of costs	7,805,085	—	15,000,000
Repayments of long-term debt	(8,896,166)	—	—
Net cash provided by financing activities	2,301,376	64,551,740	14,484,036
Effect of exchange rate changes on cash and cash equivalents	(5,825)	—	—
Net change in cash and cash equivalents	(53,577,953)	40,199,249	1,456,861
Cash and cash equivalents—Beginning of period	67,493,047	27,293,798	25,836,937
Cash and cash equivalents—End of period	\$ 13,915,094	\$ 67,493,047	\$ 27,293,798
Supplementary disclosure of cash flow activity:			
Cash paid for taxes	\$ 4,560	\$ 16,934	\$ 2,400
Cash paid for interest	\$ 1,103,677	\$ 1,061,993	\$ 425,256
Supplemental disclosure of non-cash investing and financing activities:			
Warrants issued in connection with long-term debt	\$ 148,885	\$ —	\$ 235,857
Reclassification of derivative financial instruments to additional paid-in capital	\$ —	\$ 435,365	\$ —
Preferred stock dividends accrued	\$ 24,240	\$ 24,240	\$ 23,015
Leasehold improvements paid for by lessor	\$ 1,860,000	\$ —	\$ —

The accompanying notes are an integral part of these consolidated financial statements.

**Trovagene, Inc. and Subsidiary**  
**Notes to Consolidated Financial Statements**

**1. Business Overview and Going Concerns**

Trovagene, Inc. (“Trovagene” or the “Company”) is a molecular diagnostics company headquartered in San Diego, California. The Company’s primary focus is to leverage its PCM technology in an effort to enable itself, through its CLIA/CAP - certified laboratory, and others, through the distribution of research use kits and systems, to detect and monitor ctDNA in urine and blood. The Company’s PCM technology allows for detection and quantitation of oncogene mutations in cancer patients for improved disease management. Trovagene’s Trovera™ liquid biopsy test, which utilizes PCM technology, is designed to provide important clinical information beyond the current standard of care, and is protected by significant intellectual property, including multiple issued patents and pending patent applications worldwide.

To date, Trovagene’s efforts have been principally devoted to research and development, securing and protecting patents and raising capital. Through December 31, 2016, the Company sustained cumulative net losses attributed to common stockholders of \$148,115,202. The Company’s losses have resulted primarily from expenditures incurred in connection with research and development activities, stock-based compensation expense, patent filing and maintenance expenses, outside accounting and legal services and regulatory, scientific and financial consulting fees, amortization and liquidated damages. To date, the Company has generated only limited revenue from operations and expects to incur additional losses to perform further research and development activities as well as expenses related to the commercialization of the diagnostic tests the Company had commercially available as of December 31, 2016.

*Liquidity*

The Company will need to continue to raise funds until it is able to generate revenues from operations sufficient to fund its development and commercial operations. Cash used in operating activities was \$31,039,855, \$22,119,025, and \$12,727,385 for the years ended December 31, 2016, 2015, and 2014, respectively. During the years ended December 31, 2016, 2015, and 2014, the Company incurred a net loss attributable to common stockholders of \$39,227,959, \$27,495,334, and \$14,348,499, respectively. The Company believes that it currently has adequate capital to continue operations for the next twelve months. However, to carry the Company forward beyond the next twelve months, and until it can generate adequate cash flow from operations, additional cash resources will be necessary.

To date, Trovagene’s sources of cash have been primarily limited to the sale of debt and equity securities and debt financing. Net cash provided by financing activities for the years ended December 31, 2016, 2015, and 2014 was \$2,301,376, \$64,551,740 and \$14,484,036, respectively. The Company cannot be certain that additional funding will be available on acceptable terms, or at all. To the extent that the Company can raise additional funds by issuing equity securities, the Company’s stockholders may experience significant dilution. Any debt financing, if available, may involve restrictive covenants that impact the Company’s ability to conduct its business.

On March 15, 2017, the Company announced a restructuring in connection with the addition of precision medicine therapeutics to its business. The Company estimates that this restructuring will reduce annual pre-tax expenses by approximately \$8.0 million per year (excluding one-time separation costs), primarily through a reduction of approximately 30 employees and expenses primarily linked to research, clinical studies, and operations.

The Company plans to continue providing access to its ctDNA collection, extraction and analysis technology in urine and blood to strategic accounts, including pharmaceutical companies and third party reference laboratories, by internal strategic executives. The Company intends to maintain its CLIA/CAP-certified laboratory for clinical testing services for pharmaceutical companies, third party reference laboratories and physicians and for internal programs.

If the Company is unable to raise additional capital when required or on acceptable terms, it may have to significantly delay, scale back or discontinue the development and/or commercialization of one or more of its product candidates. The Company may also be required to:

- Seek collaborators for product candidates at an earlier stage than otherwise would be desirable and on terms that are less favorable than might otherwise be available; and
- Relinquish licenses or otherwise dispose of rights to technologies, product candidates or products that the Company would otherwise seek to develop or commercialize itself.

The Company is evaluating the following options to both raise additional capital as well as reduce costs, in an effort to strengthen its liquidity position:

- Raising capital through public and private equity offerings;
- Adding capital through short-term and long-term borrowings;
- Introducing operation and business development initiatives to bring in new revenue streams;
- Reducing operating costs by identifying internal synergies;
- Engaging in strategic partnerships; and
- Taking actions to reduce or delay capital expenditures.

The Company continually assesses any spending plans, including a review of its discretionary spending in connection with certain strategic contracts, to effectively and efficiently address its liquidity needs.

## **2. Basis of Presentation and Summary of Significant Accounting Policies**

The accompanying consolidated financial statements of Trovagene, which include its wholly owned subsidiary, Trovagene Srl, have been prepared in accordance with accounting principles generally accepted in the United States of America (“GAAP”). All intercompany balances and transactions have been eliminated.

### *Use of Estimates*

The preparation of financial statements in conformity with U.S. GAAP requires management to make estimates and assumptions that affect the reported amounts of assets and liabilities and disclosure of contingent assets and liabilities at the date of the financial statements and the reported amounts of revenues and expenses during the reporting period. Actual results could differ from those estimates.

### *Cash and Cash Equivalents*

Cash and cash equivalents consist of operating, money market accounts and commercial paper as of December 31, 2016 and operating and money market accounts as of December 31, 2015 on deposit. Cash equivalents are considered by the Company to be highly liquid investments purchased with original maturities of three months or less from the date of purchase.

### *Short-Term Investments*

Short-term investments consist of corporate debt securities, U.S. treasury securities, and commercial paper. The Company classifies its short-term investments as available-for-sale, as the sale of such securities may be required prior to maturity to execute management strategies. Investments classified as available-for-sale are carried at fair value, with the unrealized gains and losses reported as a component of consolidated accumulated other comprehensive income (loss) in stockholders’ equity until realized. Realized gains and losses from the sale of available-for-sale securities, if any, are determined on a specific identification basis. A decline in the market value of any available-for-sale security below cost that is determined to be other than temporary will result in an impairment charge to earnings and a new cost basis for the security is established. No such impairment charges were recorded for any period presented. Premiums and discounts are amortized or accreted over the life of the related security as an adjustment to yield using the straight-line method and included in interest income. Interest income is recognized when earned. Realized gains and losses on investments in securities will be included in other income (loss) within the consolidated statements of operations. There were no realized gains and losses for the years ended December 31, 2016, 2015 and 2014.

### *Concentration of Credit Risk*

Financial instruments that potentially subject the Company to significant concentrations of credit risk consist primarily of cash and cash equivalents and short-term investments. The Company maintains deposit accounts at financial institutions that are in excess of federally insured limits. The Company has not experienced any losses in such accounts and believes it is not exposed to significant risk on its cash due to the financial position of the depository institution in which those deposits are held. We limit our exposure to credit loss by generally placing our cash and short-term investments in high credit quality financial

institutions and investment in fixed income instruments denominated and payable in U.S. dollars. Additionally, we have established guidelines regarding diversification of our investments and their maturities, which are designed to maintain principal and maximize liquidity.

#### *Revenues*

Revenue is recognized when persuasive evidence that an arrangement exists, delivery has occurred, the price is fixed or determinable, and collection is reasonably assured.

##### *Milestone, Royalty and License Revenues*

The Company licenses and sublicenses its patent rights to healthcare companies, medical laboratories and biotechnology partners. These agreements may involve multiple elements such as license fees, royalties and milestone payments. Revenue is recognized when the criteria described above have been met as well as the following:

- Up-front nonrefundable license fees pursuant to agreements under which the Company has no continuing performance obligations are recognized as revenues on the effective date of the agreement and when collection is reasonably assured.
- Minimum royalties are recognized as earned, and royalties are earned based on the licensee's use. The Company is unable to predict licensee's sales and thus revenue is recognized upon receipt of notification from licensee and payment when collection is assured. Notification is generally one quarter in arrears.
- Milestone payments are recognized when both the milestone is achieved and the related payment is received.

##### *Diagnostic Service Revenues*

Revenue for clinical laboratory tests may come from several sources, including commercial third-party payors, such as insurance companies and health maintenance organizations, government payors, such as Medicare and Medicaid in the United States, patient self-pay and, in some cases, from hospitals or referring laboratories who, in turn, might bill third-party payors for testing. The Company is recognizing diagnostic service revenue on the cash collection basis until such time as it is able to properly estimate collections on third party reimbursements.

##### *Clinical Research Services Revenue*

Revenue from clinical research services consists primarily of revenue from the sale of urine and blood collection supplies under agreements with our clinical research and business development partners. Revenue is recognized when supplies are delivered.

#### *Allowance for Doubtful Accounts*

The Company reviews the collectability of accounts receivable based on an assessment of historic experience, current economic conditions, and other collection indicators. At each of December 31, 2016, 2015 and 2014, the Company had not recorded an allowance for doubtful accounts. When accounts are determined to be uncollectible, they are written off against the reserve balance and the reserve is reassessed. When payments are received on reserved accounts, they are applied to the individual's account and the reserve is reassessed.

#### *Derivative Financial Instruments—Warrants*

The Company has issued common stock warrants in connection with the execution of certain equity financings. Such warrants are classified as derivative liabilities under the provisions of FASB ASC Topic 815, *Derivatives and Hedging* ("ASC 815") and are recorded at their fair market value as of each reporting period. Such warrants do not meet the exemption that a contract should not be considered a derivative instrument if it is (1) indexed to its own stock and (2) classified in stockholders' equity. Changes in fair value of derivative liabilities are recorded in the consolidated statement of operations under the caption "Change in fair value of derivative instruments."

The fair value of warrants is determined using the Black-Scholes option-pricing model using assumptions regarding the volatility of Trovogene's common stock price, the remaining life of the warrant, and the risk-free interest rates at each period end. The Company thus uses model-derived valuations where inputs are observable in active markets to determine the

## [Table of Contents](#)

fair value and accordingly classifies such warrants in Level 3 per FASB ASC Topic 820, *Fair Value Measurements* (“ASC 820”). At December 31, 2016 and 2015, the fair value of these warrants was \$834,940 and \$3,297,077, respectively, and was recorded as a liability under the caption “derivative financial instruments—warrants” on the consolidated balance sheet.

### *Stock-Based Compensation*

FASB ASC Topic 718 “*Compensation—Stock Compensation*” (“ASC 718”) requires companies to measure the cost of employee services received in exchange for the award of equity instruments based on the estimated fair value of the award at the date of grant. The expense is recognized ratably over the period during which an employee is required to provide services in exchange for the award. ASC 718 did not change the way Trovogene accounts for non-employee stock-based compensation. Trovogene continues to account for shares of common stock, stock options and warrants issued to non-employees based on the fair value of the stock, stock option or warrant, if that value is more reliably measurable than the fair value of the consideration or services received. The Company accounts for stock options issued and vesting to non-employees in accordance with FASB ASC Topic 505-50 “*Equity-Based Payment to Non-Employees*”, and, accordingly, the value of the stock compensation to non-employees is based upon the measurement date as determined at either (1) the date at which a performance commitment is reached, or (2) the date at which the necessary performance to earn the equity instruments is complete. Therefore, the fair value of these options is being “marked to market” quarterly until the measurement date is determined.

### *Fair Value of Financial Instruments*

Financial instruments consist of cash and cash equivalents, short-term investments, accounts receivable, accounts payable, debt and derivative liabilities. The Company has adopted ASC 820 for financial assets and liabilities that are required to be measured at fair value and non-financial assets and liabilities that are not required to be measured at fair value on a recurring basis. These financial instruments are stated at their respective historical carrying amounts, which approximate fair value due to their short term nature as they reflect current market interest rates. Debt is stated at its respective historical carrying amounts, which approximate fair value as they reflect current market interest rates.

In accordance with FASB ASC Subtopic 820-10, the Company measures certain assets and liabilities at fair value on a recurring basis using the three-tier fair value hierarchy, which prioritizes the inputs used in measuring fair value. The three tiers include:

- Level 1 — Quoted prices for identical instruments in active markets.
- Level 2 — Quoted prices for similar instruments in active markets; quoted prices for identical or similar instruments in markets that are not active; and model-derived valuations where inputs are observable or where significant value drivers are observable.
- Level 3 — Instruments where significant value drivers are unobservable to third parties.

### *Long-Lived Assets*

Long-lived assets consist of property and equipment and finite-lived intangible assets. The Company records property and equipment at cost, and records other intangible assets based on their fair values at the date of acquisition. Depreciation on property and equipment is calculated using the straight-line method over the estimate useful life of five years for laboratory equipment and three to five years for furniture and office equipment. Amortization of leasehold improvements is computed based on the shorter of the life of the asset or the term of the lease. Amortization of intangible assets is calculated using the straight line method over the estimate useful life of the assets, based on when the Company expect to receive cash inflows generated by the intangible assets.

Impairment losses on long lived assets used in operations are recorded when indicators of impairment are present and the undiscounted cash flows estimated to be generated by those assets are less than the assets carrying amount. If such assets are considered to be impaired, the impairment to be recognized is measured by the amount by which the carrying amount of the assets exceeds the estimated fair value of the assets. No impairment losses were recorded on long-lived assets to be held and used during the years ended December 31, 2016, 2015, and 2014.

### *Restructuring*

Restructuring costs are included in loss from operations in the consolidated statements of operations. The Company has accounted for these costs in accordance with ASC Topic 420, *Exit or Disposal Cost Obligations*. One-time termination

benefits are recorded at the time they are communicated to the affected employees. In December 2016, the Company announced a restructuring plan which was completed as of December 31, 2016. See Note 12 to the audited consolidated financial statements for further information.

#### *Income Taxes*

Income taxes are determined using the asset and liability approach of accounting for income taxes. Under this approach, deferred taxes represent the future tax consequences expected to occur when the reported amounts of assets and liabilities are recovered or paid. Deferred taxes result from differences between the financial statement and tax bases of Trovogene's assets and liabilities and are adjusted for changes in tax rates and tax laws when changes are enacted. Valuation allowances are recorded to reduce deferred tax assets when it is more likely than not that a tax benefit will not be realized. The assessment of whether or not a valuation allowance is required often requires significant judgment.

#### *Contingencies*

In the normal course of business, Trovogene is subject to loss contingencies, such as legal proceedings and claims arising out of its business, that cover a wide range of matters, including, among others, government investigations, stockholder lawsuits, product and environmental liability, and tax matters. In accordance with FASB ASC Topic 450, *Accounting for Contingencies*, Trovogene records such loss contingencies when it is probable that a liability has been incurred and the amount of loss can be reasonably estimated. Trovogene, in accordance with this guidance, does not recognize gain contingencies until realized.

#### *Cost of Revenue*

Cost of revenue represents the cost of materials, personnel costs, costs associated with processing specimens including pathological review, quality control analyses, and delivery charges necessary to render an individualized test result. Costs associated with performing tests are recorded as the tests are processed. However, the revenue on diagnostic services is recognized on a cash collection basis resulting in costs incurred before the collection of related revenue.

#### *Research and Development*

Research and development expenses, which include expenditures in connection with an in-house research and development laboratory, salaries and staff costs, purchased in-process research and development and regulatory and scientific consulting fees, as well as contract research and insurance, are accounted for in accordance with FASB ASC Topic 730-10-55-2, *Research and Development*. Also, as prescribed by this guidance, patent filing and maintenance expenses are considered legal in nature and therefore classified as general and administrative expense, if any.

While certain of the Company's research and development costs may have future benefits, the Company's policy of expensing all research and development expenditures is predicated on the fact that Trovogene has no history of successful commercialization of molecular diagnostic products to base any estimate of the number of future periods that would be benefited.

FASB ASC Topic 730, *Research and Development* requires that non-refundable advance payments for goods or services that will be used or rendered for future research and development activities be deferred and capitalized. As the related goods are delivered or the services are performed, or when the goods or services are no longer expected to be provided, the deferred amounts are recognized as an expense.

#### *Net Loss Per Share*

Basic and diluted net loss per share is presented in conformity with FASB ASC Topic 260, *Earnings per Share*, for all periods presented. In accordance with this guidance, basic and diluted net loss per common share is determined by dividing net loss applicable to common stockholders by the weighted-average common shares outstanding during the period. Preferred dividends are included in income available to common stockholders in the computation of basic and diluted earnings per share. Shares used in calculating diluted net loss per common share exclude as anti-dilutive the following share equivalents:

	December 31,		
	2016	2015	2014
Options to purchase Common Stock	5,528,628	6,948,630	4,913,472
Warrants to purchase Common stock	4,538,606	4,565,947	5,251,660
Restricted Stock Units	272,000	—	—
Series A Convertible Preferred Stock	63,125	63,125	63,125
	<u>10,402,359</u>	<u>11,577,702</u>	<u>10,228,257</u>

The following table summarizes the Company's diluted net loss per share:

	December 31,		
	2016	2015	2014
<b>Numerator:</b>			
Net loss attributable to common stockholders	\$ (39,227,959)	\$ (27,495,334)	\$ (14,348,499)
Adjustment for gain from change in fair value of derivative financial instruments—warrants	(2,321,053)	(4,396,061)	(2,422,337)
Net loss used for diluted loss per share	<u>\$ (41,549,012)</u>	<u>\$ (31,891,395)</u>	<u>\$ (16,770,836)</u>
<b>Denominator:</b>			
Weighted-average shares used to compute basic net loss per share	30,174,838	26,201,713	18,904,280
Adjustments to reflect assumed exercise of warrants	106,425	250,452	166,832
Weighted-average shares used to compute diluted net loss per share	<u>30,281,263</u>	<u>26,452,165</u>	<u>19,071,112</u>
<b>Net loss per share diluted</b>	<u>\$ (1.37)</u>	<u>\$ (1.21)</u>	<u>\$ (0.88)</u>

#### *Change in Accounting Principle*

In August 2014, the FASB issued ASU 2014-15, *Presentation of Financial Statements—Going Concern*, which impacts the accounting guidance related to the evaluation of an entity's ability to continue as a going concern. The amendment establishes management's responsibility to evaluate whether there is substantial doubt about an entity's ability to continue as a going concern in connection with preparing financial statements for each annual and interim reporting period. The amendment also gives guidance to determine whether to disclose information about relevant conditions and events when there is substantial doubt about an entity's ability to continue as a going concern. The amended guidance is effective prospectively for fiscal years ending after December 15, 2016. The Company adopted ASU 2014-15 as of December 31, 2016.

#### *Recent Accounting Pronouncements*

In August 2016, the FASB issued Accounting Standards Update ("ASU") 2016-15, *Classification of Certain Cash Receipts and Cash Payments* ("ASU 2016-15"), which includes amendments that clarify how certain cash receipts and cash payments are presented in the statement of cash flows. ASU 2016-15 also provides guidance clarifying when an entity should separate cash receipts and cash payments and classify them into more than one class of cash flows. The new amendments and guidance are effective for fiscal years beginning after December 15, 2017, including interim periods within those fiscal years. Early adoption is permitted provided that all amendments are adopted in the same period. The Company is currently evaluating the impact of adoption of ASU 2016-15 on its consolidated statements of cash flows.

In March 2016, the FASB issued ASU 2016-09, *Improvements to Employee Share-Based Payment Accounting* ("ASU 2016-09"), which aims to simplify the accounting for share-based payment transactions, including accounting for income taxes, classification on the statement of cash flows, accounting for forfeitures, and classification of awards as either liabilities or equity. In addition, under the ASU 2016-09, excess income tax benefits from share-based compensation arrangements are classified as cash flow from operations, rather than cash flow from financing activities. This ASU is effective for the Company beginning in the first quarter of 2017. The new guidance is not expected to have a material impact on the Company's financial position, results of operations or cash flows.



In February 2016, the FASB issued ASU 2016-02, *Leases*. The new standard establishes a right-of-use (“ROU”) model that requires a lessee to record a ROU asset and a lease liability on the balance sheet for most leases. The new standard is effective for fiscal years beginning after December 15, 2018, including interim periods within those fiscal years. A modified retrospective transition approach is required for capital and operating leases existing at, or entered into after, the beginning of the earliest comparative period presented in the financial statements, with certain practical expedients available. The new standard will impact the Company’s accounting for its office leases and the Company is currently evaluating the impact of the new standard on its consolidated financial statements.

In May 2014, the FASB issued ASU 2014-09, *Revenue from Contracts with Customers* (“ASU 2014-09”). The new standard is based on the principal that revenue should be recognized to depict the transfer of promised goods or services to customers in an amount that reflects the consideration to which the entity expects to be entitled in exchange for those goods or services. Since its initial release, FASB as issued several amendments to the standard, which include clarification of accounting guidance related to identification of performance obligations, intellectual property licenses, and principal versus agent considerations. ASU 2014-09 and all subsequent amendments (collectively, the “new standards”) will be effective for the Company beginning in the first quarter of fiscal year 2018 and may be applied using either the full retrospective method, in which case the standard would be applied to each prior reporting period presented, or the modified retrospective method, in which case the cumulative effect of applying the standard would be recognized at the date of initial application. To date, the Company has derived its revenues from a limited number of royalty, license and diagnostic service agreements. The consideration the Company is eligible to receive under these agreements includes upfront payments, milestone payments and royalties. Each of its collaboration agreements has unique terms that will need to be evaluated separately under the new standards. The Company has started its preliminary assessment of its active license and collaboration agreements. The new standards differ from the current accounting standard in many respects, such as in the accounting for variable consideration, including milestone payments. For example, the Company currently recognizes milestone revenue using the milestone method specified in ASC 605-28, which generally results in recognition of milestone revenue in the period that the milestone event is achieved. However, under the new accounting standards, it is possible to start to recognize milestone revenue before the milestone is achieved if management determines with a high degree of certainty that amounts recorded as revenues will not have to be reversed when the uncertainty associated with the variable consideration is subsequently resolved. In addition, the current accounting standards include a presumption that revenue from upfront non-refundable fees are recognized ratably over the performance period, unless another attribution method is determined to more closely approximate the delivery of the goods or services to the customer. The new accounting standards will require entities to determine an appropriate attribution method using either output or input methods and do not include a presumption that entities would default to a ratably attribution approach. The Company is continuing to assess the impact these items will have on its financial statements. The Company is completing its initial assessment of the new standards, including a high level review of the Company’s contract portfolio and revenue streams, particularly around royalty revenues, to identify potential differences in accounting as a result of the new standards. The Company expects to adopt the new standards using the modified retrospective method with an adjustment, if any, to beginning retained earnings for the cumulative effect of the change.

### 3. Supplementary Balance Sheet Information

#### *Short-term Investments*

The following table sets forth the composition of short-term investments as of December 31, 2016. No such investments existed as of December 31, 2015.

	Maturity in Years	Cost	Unrealized		Fair Value
			Gains	Losses	
Corporate debt securities	Less than 1 year	\$ 14,165,915	\$ 44	\$ (5,273)	\$ 14,160,686
Commercial paper	Less than 1 year	1,195,444	—	—	1,195,444
U.S. treasury securities	Less than 1 year	8,625,728	330	(4,166)	8,621,892
<b>Total Investment</b>		<b>\$ 23,987,087</b>	<b>\$ 374</b>	<b>\$ (9,439)</b>	<b>\$ 23,978,022</b>

*Property and Equipment*

Fixed assets consist of laboratory, testing and computer equipment and fixtures stated at cost. Depreciation and amortization expense for the years ended December 31, 2016, 2015, and 2014 was \$969,833, \$378,711, and \$234,813, respectively. Property and equipment consisted of the following:

	As of December 31,	
	2016	2015
Furniture and office equipment	\$ 1,144,741	\$ 1,264,547
Leasehold improvements	1,994,514	39,401
Laboratory equipment	2,449,645	2,241,413
	5,588,900	3,545,361
Less—accumulated depreciation and amortization	(1,761,985)	(854,782)
Property and equipment, net	<u>\$ 3,826,915</u>	<u>\$ 2,690,579</u>

*Accrued Liabilities*

Accrued liabilities consisted of the following:

	As of December 31,	
	2016	2015
Accrued compensation	\$ 2,203,876	\$ 896,404
Accrued research agreements	736,199	386,267
Accrued professional fees	421,314	—
Other accrued liabilities	659,976	621,126
Total accrued liabilities	<u>\$ 4,021,365</u>	<u>\$ 1,903,797</u>

**4. Stockholders' Equity***Common Stock*

During the year ended December 31, 2014, the Company issued a total of 13,011 shares of common stock upon the net exercise of warrants at a weighted-average exercise price of \$3.00.

During the year ended December 31, 2015, the Company issued a total of 10,821,808 shares of common stock. The Company received gross proceeds of approximately \$63.2 million from the sale of 9,711,110 shares of its common stock through underwritten public offerings in February 2015 and July 2015. The Company also received gross proceeds of approximately \$2.8 million from the sale of 285,421 shares of its common stock at a weighted-average price of \$9.66 under the agreement with the Agent. In addition, 265,166 shares were issued upon exercise of options for a weighted-average price of \$3.25, 282,975 shares were issued upon exercise of warrants for a weighted-average price of \$4.91, and 277,136 shares were issued upon net exercise of 449,403 warrants at a weighted-average exercise price of \$3.05.

During the year ended December 31, 2016, the Company issued a total of 959,190 shares of common stock. The Company received gross proceeds of approximately \$2.4 million from the sale of 421,810 shares of its common stock at a weighted-average price of \$5.61 under the agreement with the Agent. In addition, 98,396 shares were issued upon exercise of options for a weighted-average price of \$3.73, 341,333 shares were issued upon net exercise of 1,236,875 options at a weighted average exercise price of \$3.81, 2,651 shares were issued upon net exercise of 8,333 warrants at a weighted-average exercise price of \$3.00, and 95,000 shares were issued upon vesting of restricted stock units.

## Warrants

A summary of warrant activity and changes in warrants outstanding, including both liability and equity classifications, is presented below:

	Number of Warrants	Weighted-Average Exercise Price Per Share	Weighted-Average Remaining Contractual Term
Balance outstanding, December 31, 2013	6,233,483	\$ 3.87	4.5
Granted	85,470	\$ 3.51	
Exercised	(36,666)	\$ 3.00	
Expired	(16,667)	\$ 10.80	
Balance outstanding, December 31, 2014	6,265,620	\$ 3.85	3.6
Exercised	(732,378)	\$ 3.77	
Balance outstanding, December 31, 2015	5,533,242	\$ 3.86	2.5
Granted	30,992	\$ 4.84	
Exercised	(8,333)	\$ 3.00	
Expired	(50,000)	\$ 8.00	
Balance outstanding, December 31, 2016	5,505,901	\$ 3.83	1.6

The Company issued warrants to purchase 85,470 shares of common stock at an exercise price of \$3.51 per share during the year ended December 31, 2014. The warrants were issued in connection with a \$15.0 million debt agreement. The estimated fair value of the warrants was determined on the date of grant using the Black-Scholes option valuation model using the following assumptions: a risk-free interest rate of 2.53%, dividend yield of 0%, expected volatility of 73.8% and expected term of ten years. The resulting fair value of \$235,857 was recorded as a debt discount and was amortized to interest expense over the term of the loan using the effective interest method. In July 2016, the debt was refinanced in accordance with the fifth amendment to the debt agreement. The unamortized debt discount was amortized to interest expense over the new term of the loan using the effective interest method.

The Company issued warrants to purchase 30,992 shares of common stock at an exercise price of \$4.84 per share during the year ended December 31, 2016. The warrants were issued in connection with the fifth amendment to the debt agreement. The estimated fair value of the warrants was determined on the date of grant using the Black-Scholes option valuation model using the following assumptions: a risk-free interest rate of 1.59%, dividend yield of 0%, expected volatility of 130.66% and expected term of ten years. The resulting fair value of \$148,885 was recorded as a debt discount and was amortized to interest expense over the new term of the loan using the effective interest method.

### Series A Convertible Preferred Stock

The material terms of the Series A Convertible Preferred Stock consist of:

1) *Dividends.* Holders of the Company's Series A Convertible Preferred Stock are entitled to receive cumulative dividends at the rate per share of 4% per annum, payable quarterly on March 31, June 30, September 30 and December 31, beginning with September 30, 2005. Dividends are payable, at the Company's sole election, in cash or shares of common stock. As of December 31, 2016, 2015, and 2014, the Company had \$292,535, \$268,295, and \$244,055, respectively in accrued cumulative unpaid preferred stock dividends, included in accrued liabilities in the Company's consolidated balance sheets, and \$24,240, \$24,240, and \$23,015 of accrued dividends was recorded during the years ended December 31, 2016, 2015, and 2014, respectively.

2) *Voting Rights.* Shares of the Series A Convertible Preferred Stock have no voting rights. However, so long as any shares of Series A Convertible Preferred Stock are outstanding, the Company may not, without the affirmative vote of the holders of the shares of Series A Convertible Preferred Stock then outstanding, (a) adversely change the powers, preferences or rights given to the Series A Convertible Preferred Stock, (b) authorize or create any class of stock senior or equal to the Series A Convertible Preferred Stock, (c) amend its certificate of incorporation or other charter documents, so as to affect adversely any rights of the holders of Series A Convertible Preferred Stock or (d) increase the authorized number of shares of Series A Convertible Preferred Stock.

3) *Liquidation.* Upon any liquidation, dissolution or winding-up of the Company, the holders of the Series A Convertible Preferred Stock are entitled to receive an amount equal to the Stated Value per share, which is currently \$10 per share plus any accrued and unpaid dividends.

4) *Conversion Rights.* Each share of Series A Convertible Preferred Stock is convertible at the option of the holder into that number of shares of common stock determined by dividing the Stated Value, currently \$10 per share, by the conversion price, originally \$2.15 per share.

5) *Subsequent Equity Sales.* The conversion price is subject to adjustment for dilutive issuances for a period of 12 months beginning upon registration of the common stock underlying the Series A Convertible Preferred Stock. The relevant registration statement became effective on March 17, 2006 and during the following twelve month period the conversion price was adjusted to \$9.60 per share.

6) *Automatic Conversion.* If the price of the Company’s common stock equals \$25.80 per share for 20 consecutive trading days, and an average of 8,333 shares of common stock per day are traded during the 20 trading days, the Company will have the right to deliver a notice to the holders of the Series A Convertible Preferred Stock, requesting the holders to convert any portion of the shares of Series A Convertible Preferred Stock into shares of common stock at the applicable conversion price. As of the date of these financial statements, such conditions have not been met.

As of each of December 31, 2016, 2015, and 2014, there were 60,600 shares of Series A Convertible Preferred Stock outstanding.

## 5. Stock-Based Compensation

In June 2004, the Company adopted the Trovagene Stock Option Plan, as amended (the “2004 Plan”), under which up to 6,000,000 shares common stock were reserved for issuance to directors and eligible employees, including executive officers and consultants. Generally, vesting for options granted under the Plan was from three to four years, and options expired after a 10-year period. Options were granted at an exercise price not less than the fair market value at the date of grant. As of December 31, 2014, the 2004 Plan was expired.

The Trovagene, Inc. 2014 Equity Incentive Plan (the “2014 EIP”), authorizing up to 2,500,000 shares of common stock for issuance under the 2014 EIP, was approved by the Board in June 2014 and approved by the stockholders of the Company at the September 17, 2014 Annual Meeting of Stockholders. An additional 2,500,000 shares of common stock was authorized for issuance by the Board in March 2015 and was approved by the stockholders at the June 10, 2015 Annual Meeting of Stockholders.

During the year ended December 31, 2016, the Company had issued 996,000 options to its executive officers and non-employee directors that were over the authorized number of shares available in the 2014 EIP and were subject to shareholder approval. As per ASC Topic 718, the options were accounted for as liabilities and recorded at fair value with the changes in fair value being recorded in the Company’s consolidated statements of operations. Stockholder approval was obtained on May 17, 2016 to increase the number of authorized shares in the 2014 EIP from 5,000,000 to 7,500,000. Accordingly, the options were remeasured as of the date of stockholder approval with the change recorded in stock based compensation expense and the \$217,333 liability was reclassified to additional paid in capital.

As of December 31, 2016, there were 2,829,858 shares available for issuance under the 2014 EIP.

Stock-based compensation has been recognized in operating results as follows:

	Years ended December 31,		
	2016	2015	2014
In cost of revenue	\$ 122,301	\$ 39,676	\$ —
In research and development expenses	2,420,696	1,499,009	796,008
In selling and marketing expense	2,111,366	768,146	145,239
In general and administrative expenses	2,910,156	1,639,196	1,128,947
Benefit from restructuring	(60,203)	—	—
Total stock-based compensation	<u>\$ 7,504,316</u>	<u>\$ 3,946,027</u>	<u>\$ 2,070,194</u>

*Stock Options*

The estimated fair value of stock option awards was determined on the date of grant using the Black-Scholes option valuation model with the following assumptions during the years indicated below:

	Years ended December 31,		
	2016	2015	2014
Risk-free interest rate	0.93% - 1.89%	1.35% - 2.15%	1.42% - 2.1%
Dividend yield	0%	0%	0%
Expected volatility (range)	80% - 134%	73% - 77%	81% - 86%
Expected volatility (weighted-average)	103%	75%	85%
Expected term (in years)	5.5 years	6.0 years	5.8 years

*Risk-free interest rate* — Based on the daily yield curve rates for U.S. Treasury obligations with maturities that correspond to the expected term of the Company’s stock options.

*Dividend yield* — Trovogene has not paid any dividends on common stock since its inception and does not anticipate paying dividends on its common stock in the foreseeable future.

*Expected volatility* — Based on the historical volatility of Trovogene’s common stock.

*Expected term* — The expected option term represents the period that stock-based awards are expected to be outstanding based on the simplified method provided in Staff Accounting Bulletin (“SAB”) No. 107, *Share-Based Payment* (“SAB No. 107”), which averages an award’s weighted-average vesting period and expected term for “plain vanilla” share options. Under SAB No. 107, options are considered to be “plain vanilla” if they have the following basic characteristics: (1) are granted “at-the-money”; (2) exercisability is conditioned upon service through the vesting date; (3) termination of service prior to vesting results in forfeiture; (4) limited exercise period following termination of service; and (5) are non-transferable and non-hedgeable.

*Forfeitures* — FASB ASC Topic 718 (“ASC 718”) requires forfeitures to be estimated at the time of grant and revised, if necessary, in subsequent periods if actual forfeitures differ from those estimates. The Company estimates forfeitures based on its historical experience.

The weighted-average fair value per share of all options granted during the years ended December 31, 2016, 2015, and 2014, estimated as of the grant date using the Black-Scholes option valuation model, was \$3.60, \$4.60 and \$3.16 per share, respectively.

The unrecognized compensation cost related to non-vested stock options outstanding at December 31, 2016 and 2015 was \$8,211,896 and \$10,430,604, respectively. The weighted-average remaining amortization period at December 31, 2016 and 2015 for non-vested stock options was 2.8 years and 3.1 years, respectively.

The total intrinsic value of stock options exercised was \$1,932,799, \$1,382,255 and \$0 during the years ended December 31, 2016, 2015 and 2014, respectively. The total fair value of shares vested during the years ended December 31, 2016, 2015 and 2014 was \$6,261,655, \$2,634,688 and \$1,960,256, respectively.

A summary of stock option activity and of changes in stock options outstanding is presented below:

	Number of Options	Weighted-Average Exercise Price Per Share	Intrinsic Value	Weighted-Average Remaining Contractual Life
Balance outstanding, December 31, 2013	4,287,545	\$ 5.18	\$ 5,896,329	6.7 years
Granted	1,410,038	\$ 4.42		
Forfeited	(784,111)	\$ 7.08		
Balance outstanding, December 31, 2014	4,913,472	\$ 4.66	\$ 2,808,083	7.6 years
Granted	2,688,500	\$ 7.02		
Exercised	(265,166)	\$ 3.25		
Forfeited	(388,176)	\$ 7.75		
Balance outstanding, December 31, 2015	6,948,630	\$ 5.45	\$ 5,903,466	7.8 years
Granted	3,246,250	\$ 5.02		
Exercised	(1,335,271)	\$ 3.81		
Forfeited	(3,330,981)	\$ 5.63		
Balance outstanding, December 31, 2016	5,528,628	\$ 5.49	\$ —	7.7 years
Vested and exercisable, December 31, 2016	2,415,461	\$ 5.18	\$ —	6.4 years

ASC 718 requires that cash flows resulting from tax deductions in excess of the cumulative compensation cost recognized for options exercised (excess tax benefits) be classified as cash inflows from financing activities and cash outflows from operating activities. Due to Trovagine's accumulated deficit position, no tax benefits have been recognized in the cash flow statement.

#### Restricted Stock Units

Under guidance provided by ASC Topic 718 "Compensation—Stock Compensation" for share-based payments, stock-based compensation cost for restricted stock units is measured at the grant date based on the closing market price of the Company's common stock at the grant date and recognized ratably over the service period through the vesting date. All restricted stock units were granted with no purchase price. Vesting of the restricted stock units is generally subject to service conditions, while vesting of certain units are based on attainment of specific performance objectives. There were no restricted stock units granted during the year ended December 31, 2015 and 2014.

A summary of the restricted stock unit activity is presented below:

	Number of Shares	Weighted Average Grant Date Fair Value Per Share	Intrinsic Value
Non-vested restricted stock units outstanding, December 31, 2015	—	\$ —	
Granted	402,000	\$ 4.06	
Vested	(95,000)	\$ 4.27	
Forfeited	(35,000)	\$ 3.99	
Non-vested restricted stock units outstanding, December 31, 2016	272,000	\$ 3.99	\$ 571,200

All restricted stock units outstanding as of December 31, 2016 vested on January 2, 2017. At December 31, 2016, total unrecognized compensation cost related to non-vested restricted stock units was \$4,430, which is expected to be recognized over one day. The total intrinsic value of restricted stock units vested was \$293,781 during the year ended December 31, 2016. The total fair value of restricted stock units vested during the year ended December 31, 2016 was \$405,550.

#### 6. Derivative Financial Instruments — Warrants

Based upon the Company's analysis of the criteria contained in ASC Topic 815-40, *Contracts in Entity's Own Equity* ("ASC 815-40"), Trovagine has determined that certain warrants issued in connection with its private placements must be recorded as derivative liabilities with a charge to additional paid-in capital as they were issued with other equity instruments. In accordance with ASC 815-40, the warrants are also being re-measured at each balance sheet date based on estimated fair value,

[Table of Contents](#)

and any resultant change in fair value is being recorded in the Company's statement of operations. The Company estimates the fair value of these warrants using the Black-Scholes option pricing model.

The range of assumptions used to determine the fair value of the warrants valued using the Black-Scholes option pricing model during the periods indicated was:

	Year ended December 31		
	2016	2015	2014
Estimated fair value of Trovogene common stock	\$2.10 - \$4.65	\$5.40 - \$10.15	\$3.00 - \$6.74
Expected warrant term	2.0 - 2.8 years	3.0 - 3.8 years	4.0 years
Risk-free interest rate	0.71% - 1.20%	0.89% - 1.31%	1.38%
Expected volatility	82% - 94%	73% - 77%	86%
Dividend yield	—%	—%	—%

Expected volatility is based on the historical volatility of Trovogene's common stock. The warrants have a transferability provision and based on guidance provided in SAB No. 107 for instruments issued with such a provision, Trovogene used the full contractual term as the expected term of the warrants. The risk-free interest rate is based on the U.S. Treasury security rates consistent with the expected remaining term of the warrants at each balance sheet date.

The following table sets forth the components of changes in the Company's derivative financial instruments—warrants liability balance, valued using the Black-Scholes option pricing method, for the periods indicated.

Date	Description	Number of Warrants	Derivative Instrument Liability
December 31, 2014	Balance of derivative financial instruments—warrants liability	1,013,961	\$ 3,006,021
	Exercised warrants	(46,666)	(435,365)
	Change in fair value of warrants during the year recognized as a loss in the statement of operations	—	726,421
December 31, 2015	Balance of derivative financial instruments—warrants liability	967,295	3,297,077
	Change in fair value of warrants during the year recognized as a gain in the statement of operations	—	(2,462,137)
December 31, 2016	Balance of derivative financial instruments—warrants liability	967,295	\$ 834,940

The remaining contractual term of these warrants outstanding at December 31, 2016 and 2015 was approximately 2.0 and 3.0 years, respectively.

At December 31, 2016 and 2015, the total fair value of the above warrants accounted for as derivative financial instruments—warrants, valued using the Black-Scholes option pricing model, was \$834,940 and \$3,297,077, respectively, and is classified as derivative financial instruments—warrants liability on the balance sheet.

## 7. Fair Value Measurements

The following table presents the Company's assets and liabilities that are measured and recognized at fair value on a recurring basis classified under the appropriate level of the fair value hierarchy as of December 31, 2016 and 2015:

	Fair Value Measurements at December 31, 2016			Total
	Quoted Prices in Active Markets for Identical Assets and Liabilities (Level 1)	Significant Other Observable Inputs (Level 2)	Significant Unobservable Inputs (Level 3)	
<b>Assets:</b>				
Money market fund (1)	\$ 12,095,620	\$ —	\$ —	\$ 12,095,620
Corporate debt securities (2)	—	14,160,686	—	14,160,686
Commercial paper (3)	—	2,393,948	—	2,393,948
U.S. treasury securities (2)	—	8,621,892	—	8,621,892
<b>Total Assets</b>	<b>\$ 12,095,620</b>	<b>\$ 25,176,526</b>	<b>\$ —</b>	<b>\$ 37,272,146</b>
<b>Liabilities:</b>				
Derivative financial instruments—warrants	\$ —	\$ —	\$ 834,940	\$ 834,940
<b>Total Liabilities</b>	<b>\$ —</b>	<b>\$ —</b>	<b>\$ 834,940</b>	<b>\$ 834,940</b>

	Fair Value Measurements at December 31, 2015			Total
	Quoted Prices in Active Markets for Identical Assets and Liabilities (Level 1)	Significant Other Observable Inputs (Level 2)	Significant Unobservable Inputs (Level 3)	
<b>Assets:</b>				
Money market fund (1)	\$ 65,016,222	\$ —	\$ —	\$ 65,016,222
<b>Total Assets</b>	<b>\$ 65,016,222</b>	<b>\$ —</b>	<b>\$ —</b>	<b>\$ 65,016,222</b>
<b>Liabilities:</b>				
Derivative financial instruments—warrants	\$ —	\$ —	\$ 3,297,077	\$ 3,297,077
<b>Total Liabilities</b>	<b>\$ —</b>	<b>\$ —</b>	<b>\$ 3,297,077</b>	<b>\$ 3,297,077</b>

(1) Included as a component of cash and cash equivalents on the accompanying consolidated balance sheet.

(2) Included in short-term investments on the accompanying consolidated balance sheet.

(3) \$1,198,504 of commercial paper was included as a component of cash and cash equivalents, and the rest of amount was included in short-term investments on the accompanying consolidated balance sheet.

The following table sets forth a summary of changes in the fair value of the Company's Level 3 liabilities for the years ended December 31, 2016 and 2015:

Description	Balance at December 31, 2015	Unrealized (gains) or losses	Balance at December 31, 2016
Derivative financial instruments—Warrants	\$ 3,297,077	\$ (2,462,137)	\$ 834,940

Description	Balance at December 31, 2014	Fair Value of Warrants Reclassified to Additional Paid-in Capital	Unrealized (gains) or losses	Balance at December 31, 2015
Derivative financial instruments—Warrants	\$ 3,006,021	\$ (435,365)	\$ 726,421	\$ 3,297,077



The unrealized gains or losses on the derivative financial instruments—warrants are recorded as a change in fair value of derivative financial instruments—warrants in the Company’s consolidated statement of operations. A financial instrument’s level within the fair value hierarchy is based on the lowest level of any input that is significant to the fair value measurement. At each reporting period, the Company reviews the assets and liabilities that are subject to ASC Topic 815-40. At each reporting period, all assets and liabilities for which the fair value measurement is based on significant unobservable inputs or instruments that trade infrequently and therefore have little or no price transparency are classified as Level 3.

## 8. Debt

### *Equipment Line of Credit*

In November 2015, the Company entered into a Loan and Security Agreement (“Equipment Line of Credit”) with Silicon Valley Bank that provided for cash borrowings for equipment (“Equipment Advances”) of up to \$2.0 million, secured by the equipment financed. Under the terms of the agreement, interest is equal to 1.25% above the Prime Rate. At December 31, 2016, the interest rate was 5.0%. Interest only payments are due on borrowings through November 30, 2016, with both interest and principal payments commencing in December 2016. Any equipment advances after November 30, 2016 are subject to principal and interest payments immediately over a 36-month period following the advance. All unpaid principal and interest on each Equipment Advance will be due on November 1, 2019. The Company has an obligation to make a final payment equal to 7% of total amounts borrowed at the loan maturity date.

The Company is also subject to certain affirmative and negative covenants under the Equipment Line of Credit. As of December 31, 2016, the Company was in compliance with all covenants.

As of December 31, 2016, amounts due under the Equipment Line of Credit included \$626,104 in current liabilities and \$1,232,534 in long-term liabilities, which includes \$32,501 of final fee premium accretion. The Company recorded \$111,293 in interest expense related to the Equipment Line of Credit during the year ended December 31, 2016.

Future maturities of long-term debt at December 31, 2016 are as follows:

2017	\$	626,104
2018		626,104
2019		573,929
Total principal		1,826,137
Plus final fee premium accretion		32,501
Total long-term obligations	\$	1,858,638

### *Loan and Security Agreement*

In June 2014, the Company entered into a \$15,000,000 loan and security agreement (“Agreement”) with two banks pursuant to which the lenders provided the Company with a term loan, which was funded at closing. The loan is secured by a security interest in all of the Company’s assets except intellectual property, which is subject to a negative pledge. In connection with the loan, each of the lenders received a warrant to purchase up to an aggregate of 85,470 shares of the Company’s common stock at an exercise price of \$3.51 per share, which such warrants are exercisable for ten years from the date of issuance.

On July 20, 2016, the Company signed the 5th Amendment to Loan and Security Agreement (“Amendment”) to refinance its existing term loan. Under the Amendment, the interest rate was adjusted to 3.75% plus the Wall Street Journal Prime Rate (subject to a floor of 7.25%). At December 31, 2016, the interest rate was 7.5%. The Amendment also extended the maturity date of the loan to February 1, 2020. The Company is required to make interest only payments on the outstanding amount of the loan on a monthly basis through September 1, 2017, after which equal monthly payments of principal and interest are due until the loan maturity date of February 1, 2020. In addition, the lenders received a warrant to purchase an aggregate 30,992 shares of the Company’s common stock at an exercise price of \$4.84 per share exercisable for ten years from the date of issuance. The fair value of the warrants, totaling \$148,885, was recorded as debt discount and additional paid-in capital as the warrants were equity classified. As of December 31, 2016, warrants to purchase 73,727 shares of common stock remains outstanding, of which 42,735 of these warrants were in connection with the original Agreement.

[Table of Contents](#)

At the Company's option, it may prepay all of the outstanding principal balance, subject to certain pre-payment fees ranging from 1% to 3% of the prepayment amount. In the event of a final payment of the loans under the loan agreement, either in the event of repayment of the loan at maturity or upon any prepayment, the Company is obligated to pay the amortized portion of the final fee of \$1,125,000.

The Company is also subject to certain affirmative and negative covenants under the Agreement, including limitations on its ability to: undergo certain change of control events; convey, sell, lease, license, transfer or otherwise dispose of any equipment financed by loans under the loan agreement; create, incur, assume, guarantee or be liable with respect to indebtedness, subject to certain exceptions; grant liens on any equipment financed under the loan agreement; make or permit any payment on specified subordinated debt; and pay dividends. In addition, under the Agreement, subject to certain exceptions, the Company is required to maintain with the lender its primary operating, other deposit and securities accounts. Furthermore, under the Amendment, the Company is required to be in compliance with healthcare laws and regulations and terms and conditions of healthcare permits. The Company was in compliance with all covenants under the Agreement, as amended, as of December 31, 2016.

As of December 31, 2016, amounts due under the Agreement include \$1,734,005 in current liabilities, which include \$265,995 of current portion of debt discount, and \$12,943,825 in long-term liabilities, which include \$192,171 of final fee premium accretion and \$248,346 of debt discount. The Company recorded \$1,563,049 in interest expense related to the Agreement during the year ended December 31, 2016. Closing costs are being accreted over the life of the loan to interest expense.

Future maturities of long-term debt at December 31, 2016 are as follows:

2017	\$	2,000,000
2018		6,000,000
2019		6,000,000
2020		1,000,000
Total principal		15,000,000
Less discount		(514,341)
Plus final fee premium accretion		192,171
Total long-term obligations	\$	14,677,830

## 9. Income Taxes

At December 31, 2016, Trovagene had federal net operating loss carryforwards (NOLs) of approximately \$106.7 million, which, if not used, expire beginning in 2020. Trovagene also has California NOLs of approximately \$87.4 million that will begin to expire in 2021. Trovagene's fully owned foreign subsidiary has an NOL carryover of \$0.4 million. Trovagene also has research and development tax credits available for federal and California purposes of approximately \$2.0 million and \$0.8 million, respectively. The federal research and development tax credits will begin to expire on January 31, 2025. The California research and development tax credits are not set to expire. The utilization of these NOLs and research and development tax credits is subject to limitations based on past and future changes in ownership of Trovagene pursuant to Section 382 ("Section 382") of the Internal Revenue Code of 1986, as amended (the "Code"). The Company has determined that ownership changes have occurred for purposes of Section 382 and, therefore, the ability of the Company to utilize its NOLs is limited.

The provision for income taxes based on losses from continuing operations consists of the following at December 31 (in thousands):

	Years ended December 31,		
	2016	2015	2014
<b>Deferred benefit</b>			
Federal	\$ (14,035)	\$ (9,602)	\$ (5,651)
State	(2,443)	(1,742)	(449)
Foreign	(114)	—	—
<b>Total deferred benefit</b>	<b>(16,592)</b>	<b>(11,344)</b>	<b>(6,100)</b>
Valuation allowance	16,592	11,344	6,100
<b>Total income tax provision</b>	<b>\$ —</b>	<b>\$ —</b>	<b>\$ —</b>

Significant components of the Company's taxes and the rates as of December 31 are shown below (in thousands, except percentages):

	Years ended December 31,			
	2016		2015	
Tax computed at the federal statutory rate	\$ (13,206)	34 %	\$ (9,340)	34 %
State tax, net of federal tax benefit	(2,286)	6 %	(1,559)	6 %
Foreign Tax	(114)	— %	—	— %
Permanent Items	(114)	— %	258	(1)%
Tax credits	(1,276)	3 %	(997)	3 %
Valuation allowance increase	16,996	(43)%	11,638	(42)%
<b>Provision for income taxes</b>	<b>\$ —</b>	<b>— %</b>	<b>\$ —</b>	<b>— %</b>

Significant components of the Company's deferred tax assets and liabilities from federal and state income taxes as of December 31 are shown below (in thousands):

	Years ended December 31,	
	2016	2015
<b>Deferred tax assets</b>		
Tax loss carryforwards	\$ 41,502	\$ 27,962
Research and development credits and other tax credits	2,817	1,698
Stock-based compensation	4,658	3,225
Other	1,283	782
<b>Total deferred tax assets</b>	<b>50,260</b>	<b>33,667</b>
Valuation allowance	(50,260)	(33,667)
<b>Net deferred tax asset</b>	<b>\$ —</b>	<b>\$ —</b>

Trovagene records a valuation allowance against deferred tax assets to the extent that it is more likely than not that some portion, or all of, the deferred tax assets will not be realized. Due to the substantial doubt related to Trovagene's ability to utilize its deferred tax assets, the Company recorded a valuation allowance against the deferred tax.

FASB ASC Topic 740-10-30-7, *Accounting for Income Taxes* had no effect on Trovagene's financial position, cash flows or results of operations upon adoption, as Trovagene does not have any unrecognized tax benefits. Trovagene's practice is to recognize interest and/or penalties related to income tax matters in income tax expense, and none have been incurred to date.

## 10. Commitments and Contingencies

### *Research and Development and License Agreements*

The Company has entered into a variety of collaborative research and specimen transfer agreements relating to its development efforts. Included in research and development expense, the Company has incurred and recorded approximately \$2,535,000, \$1,362,000, and \$712,000 as of December 31, 2016, 2015 and 2014, respectively, relating to services provided by the collaborators in connection with these agreements.

The Company is a party to various agreements under which it licenses technology on an exclusive basis in the field of human diagnostics. License fees are generally calculated as a percentage of product revenues, with rates that vary by agreement. To date, payments have not been material.

### *Collaborative Arrangement*

In November 2016, the Company entered into a collaborative arrangement with Boreal to co-develop urine and blood ctDNA assay kits and systems and to globally distribute assay kits for use on the Boreal OnTarget™ system in blood and exclusively urine. The Company is accounting for the joint development and commercialization activities with this third party as a joint risk sharing collaboration in accordance with ASC Topic 808, *Collaborative Arrangements* (“ASC Topic 808”). ASC Topic 808 defines a collaborative arrangement as an arrangement where the parties are active participants and have exposure to significant risks. Under the terms of an agreement with Boreal, the Company is committed to make two milestone payments totaling \$1.0 million for licensing and distribution rights. The Company paid the first milestone payment of \$500,000 in December 2016 and the second milestone payment will be made upon the achievement of certain research and development objectives but no later than January 1, 2018. As of December 31, 2016, the Company has incurred and recorded approximately \$475,000 in research and development expenses in connection with this collaborative arrangement.

### *Litigation*

Trovagene does not believe that the Company has legal liabilities that are probable or reasonably possible that require either accrual or disclosure, except for the following: On March 28, 2016 the Company filed a complaint in the Superior Court of the State of California for the County of San Diego against the Company’s former CEO and CFO, for, among other things, breach of fiduciary duty for failing to present a lucrative corporate opportunity to the Company concerning promising new therapeutics in the field of precision medicine and instead taking that opportunity for their own personal benefit. The complaint asks that these two former executives be required to turn over their interests in these new therapeutics to the Company. The former CEO and CFO filed a cross complaint in the Superior Court of the State of California for the County of San Diego against the Company on May 23, 2016 for, among other things, breach of contract. The parties are currently engaged in the discovery process. From time to time, the Company may become involved in various lawsuits and legal proceedings that arise in the ordinary course of business. However, litigation is subject to inherent uncertainties, and an adverse result in these or other matters may arise from time to time that may harm the Company’s business.

### *Employment and Consulting Agreements*

The Company has longer-term contractual commitments with various consultants and employees. Certain employment agreements provide for severance payments.

### *Lease Agreements*

The Company currently leases approximately 26,100 square feet facilities in San Diego under an operating lease that expires on December 31, 2021 at a monthly rental rate of approximately \$68,000. The Company also leases certain lab and office space in Torino, Italy, of approximately 2,300 square feet at a monthly rental rate of approximately \$3,100. The lease is for a period of three years and expires December 31, 2018. Rent expense for the years ended December 31, 2016, 2015, and 2014 was approximately \$602,000, \$471,000 and \$315,000, respectively.

The Company is also a party to various non-cancelable operating lease agreements for office equipment.

Total annual commitments under non-cancelable lease agreements for each of the years ended December 31 are as follows:

2017	\$	896,050
2018		918,751
2019		906,879
2020		931,457
2021		959,401
Thereafter		—
Total(1)	\$	4,612,538

(1) This amount has not been reduced by sublease income of \$306,066.

#### *Public Offering and Controlled Equity Offering*

On May 27, 2016 the Company filed a Form S-3 Registration Statement to offer and sell in one or more offerings, any combination of common stock, preferred stock, debt securities, warrants, or units having an aggregate initial offering price not exceeding \$250,000,000. The preferred stock, debt securities, warrants, and units may be convertible or exercisable or exchangeable for common stock or preferred stock or other Trovogene securities. This form was declared effective on June 13, 2016. The Company has an agreement with the Agent on January 25, 2013 to issue and sell up to \$30,000,000 of shares of common stock through the Agent. As payment for its services, the Agent is entitled to a 3% commission on gross proceeds. Gross proceeds of \$2.4 million have been raised since the date of effectiveness of the Form S-3 on June 13, 2016.

#### *Database Usage*

In March 2016 the Company entered into an agreement with an outside vendor to develop an online database for test requisition and test results. Under the agreement, the Company is obligated to pay a fixed development fee, and a usage fee each time an external user completes and submits a test order form to the database. To date, the Company has paid the fixed development fee, but has incurred no costs in connection with the usage fees.

### **11. Employee Benefit Plan**

The Company has a retirement savings plan under Section 401(k) of the Code covering its employees. The plan allows employees to defer, up to the maximum allowed, a percentage of their income on a pre-tax basis through contributions to the plans, plus any employee age 50 and over can participate in the caught-up dollars as allowed by Internal Revenue Service codes. The Company also has a Roth investment plan that is taken after taxes. The Company does not currently make matching contributions.

### **12. Restructuring Charges**

On December 13, 2016, the Company announced a strategic restructuring plan that allows it to concentrate on the distribution of kits and systems to be utilized by research institutions, cancer centers, and clinical service facilities for research use around the world. This restructuring plan included a reduction in force and has been completed as of December 31, 2016. The Company incurred approximately \$790,000 in restructuring charges, which has been included as a component of operating loss for the year ended December 31, 2016. Restructuring charges include approximately \$358,000 of costs related to termination of employees, which is net of a \$60,000 stock-based compensation expense reversal for certain terminated employees. The remaining restructuring charges of approximately \$432,000 were related to the impairment of an abandoned software development project. Of the total restructuring expenses recorded, approximately \$418,000 remains to be paid as of December 31, 2016 and is included in accrued liabilities on the Company's consolidated balance sheet.

### **13. Related Party Transactions**

In March 2016, the Company engaged Rutan & Tucker, LLP, a law firm to represent Trovogene, Inc. with respect to various lawsuits. One of the partners from Rutan & Tucker, LLP, is the son of the Company's Chairman of the Board. The fees for legal services are based on the hourly rates of the individuals performing the legal services. During the year ended December 31, 2016, the Company incurred and recorded approximately \$537,000 of legal expenses for services performed by Rutan & Tucker, LLP.

In September 2015, the Company entered into a research agreement with the University of Torino (“University”) to collaborate on a program of research to develop, optimize and test molecular profiling tools for plasma and urine ctDNA in cancer. Dr. Alberto Bardelli, the Principal Investigator of the University who oversees this research program, is also a member of the Scientific Advisory Board of the Company. Under the agreement, the Company committed to pay up to \$743,000 for the services performed by the University. In addition, the Company may pay royalties to the University on revenue generated by the Company from the commercialization of any tools developed during the collaboration. During the years ended December 31, 2016 and 2015, the Company incurred and recorded approximately \$540,000 and \$188,000 of research and development expenses related to the agreement, respectively. No royalty expense has been incurred as of December 31, 2016.

#### 14. Selected Quarterly Financial Data (Unaudited)

The following is a summary of the quarterly results of operations of the Company for years ended December 31, 2016 and 2015:

	Quarter Ended(1)			
	March 31	June 30	September 30	December 31
(dollars in thousands, except per share data)				
<b>2016</b>				
Revenues	\$ 120	\$ 104	\$ 89	\$ 68
Operating expenses	\$ 10,579	\$ 10,084	\$ 10,013	\$ 9,850
Net loss attributable to common stockholders	\$ (10,269)	\$ (10,208)	\$ (10,197)	\$ (8,554)
Net loss per common share - basic	\$ (0.35)	\$ (0.34)	\$ (0.34)	\$ (0.28)
Net loss per common share - diluted	\$ (0.36)	\$ (0.34)	\$ (0.34)	\$ (0.34)
Shares used in the calculation of net loss attributable to common stockholders - basic	29,755,184	29,958,037	30,339,774	30,639,440
Shares used in the calculation of net loss attributable to common stockholders - diluted	30,108,377	29,958,037	30,339,774	30,711,946
<b>2015</b>				
Revenues	\$ 127	\$ 49	\$ 58	\$ 79
Operating expenses	\$ 4,975	\$ 6,682	\$ 6,467	\$ 7,463
Net loss attributable to common stockholders	\$ (7,180)	\$ (10,186)	\$ (2,742)	\$ (7,387)
Net loss per common share - basic	\$ (0.33)	\$ (0.41)	\$ (0.10)	\$ (0.25)
Net loss per common share - diluted	\$ (0.33)	\$ (0.41)	\$ (0.23)	\$ (0.26)
Shares used in the calculation of net loss attributable to common stockholders - basic	21,817,710	24,592,883	28,560,211	29,723,254
Shares used in the calculation of net loss attributable to common stockholders - diluted	21,817,710	24,592,883	29,128,235	30,157,038

(1) Basic and diluted net loss per common share are computed independently for each of the periods presented. Accordingly, the sum of the quarterly net loss per common share amount may not agree to the total for the year.

#### 15. Subsequent Events

On March 13, 2017, the Company entered into a license agreement with Nerviano Medical Sciences, S.r.l., a leading oncology discovery organization (“Nerviano”), that grants the Company exclusive global development and commercialization rights to NMS-1286937, which the Company refers to as PCM-075. PCM-075 is an oral, investigative drug and a highly selective adenosine triphosphate (ATP) competitive inhibitor of the serine/threonine polo-like-kinase 1 (PLK 1). Pursuant to the license agreement, the Company will assume sole responsibility for global development and commercialization of PCM-075. Trovogene will pay Nerviano an upfront payment of \$2.0 million, as well as development and regulatory-based milestone

[Table of Contents](#)

payments and royalty payments on future net sales of PCM-075. Nerviano is the current manufacturer of bulk and finished drug for PCM-075 and the Company has all rights to manufacture bulk and finished goods.

On March 15, 2017, in connection with the addition of precision medicine therapeutics to its business, the Company announced a restructuring which the Company estimates will reduce annual pre-tax expenses by approximately \$8.0 million per year, primarily through a reduction of approximately 30 employees and expenses primarily linked to research, clinical studies, and operations.

The Company plans to continue providing access to its ctDNA collection, extraction and analysis technology in urine and blood to strategic accounts, including pharmaceutical companies and third party reference laboratories, by internal strategic executives. The Company intends to maintain its CLIA/CAP-certified laboratory for clinical testing services for pharmaceutical companies, third party reference laboratories and physicians and for internal programs.

**CERTAIN PORTIONS OF THIS EXHIBIT HAVE BEEN OMITTED BASED UPON A REQUEST FOR CONFIDENTIAL TREATMENT AND THE NON-PUBLIC INFORMATION HAS BEEN FILED WITH THE SECURITIES AND EXCHANGE COMMISSION**

LICENSE AGREEMENT

THIS LICENSE AGREEMENT (this “Agreement”) dated as of March 13, 2017 (the “Effective Date”), between NERVIANO MEDICAL SCIENCES S.r.l., an Italian corporation (“Nerviano”), having a place of business at viale Pasteur, 10, 20014 Nerviano, Italy, and TROVAGENE, Inc., a Delaware corporation with offices at 11055 Flintkote Avenue, San Diego, CA 92121 USA (“Trovagene”). A “Party” shall mean either of Nerviano and Trovagene and “Parties” shall mean both Nerviano and Trovagene.

WHEREAS, Nerviano is developing compounds for the treatment of oncology diseases and owns or has rights in the API and Licensed IP Rights (as each is defined below).

WHEREAS, Trovagene has capabilities in the development of oncology products and desires to obtain an exclusive license under Nerviano’s rights in the API and Licensed IP Rights on the terms and conditions set forth below.

NOW, THEREFORE, in consideration of the foregoing premises and the mutual covenants herein contained, the Parties hereby agree as follows:

1 DEFINITIONS

For purposes of this Agreement, the terms defined in this Section 1 shall have the respective meanings set forth below:

1.1 “Acquirer” shall mean a Pharmaceutical Company that after the Execution Date acquires control of Trovagene as a result and upon consummation, of a Change of Control, where “Pharmaceutical Company” means any entity that, directly or through one or more of its Affiliates, is involved in the business of researching, testing, developing, manufacturing, packaging, marketing, distributing or selling medical devices, medical diagnostic products, or pharmaceutical or medicinal products, formulations or compounds.

1.2 “Annual Net Sales” means, with respect to a Product, on a Product-by- Product basis, the total aggregate Net Sales of such Product by Trovagene and any of its Affiliates and Sublicensees in the Territory in any relevant calendar year.

1.3 “Affiliate” shall mean, with respect to a Party, a person, corporation, partnership, or other entity that controls, is controlled by or is under common control with such Party, provided that, with respect to Nerviano, Affiliate includes a person, corporation, partnership, or other entity that is controlled by Nerviano and/or NMS Group S.r.l., or is under common control with Nerviano. For the purposes of this definition, (i) an Affiliate is considered an Affiliate regardless of whether such Affiliate is an Affiliate on the Effective Date or becomes an Affiliate after the Effective Date and (ii) the word “control” (including, with correlative meaning, the terms “controlled by” or “under the common control with”) means the actual power, either directly or indirectly through one (1) or more intermediaries, to direct or cause the direction of the management and policies of such entity either by the ownership of at least fifty percent (50%) of the voting stock of such entity or the ability to otherwise control the management of the corporation.

1.4 “API” shall mean the small molecule that binds to and inhibits Polo Like Kinase-1, “PLK-1” and that is specifically disclosed and generically described in Nerviano Patent Case NMS 021+1 such as the molecule known internally at Nerviano as NMS-1286937 (NMS-P937) with the chemical structure set forth on **Exhibit 1.4**, together with its pharmaceutically acceptable salts, esters, ethers, hydrates, isomers, mixtures of isomers, complexes or derivatives.

1.5 “Change of Control” shall mean the occurrence of any of the following after the Effective Date:

- (a) a transaction or series of related transactions that results in the sale, transfer or other disposition of all or substantially all of Trovagene’s assets;
- (b) a merger or consolidation in which Trovagene is not the surviving corporation or in which, if Trovagene is the surviving corporation, the beneficial owners of the outstanding voting securities of Trovagene immediately prior to the consummation of



such merger or consolidation do not, immediately after consummation of such merger or consolidation, beneficially own, directly or indirectly, stock or other securities of Trovogene that possess fifty percent (50%) or more of the voting power of all Trovogene's outstanding stock and other securities and the power to elect a majority of the members of Trovogene's board of directors;

(c) a transaction or series of related transactions (which may include, without limitation, a tender offer for Trovogene's stock or the issuance, sale or exchange of stock of Trovogene) whereby the beneficial owners of the outstanding voting securities of Trovogene immediately prior to such transaction or series of transactions do not, immediately after consummation of such transaction or any of such related transactions, own stock or other securities of Trovogene that possess fifty percent (50%) or more of the voting power of all Trovogene's outstanding stock and other securities and the power to elect a majority of the members of Trovogene's board of directors; or

(d) the acquisition (whether in a single transaction or series of related transactions) after the Effective Date by a Third Party or Group (as such term is defined in the Securities Exchange Act of 1934, as amended) of beneficial ownership of fifty percent (50%) or more of Trovogene's voting securities or other securities, indebtedness or other rights convertible into such voting securities; *provided*, that a Change of Control shall not include any transaction or series of transactions solely for *bona fide* financing purposes in which cash is received by Trovogene or indebtedness of Trovogene is cancelled or converted or a combination thereof for so long as the Third Party or Group acquiring such ownership does not then or thereafter have any other relationship with Trovogene other than such financing arrangement, including any arrangement involving the development, manufacture or commercialization of a Product.

1.6 "Commercially Reasonable Efforts" means, as applied to Trovogene, its Affiliate or a Sublicensee, those efforts and resources that a company within the bio-pharmaceutical industry at a similar stage of development as Trovogene, such Affiliate or such Sublicensee, as applicable, would use for a compound or product with similar market and/or commercialization prospects at a similar stage in its product life cycle, taking into account the stage of development or commercialization of the compound or product, the cost-effectiveness of efforts or resources, the competitiveness of alternative compounds or products that are or are expected to be in the marketplace, the patent and other proprietary position of the compound or product, the profitability of the compound or product.

1.7 "Competent Authority(ies)" shall mean, collectively, (a) the governmental entities in each country or supranational organization that is responsible for the regulation of any Product or the establishment, maintenance and/or protection of rights related to the Licensed IP Rights (including the FDA, the EMA and the MHLW), or (b) any other applicable regulatory or administrative agency in any country or supranational organization that is comparable to, or a counterpart of, the foregoing.

1.8 "Competing Product" means any small molecule that has a binding affinity for PLK-1 and is specifically developed, directed or clinically tested against PLK-1, and that is not an API.

1.9 "Confidential Information" means all embodiments of Nerviano Licensed IP Rights and all other information disclosed, directly or indirectly, by one Party to the other during the Term of this Agreement or prior to the Effective Date, that is identified as confidential or is customarily regarded as confidential within the pharmaceutical industry, whether disclosed in electronic, tangible, oral or visual form. Without limiting the generality of the foregoing, Trovogene's Confidential Information includes the Royalty Reports made by Trovogene to Nerviano under Article 5 of this Agreement. Confidential Information shall not include such information that: (a) was or becomes generally available to the public other than as a result of an unauthorized disclosure by a Party hereto or any of such Party's Affiliates, employees, agents or representatives; (b) was or becomes available to a Party hereto on a non-confidential basis from a source other than (in the case of future information) any other Party hereto (or any of such Party's Affiliates, employees, agents or representatives); *provided* that such source was not known to be bound by any agreement to keep such information confidential or otherwise prohibited from transmitting the information by a contractual, legal or fiduciary obligation; or (c) is independently developed by any Party hereto without the use of or reference to the Confidential Information of the other Party hereto or any of such other Party's Affiliates. Information that is otherwise Confidential Information and consists of a combination of information shall not be deemed to be in the public domain if individual elements of such information are in the public domain, unless the specific combination of those elements is also in the public domain.

1.10 "Control" or "Controlled" with respect to intangible or intellectual property rights (including patent rights, know-how, trade secrets and rights to access or cross-reference regulatory filings) means possession of the right to grant a license or sublicense hereunder without violating the terms of any agreement or other arrangement with any Third Party existing at the time the applicable Party would be first required hereunder to grant the other Party such license or sublicense.

- 1.11 “Development” means all studies and other activities required to be conducted prior to NDA Approval, including non-clinical testing, clinical studies, packaging and regulatory affairs, and any clinical or other studies required to be conducted after NDA Approval as a condition to approval of an NDA.
- 1.12 “Development Data” means all non-clinical and clinical data (including raw data, analyses and reports), including pharmacological, pharmaceutical, pharmacokinetic and toxicological data, relating to either API or Product that is Controlled at any time during the term of this Agreement by either Party or their Affiliates, including all such data generated by a CRO for a Party.
- 1.13 “Development Plan” means the plan for Development of the Product established by the JDC, as such plan is further defined in Section 7.7. An initial Development Plan is outlined in **Exhibit 1.13**.
- 1.14 “Early Development Term” means the \* from the Effective Date.
- 1.15 “EMA” shall mean the European Agency for the Evaluation of Medicinal Products of the European Union, or the successor thereto.
- 1.16 “FDA” shall mean the Food and Drug Administration of the United States, or the successor thereto.
- 1.17 “Field” shall mean all fields of use, including the diagnosis, prevention or treatment of any disease, state or condition in humans or other animals.
- 1.18 “First Commercial Sale” shall mean, with respect to any Product, the first sale of such Product to an end user after all necessary marketing and pricing approvals (if any) have been granted by the applicable governing health authority of such country.
- 1.19 “Inventions” shall mean any invention, improvement, modification, know-how, information or other technology that is first conceived by either or both of the Parties pursuant to work conducted under the Development Plan.
- 1.20 “Licensed IP Rights” shall mean, collectively, the Nerviano Patents and the Nerviano Know-How.
- 1.21 “Major Market Countries” shall mean \* and any one of the following \* Countries, as determined by Trovogene in its sole discretion: \*, as well as any of \* or \*.
- 1.22 “MHLW” shall mean the Ministry of Health, Labour and Welfare of Japan, or the successor thereto.
- 1.23 “NDA” shall mean a New Drug Application, or similar application for marketing approval of a Product submitted to the FDA, EMA or MHLW, or any comparable Competent Authority.

[\*] Certain information on this page has been omitted and filed separately with the Securities and Exchange Commission. Confidential treatment has been requested with respect to the omitted portion.

- 1.24 “Nerviano Know-How” shall mean all trade secrets and other know-how rights in and to all data, information, regulatory correspondence, compositions and other technology (including, but not limited to formulae, procedures, protocols, techniques and results of experimentation and testing) that are (a) controlled by Nerviano or its Affiliates as of the Effective Date or at any time during the term of this Agreement and (b) are necessary or useful for Trovogene to make, use, develop, sell or seek regulatory approval to market a composition, or to practice any method or process, at any time claimed or disclosed in any issued patent or pending patent application within the Licensed Patent Rights or that otherwise relate to the API or its manufacture or use.
- 1.25 “Nerviano Patents” shall mean the patents that are Controlled by Nerviano or its Affiliates as of the Effective Date or at any time during the term of this Agreement and are (a) the patents and patent applications listed on Exhibit 1.25 together with any After-Developed Nerviano Inventions, (b) all patents and patent applications in any country of the world that claim or cover the API, or the manufacture or use thereof, and in which Nerviano or its Affiliates heretofore or hereafter has an ownership or (sub)licensable interest, (c) all divisions, continuations, continuations-in-part, that claim priority to, or common priority with, the patent applications described in clauses (a) and (b) above or the patent applications that resulted in the patents described in clauses (a) and (b) above, and (d) all patents that have issued or in the future issue from any of the foregoing patent applications, including utility, model and design patents and certificates of invention, together with any reissues, renewals, extensions or additions thereto.

1.26 “Net Sales” means the gross amount invoiced on sales of the Product by Trovogene, or its Affiliates or Sublicensees, to unrelated Third Parties less deductions for the following items, as allocable to such Product (if not previously deducted from the amount invoiced) and consistent with customary business practices:

- (a) any rebates, quantity, trade and cash discounts;
- (b) charge-back payments and rebates granted to managed health care organizations or to federal, state, and local governments, their respective agencies, purchasers, or reimbursers, including mandatory rebates;
- (c) retroactive price reductions, credits or allowances actually granted upon rejections or returns of Products, including for recalls or damaged goods;
- (d) a reasonable allowance for bad debts relating to the Product, taken in accordance with U.S. Generally Accepted Accounting Principles, consistently applied;
- (e) freight, insurance, data and other charges or fees related to the shipping or handling of Licensed Products or services provided in connection with the shipping or handling of Licensed Products (to the extent borne by the Party) and inventory management fees, discounts or credits; *provided* that the cumulative annual amount of such deductions under this paragraph (e) shall not exceed three percent (3%) of the cumulative annual gross sales; and
- (f) sales taxes, excise taxes, use taxes, tariffs and import/export duties, or other governmental charges actually due or incurred with respect to such sales, including value-added taxes.

All such discounts, allowances, credits, rebates and other deductions shall be fairly and equitably allocated to the Product and other products or services of Trovogene, and its Affiliates or Sublicensees, such that the Product does not bear a disproportionate portion of such deductions. The transfer of Product by Trovogene to an Affiliate or Sublicensee of Trovogene shall not be considered a sale. Every other commercial use or disposition of a Product by Trovogene or its Sublicensees in barter or other transactions (other than dispensing of reasonable and customary quantities of promotional samples, for testing or trials, or for compassionate use) shall be considered a sale of such Product at the weighted average Net Sales price for such Product during the preceding quarter.

Where the consideration for Licensed Products includes any non-cash element, the Net Sales applicable to any such transaction shall be the fair market value for the applicable quantity for the period in question in the applicable country of the Territory. The fair market value shall be determined, wherever possible, by reference to the average selling price of the relevant Product in arm's length transactions in the relevant country.

If a Product is sold in a package or formulated in combination with one or more other active ingredients that are not API (as used in this definition of Net Sales, a “**Combination Product**”), then for each quarter payment period and on a country-by-country basis, the gross amount invoiced for that Product shall be calculated by multiplying the gross amount invoiced for such Combination Product by the fraction  $A/(A+B)$ , where “A” is the gross amount invoiced for the Product sold separately and “B” is the gross amount invoiced for the other active ingredient(s) sold separately. If the other active ingredient is not sold separately, then the gross amount invoiced for that Product shall be calculated by multiplying the gross amount invoiced for the Combination Product by the fraction  $A/C$ , where “A” is the gross invoice amount for the Product, if sold separately, and “C” is the gross invoice amount for the Combination Product. If a particular Combination Product is not addressed by the foregoing, Net Sales for royalty determination shall be determined by the Parties in good faith.

1.27 “Non-Royalty Income” means any and all consideration in any form provided by a Sublicensee to Trovogene or any of its Affiliates for a grant of a sublicense under any of the Licensed IP Rights including without limitation any up-front license fees, license issue fees, maintenance fees, milestone payments, and the fair market value of any non-cash consideration, but excluding (a) royalty payments, (b) amounts received to reimburse Trovogene’s costs to perform research, development or similar services, (c) reimbursement of patent or other out-of-pocket expenses, and (d) the purchase of any debt or securities of Trovogene at a price up to one hundred percent (100%) of the then fair market value of such debt or securities (any amounts paid by a Sublicensee that represent a premium for such debt or securities shall be included in Non-Royalty Income).

1.28 “Person” shall mean an individual, corporation, partnership, limited liability company, trust, business trust, association, joint stock company, joint venture, pool, syndicate, sole proprietorship, unincorporated organization, governmental authority or any other form of entity not specifically listed herein.

- 1.29 “Phase I Clinical Trial” shall mean a human clinical trial that is intended to initially evaluate the safety and/or pharmacological effect of a Product in subjects or that would otherwise satisfy requirements of 21 C.F.R. 312.21(a), or its foreign equivalent.
- 1.30 “Phase II Clinical Trial” shall mean a human clinical trial in any country that is intended to initially evaluate the effectiveness of a Product for a particular indication or indications in patients with the disease or indication under study or would otherwise satisfy requirements of 21 CFR 312.21(b), or its foreign equivalent.
- 1.31 “Phase III Clinical Trial” shall mean a human clinical trial including registration enabling Phase II Clinical Trials or equivalent, in any country, the results of which could be used to establish safety and efficacy of a Product as a basis for an NDA or would otherwise satisfy requirements of 21 CFR 312.21(c), or its foreign equivalent.
- 1.32 “Product(s)” shall mean any product that incorporates the API and if made, used, sold, offered for sale or imported absent the license granted hereunder would infringe a Valid Claim, or that otherwise uses or incorporates the Nerviano Know-How.
- 1.33 “Registration(s)” shall mean any and all permits, licenses, authorizations, registrations or regulatory approvals (including NDAs) required and/or granted by any Competent Authority as a prerequisite to the development, manufacturing, packaging, marketing and selling of any product.
- 1.34 “Royalty Term” shall mean, with respect to each Product in each country, the earlier of of (a) term for which a Valid Claim remains in effect and would be infringed but for the license granted by this Agreement, by the use, offer for sale, sale or import of such Product in such country, and (b) the commercialization of a generic compound with the same or substantially similar API in such country.
- 1.35 “Sublicense Agreement” means any agreement or set of agreements under which Trovogene grants a Sublicensee a sublicense, option or other right allowing such Sublicensee to develop, use and distribute or sell the Product. A distributor agreement shall not be a Sublicense Agreement.
- 1.36 “Sublicensee” means an Affiliate or Third Party to whom Trovogene or a Trovogene Sublicensee grants a sublicense under any Licensed IP Rights to develop, use, distribute or sell the Product in the Territory, or otherwise grants any right to develop, promote, distribute and sell the Product in the Territory. A distributor shall not be a Sublicensee.
- 1.37 “Supply Agreement” means an agreement that may be entered into between Trovogene and Nerviano after the Effective Date pursuant to which Nerviano produces Product for, and supplies Product to, Trovogene.
- 1.38 “Territory” shall mean the world.
- 1.39 “Third Party” shall mean any Person other than Nerviano, Trovogene and their respective Affiliates.
- 1.40 “Trovogene Know-How” means know-how that (a) is Controlled by Trovogene or its Affiliates as of the Effective Date or during the term of the Agreement and (b) is necessary or useful to develop, make, have made, use, sell, offer to sell, import, export, register and promote a Product in the Territory, but only to the extent that such know-how is related to the API or a Product or a method of using or manufacturing of the API or Product.
- 1.41 “Trovogene Patents” means the patents and patent applications (including provisional applications, continuations, divisionals and continuations-in-part) that are Controlled by Trovogene or its Affiliates as of the Effective Date or at any time during the Term of this Agreement that, in each case, claim the API, a Product or their method of formulation, manufacture or use, and all patents issuing therefrom (and all substitutions, reissues, renewals, reexaminations, supplementary protection certificates, extensions, registrations and confirmations of any of the foregoing patents).
- 1.42 “Valid Claim” shall mean a claim of an issued and unexpired patent included within the Licensed IP Rights, which has not been held permanently revoked, unenforceable 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 which has not been admitted to be invalid or unenforceable through reissue or disclaimer or otherwise.
- 1.43 Interpretation

- (a) Whenever any provision of this Agreement uses the term “including” (or “includes”), such term shall be deemed to mean “including without limitation” and “including but not limited to” (or “includes without limitations” and “includes but is not limited to”) regardless of whether the words “without limitation” or “but not limited to” actually follow the term “including” (or “includes”);
- (b) “Herein,” “hereby,” “hereunder,” “hereof” and other equivalent words shall refer to this Agreement as an entirety and not solely to the particular portion of this Agreement in which any such word is used;
- (c) The recitals set forth at the start of this Agreement, along with the Exhibits and Schedules to this Agreement, and the terms and conditions incorporated in such recitals, Exhibits and Schedules shall be deemed integral parts of this Agreement and all references in this Agreement to this Agreement shall encompass such recitals, Exhibits and Schedules and the terms and conditions incorporated in such recitals, Exhibits and Schedules;
- (d) Unless otherwise provided, all references to Sections, Articles, Schedules and Exhibits in this Agreement are to Sections, Articles, Schedules and Exhibits of and to this Agreement;
- (e) All references to days, months, quarters or years are references to calendar days, calendar months, calendar quarters or calendar years;

Any reference to any federal, national, state, local or foreign statute or law shall be deemed to also refer to all rules and regulations promulgated thereunder, unless the context requires otherwise.

## 2 REPRESENTATIONS AND WARRANTIES

2.1 Mutual Representations and Warranties. Each Party hereby represents and warrants to the other Party as of the Effective Date as follows:

- (a) Such Party is a corporation duly organized, validly existing and in good standing under the laws of the jurisdiction in which it is incorporated.
- (b) Such Party (a) has the corporate power and authority and the legal right to enter into this Agreement and to perform its obligations hereunder, and (b) has taken all necessary corporate action on its part to authorize the execution and delivery of this Agreement and the performance of its obligations hereunder. This Agreement has been duly executed and delivered on behalf of such Party, and constitutes a legal, valid, binding obligation, enforceable against such Party in accordance with its terms.
- (c) All necessary consents, approvals and authorizations of all governmental authorities and other Persons required to be obtained by such Party in connection with this Agreement have been obtained.
- (d) The execution and delivery of this Agreement and the performance of such Party’s obligations hereunder (a) do not conflict with or violate any requirement of applicable laws or regulations, and (b) do not conflict with, or constitute a default under, any contractual obligation of it.

2.2 Additional Nerviano Representations and Warranties. Nerviano hereby represents and warrants to Trovogene that Nerviano (a) is the sole owner or exclusive licensee of the Licensed IP Rights, and that Nerviano has not granted to any Third Party any license or other interest in the Licensed IP Rights, (b) is not aware of any Third Party patent, patent application or other intellectual property rights that would be infringed (i) by practicing any process or method or by making, using or selling any composition which is claimed or disclosed in the Nerviano Patents or which constitutes Nerviano Know-How or (ii) by making, using or selling Products, (c) is not aware of any infringement or misappropriation by a Third Party of the Licensed IP Rights, (d) all inventors of the inventions claimed in the Nerviano Patents have assigned all their right, title and interest in and to such inventions to Nerviano; (e) Nerviano has delivered to Trovogene all relevant regulatory materials, including all data and patient records, and such materials are accurate and complete in all material respects; and (f) can secure supply of sufficient clinical grade API (more than \* kg) to enable Trovogene to start phase I/II clinical trials within \* months from the Effective Date in the Major Market Countries.

2.3 Additional Trovogene Representations and Warranties. Trovogene hereby further represents and warrants to Nerviano that as of the Effective Date, no Pharmaceutical Company owns more than five (5) percent of Trovogene’s currently outstanding and fully diluted shares of stock or other securities of Trovogene, indebtedness or options, warrants or other rights convertible into such securities, nor has entered into any agreement or other arrangement to acquire any such securities or other rights.

[\*] Certain information on this page has been omitted and filed separately with the Securities and Exchange Commission. Confidential treatment has been requested with respect to the omitted portion.

2.4 Disclaimer of Warranties. EXCEPT AS OTHERWISE EXPRESSLY PROVIDED IN THIS AGREEMENT OR MANDATED BY APPLICABLE LAW (WITHOUT THE RIGHT TO WAIVE OR DISCLAIM), NEITHER PARTY MAKES ANY REPRESENTATION OR WARRANTY WITH RESPECT TO THE PRODUCT, ANY TECHNOLOGY, GOODS, SERVICES, RIGHTS, THE SUCCESS OF EFFORTS CONTEMPLATED UNDER THIS AGREEMENT, OR OTHER SUBJECT MATTER OF THIS AGREEMENT AND HEREBY DISCLAIMS ALL WARRANTIES, CONDITIONS OR REPRESENTATIONS OF ANY KIND, EXPRESS OR IMPLIED, INCLUDING IMPLIED WARRANTIES OF PERFORMANCE, MERCHANTABILITY, SATISFACTORY QUALITY, FITNESS FOR A PARTICULAR PURPOSE OR NON-INFRINGEMENT OF THIRD PARTY INTELLECTUAL PROPERTY RIGHTS.

### 3 LICENSE GRANT; EXCLUSIVITY

#### 3.1 Licensed IP Rights.

(a) Nerviano hereby grant to Trovogene an exclusive (even as to Nerviano and its Affiliates) license (with the right to grant Sublicenses subject to Section 3.3) under the Licensed IP Rights to conduct research and to develop, make, have made, use, offer for sale, sell and import Products and otherwise exploit the Licensed IP Rights in the Territory for use in the Field.

(b) Nerviano hereby grants to Trovogene a royalty-free, non-exclusive license (with the right to grant Sublicenses subject to Section 3.3) under any patent, know-how or other intellectual property rights Controlled by Nerviano to research and to develop, make, have made, use, offer for sale, sell and import any diagnostic product for use with the Products.

3.2 Exclusivity. During the Royalty Term, neither Nerviano nor its Affiliates shall, directly or indirectly, initiate or conduct (or enable or license any Third Party to) research, develop and/or commercialize a Competing Product.

3.3 Sublicenses. Subject to the terms and consistent with the obligations of this Agreement, Trovogene shall have the right to grant sublicenses within the scope of the licenses under Section 3.1. For the avoidance of doubt, the right for Trovogene to grant a sublicense is intended to include the right to further sublicense provided that Trovogene shall remain responsible for and shall ensure that each Sublicensee (including any further permitted Sublicensee) complies with the terms and conditions of this Agreement. Trovogene or its Sublicensee shall promptly inform Nerviano in writing of all such further sublicenses.

3.4 Availability of the Licensed IP Rights and API. Nerviano shall promptly provide Trovogene with a copy of all information available to Nerviano relating to the Licensed IP Rights or API, including without limitation: (a) all quantities of the API (whether GMP or non-GMP), (b) all assays relating to PLK-1 (including diagnostic, pharmacology or release assays), (c) information and know-how regarding the manufacture or use of the API or otherwise relating to PLK-1, (d) regulatory submissions, (e) communications with the Competent Authorities (including the minutes of any meetings), (f) trial master files, including case report forms, (g) listings and tables of results from the clinical trials, (h) treatment-related serious adverse event reports from the clinical trials.

3.5 Registrations. Nerviano acknowledges and agrees that Trovogene shall own all Registrations for Products for use in the Field in each country in the Territory. After the Effective Date, Nerviano shall transfer to Trovogene all Registrations for Products. Nerviano hereby grants to Trovogene a free-of-charge right to reference and use and have full access to all other Registrations and all other regulatory documents that relate to the Licensed IP Rights or API, including INDs, BLAs, NDAs and DMFs (whether as an independent document or as part of any NDA, and all chemistry, manufacturing and controls information), and any supplements, amendments or updates to the foregoing (for the purposes of this Section, the "Right of Reference"). Trovogene shall have the right to (sub)license the Right of Reference to its sublicensees and Affiliates. Nerviano shall promptly notify Trovogene of any written or oral notices received from, or inspections by any Competent Authority relating to any such Registrations, and the Parties agree that Trovogene shall have the exclusive right to respond to any such written notices or inspections and the resolution of any issue raised by such Competent Authority. During the time that Nerviano is the holder of a Registration, Trovogene shall be entitled to attend any and all meetings and participate in telephone calls with the Competent Authorities, including without limitation any meeting preparation, meeting co-ordination and preparation of minutes.

4 FINANCIAL CONSIDERATIONS

4.1 License Fees. (a) Subject to the terms of this Agreement, including without limitation Section 10.1, upon ten (10) days after the Effective Date Trovogene shall pay to Nerviano a non-refundable, non- creditable initial fee of two Million United States Dollars (US \$ 2,000,000).

(b) In case of sublicensing of rights to or under any of the Licensed IP Rights during the Early Development Term, then Trovogene, in addition to the initial License fee as per Section 4.1(a), shall pay to Nerviano a further amount equal to \* percent (\*%) of any Non-Royalty Income received from the Sublicensee.

4.2 Royalties.

Trovogene shall pay to Nerviano the following royalties (“Royalties”):

4.2.1 During the applicable Royalty Term for a Product, on a Product-by-Product and country by country basis, subject to the terms and conditions of this Agreement, with respect to aggregate Annual Net Sales in the Territory by Trovogene and its Affiliates and Sublicensees, Trovogene shall pay to Nerviano Royalties equal to, for Annual Net Sales of such Product in countries where the sale of such Product is covered by a Valid Claim in such country, then:

(a) \* percent (\*%) of the first \* United States Dollars (US \$\*) of such Annual Net Sales,

(b) \* percent (\*%) of such Annual Net Sales in excess of \* United States Dollars (US \$\*) but less than \* United States Dollars (US \$\*), and

(c) \* percent (\*%) of such Annual Net Sales in excess of \* United States Dollars (US \$\*), and

[\*] Certain information on this page has been omitted and filed separately with the Securities and Exchange Commission. Confidential treatment has been requested with respect to the omitted portion.

Only one royalty shall be owing for a Product regardless of how many Valid Claims cover such Product.

4.2.2 Third Party Royalties. If Trovogene, its Affiliates or Sublicensees is required to pay royalties to any Third Party in order to exercise its rights hereunder to make, have made, use, sell, offer to sale or import any Product, then Trovogene shall have the right to credit \* percent (\*%) of such Third Party royalty payments against the Royalties owing to Nerviano under Section 4.2.1 with respect to sales of such Product in such country; provided, however, that Trovogene shall not reduce the amount of the Royalties paid to Nerviano under Section 4.2.1 by reason of this Section 4.2.2, with respect to sales of such Product in such country, to less than \* percent (\*%) of the Royalties that would otherwise be due under Section 4.2.1.

4.3 Milestone Payments. Trovogene shall pay to Nerviano the following amounts within thirty (30) days following the first achievement of the applicable milestone event as set forth below. Each milestone payment is due only one time.

4.3.1 Development Milestones

Payment

(in US Dollars)

Milestone Event

Dosing of the first subject in the first Phase III Clinical Trial for the first Product or after completion of a Phase II Clinical Trial that is used as the basis for an NDA submission.

\$ \*

Upon filing of the first NDA or equivalent for the first Product.

4.3.2 Commercial Milestones

\$\*

Payment

(in US Dollars)

Milestone Event

First Commercial Sale in \* for the first Product

\$\*

First Commercial Sale in \* or \* (whichever is first) for the first Product

\$\*

First Commercial Sale in \* for the first Product

\$\*

[\*] Certain information on this page has been omitted and filed separately with the Securities and Exchange Commission. Confidential treatment has been requested with respect to the omitted portion.

As from the marketing approval of the first Product, Trovagene may request Nerviano to consider the opportunity of paying one or more Commercial Milestone Payments present in this section 4.3.2 in lieu of cash, in registered common stock of Trovagene common shares, subject to mutual written agreement. The Parties will negotiate in good faith such request before the occurrence of the First Commercial Sale.

4.3.3 Net Sales Milestones

Trovagene would pay Nerviano the following one-time payments when Annual Net Sales of the Product in the Territory first reach the following thresholds:

Payment

(in US Dollars)

Milestone Event

Annual Net Sales of \$ \*

\$\*

Annual Net Sales of \$ \*

\$\*

4.4 Payment for Services. Prior to \*, Trovagene will purchase no less than \$\* of Services from Nerviano. Such "Services" could include, but are not limited to, provision of API under a Supply Agreement, technology transfer activities, preclinical or clinical activities, process development activities, assay development activities. The cost of such services shall be reasonably negotiated by both Parties.

5 ROYALTY REPORTS AND ACCOUNTING

5.1 Royalty Reports. Within sixty (60) days after the end of each calendar quarter during the term of this Agreement following the First Commercial Sale of a Product, Trovagene shall furnish to Nerviano a quarterly written report stating in reasonably specific detail (a) the gross sales of a Product sold by Trovagene, its Affiliates, Sublicensees or Acquiror, (b) the units sold by Trovagene, its Affiliates, Sublicensees or Acquiror and the calculation of Net Sales during such calendar quarter on a country by country basis; (c) the calculation of the royalties, if any, that shall have accrued based upon such Net Sales; (d) the withholding taxes, if any, required by law to be deducted with respect to such sales; and (e) the exchange rates, if any, used in determining the amount of United States Dollars. With respect to sales of Products invoiced in United States Dollars, the gross sales, Net Sales and royalties payable shall be expressed in

[\*] Certain information on this page has been omitted and filed separately with the Securities and Exchange Commission. Confidential treatment has been requested with respect to the omitted portion.



United States Dollars. With respect to Net Sales invoiced in a currency other than United States Dollars, such amounts shall be expressed both in the currency in which the distribution is invoiced and in the United States Dollar equivalent. The conversion of the foreign currencies to the United States Dollar equivalent shall be calculated using the daily average closing rates of exchange (local currency per US\$1) published by Reuters Ltd on the last business day of each month during the applicable calendar quarter

## 5.2 Audits.

5.2.1 Trovogene shall keep full and true books of accounts and other records in sufficient detail so that the Royalties payable hereunder can be properly ascertained. Upon the written request of Nerviano and not more than once in each calendar year, Trovogene shall permit an independent certified public accounting firm of nationally recognized standing selected by Nerviano and reasonably acceptable to Trovogene, at Nerviano's expense, to have access during normal business hours and upon reasonable notice to such books and financial records of Trovogene as may be necessary to determine the correctness of any Payment Report or payment made under this Agreement or to obtain information as to Royalties payable in case of failure to report or pay pursuant to the terms of this Agreement and as may be reasonably necessary to verify the accuracy of the payment reports hereunder for the eight (8) calendar quarters immediately prior to the date of such request (other than records for which Nerviano has already conducted an audit under this Section).

5.2.2 If such accounting firm concludes that additional amounts were owed during the audited period, Trovogene shall pay such additional amounts within thirty (30) days after the date Nerviano delivers to Trovogene such accounting firm's written report so concluding. The fees charged by such accounting firm shall be paid by Nerviano; provided, however, if the audit discloses that the royalties payable by Trovogene for such period are more than one hundred five percent (105%) of the royalties actually paid for such period, then Trovogene shall pay the reasonable fees and expenses charged by such accounting firm. Trovogene shall require each Sublicensee (whether an Affiliate or a Third Party) to extend to Nerviano the same audit rights as those described in this Section 5.2.

5.2.3 Nerviano shall cause its accounting firm to retain all financial information subject to review under this Section 5.2 in strict confidence; provided, however, that Trovogene shall have the right to require that such accounting firm, prior to conducting such audit, enter into an appropriate non-disclosure agreement with Trovogene regarding such financial information. The accounting firm shall disclose to Nerviano only whether the reports are correct or not and the amount of any discrepancy. No other information shall be shared. Nerviano shall treat all such financial information as Trovogene's Confidential Information.

## 6 PAYMENTS

6.1 All payments due under this Agreement shall be paid in immediately available funds in US Dollars to the bank account designated in writing by the Party receiving the payment. To the extent Net Sales are accrued in currencies other than US Dollars, Net Sales shall be converted to US Dollars at the daily average rates of exchange as published by Reuters Ltd for the applicable currency as of the last business day of the applicable monthly period in which the Net Sales are accrued.

6.2 Payment Terms Royalties shown to have accrued by each royalty report provided for under Section 5 shall be due on the date such royalty report is due. Payment of royalties in whole or in part may be made in advance of such due date.

6.3 Exchange Control. If at any time legal restrictions prevent the prompt remittance of part or all royalties with respect to any country in the Territory where the Product is sold, Trovogene shall have the right, in its sole discretion, to make such payments by depositing the amount thereof in local currency to Nerviano's account in a bank or other depository institution in such country. If the royalty rate specified in this Agreement should exceed the permissible rate established in any country, the royalty rate for sales in such country shall be adjusted to the highest legally permissible or government-approved rate.

6.4 Withholding Taxes. Trovogene shall be entitled to deduct the amount of any withholding taxes, value-added taxes or other taxes, levies or charges with respect to such amounts, other than United States taxes, payable by Trovogene, its Affiliates or Sublicensees, or any taxes required to be withheld by Trovogene, its Affiliates or Sublicensees, to the extent Trovogene, its Affiliates, Sublicensees or Acquirors pay to the appropriate governmental authority on behalf of Nerviano such taxes, levies or charges. Trovogene shall use reasonable efforts to minimize any such taxes, levies or charges required to be withheld on behalf of Nerviano by Trovogene, its Affiliates or Sublicensees. Trovogene promptly shall deliver to Nerviano proof of payment of all such taxes, levies and other charges, together with copies of all communications from or with such governmental authority with respect thereto.

7 DEVELOPMENT

7.1 Joint Development Committee.

(a) Within thirty (30) days following the Effective Date, Nerviano and Trovagine shall appoint a Joint Development Committee (the “JDC”) to exchange information regarding all activities related to the Development of the Product, including to facilitate the transfer from Nerviano to Trovagine of Nerviano Know-How. The JDC shall continue to be in effect until the receipt of the first Regulatory Approval for the Product.

(b) The JDC will consist of four individuals of which two will be designated by Nerviano and two will be designated by Trovagine. Trovagine has the right to designate the chair of the JDC. One representative from each Party shall be a senior executive from such Party. Each Party shall have the right, at any time, to designate by written notice to the other Party, a replacement for any of such Party’s members on the JDC. The JDC shall endeavor to work by consensus. Where consensus cannot be reached, Trovagine shall make the final determination after consultation with Nerviano and considering Nerviano’s position in good faith; *provided, however*, that Trovagine shall not make any final determination that conflicts with the terms and conditions of this Agreement. As the time of the establishment of the JDC, each Party shall also designate one of its members of the JDC as the primary contact and coordinator for such Party, to facilitate communication and coordination of the Parties’ activities under the Agreement (the “Project Coordinator”).

(c) The JDC shall meet as necessary, but, in any event no less frequently than twice each year. In lieu of in person meetings, meetings of the JDC may take place by telephonic or video conference. The site for the in-person meetings shall alternate between Nerviano, Italy and San Diego, California, or such other location agreed to by the Parties. Other than with respect to special meetings of the JDC, which may be called by either Party on not less than ten days prior written notice (which notice may be by e-mail), the chairperson shall send to the members of the JDC a notice of and agenda for each meeting at least five business days prior to the date of such meeting.

(d) Promptly after each meeting of the JDC, the chairperson shall (or shall designate another member of the JDC) to prepare and distribute, via facsimile or e-mail to all members of the JDC, draft action steps and decisions of the meeting. Promptly after the draft action steps and decisions are distributed, the members shall either note their approval or provide proposed revisions to the draft. Promptly after the receipt of all approvals or proposed revisions to the draft, the chairperson shall issue the final action steps and decisions of the JDC.

(e) Each Party shall bear its own costs, including travel, lodging, food and telephone or video conference costs, for its personnel serving on the JDC or attending any meeting of the JDC.

7.2 Development Plan. A preliminary summary development plan, including required timelines and other diligence requirements, for the Product (the “Initial Development Plan”) is attached as **Exhibit 1.13**. Within ninety (90) days after the Effective Date, the JDC shall replace the Initial Development Plan with a reasonably detailed master development plan, which shall be consistent with the Initial Development Plan, and which shall be attached hereto as **Exhibit 7.2** (such plan, as amended by the JDC from time to time through written communications such as *via* e-mail, is referred to as the “Development Plan”).

7.3 Development Activities. Pursuant to the Development Plan and using Commercially Reasonable Efforts, Trovagine, either on its own or through its Affiliates or Sublicensees, shall conduct all additional Development necessary for Regulatory Approval of the Product in the Major Market Countries. All such Development activities shall be conducted in accordance with the principles of GLP, GMP and GCP, as applicable, or the regulatory guidelines applicable to the country in which such activities are conducted.

7.4 Nerviano Support. Commencing on or promptly following the Effective Date, Nerviano shall provide Trovagine with Nerviano Know-How in its possession that is reasonably required to conduct the Development of the Product, or is reasonably requested by Trovagine.

7.5 Regulatory Approvals. Trovagine, either on its own or through its Affiliates or permitted Sublicensees, shall use Commercially Reasonable Efforts to (a) obtain Regulatory Approvals for the Product in accordance with the Development Plan; (b) compile, submit and prosecute in a timely manner all necessary data, documents, NDAs (including labeling), in a format acceptable to the applicable Regulatory Authorities, except that if Trovagine requests then Nerviano shall assist Trovagine in completing the CMC section of the filings; and (c) maintain and renew the Regulatory Approvals obtained by Trovagine and hold all such filings and approvals in its name, all at Trovagine’s expense. Trovagine shall pay all user fees and other costs required to obtain and maintain such NDA Approvals. Trovagine and its Affiliates may use and cross-reference any INDs held by Nerviano for the Product.

7.6 On-Going Disclosure Regarding Development. Trovogene will keep Nerviano reasonably informed about Trovogene's (and its CRO's), or its Affiliate's or Sublicensee's, efforts to develop the Product, including summaries regarding Trovogene's progress towards meeting the pertinent goals and milestones in the Development Plan, and any major changes to the Development Plan. Such disclosures will be made through the JDC at JDC meetings and in a written report to be attached to or included in the minutes of each JDC meeting. Without limiting the generality of the foregoing, such reports will contain the following: filing of an IND or NDA with respect to the Product in any jurisdiction; initiation of any clinical study with respect to the Product in any jurisdiction; and identification of NDA Approvals in any jurisdiction.

7.7 Development Data.

(a) Promptly after the Effective Date, Nerviano shall transfer to Trovogene all existing Development Data and during the term of this Agreement Nerviano shall promptly and consistently transfer to Trovogene all Development Data as and when generated or developed. Trovogene shall be the sole owner of the Development Data and Nerviano does and hereby assigns to Trovogene all of its right, title and interest therein.

(b) Both Parties shall develop and maintain the Development Data, related records, documents and raw data in sufficient detail and in good scientific manner as will properly reflect all work done and results achieved in the development of the API and Product.

7.8 Reporting Adverse Drug Reactions/Experiences. Trovogene shall be responsible for reporting all Adverse Drug Reactions to the appropriate Regulatory Authorities in the Territory in accordance with the appropriate laws and regulations of the relevant countries and authorities. Trovogene will ensure that its Affiliates and Sublicensees comply with all such reporting obligations.

7.9 Development Diligence. Trovogene shall use Commercially Reasonable Efforts to conduct the development activities with respect to the Products pursuant to the Development Plan. In any event, Trovogene shall commence the planned clinical studies referred to in the Initial Development Plan as the "Initial Clinical Studies", within \* after the Effective Date; *provided*, that Trovogene clinical application referencing Nerviano's IND is accepted by the Division of Hematology at the FDA to allow for a timely initiation of a clinical study, that Nerviano has timely complied with its obligations under Section 7.5 and, to the extent required for initiation of the Initial Clinical Studies has timely supplied adequate material for such Initial Clinical Studies in accordance with the Supply Agreement; and (ii) thereafter use Commercially Reasonable Efforts to conduct the Initial Clinical Studies.

[\*] Certain information on this page has been omitted and filed separately with the Securities and Exchange Commission. Confidential treatment has been requested with respect to the omitted portion.

8 MANUFACTURE

8.1 Product Supply. Trovogene shall have the right to manufacture or engage a third party manufacture for a supply of the API or Product. However, the Parties shall negotiate in good faith for thirty (30) days, with such reasonable extensions as agreed to by the parties, after the Effective Date to reach mutual agreement on the terms of the Supply Agreement pursuant to which Nerviano would provide a clinical supply of API and/or Product to Trovogene. Existing materials and its related costs as well as estimated costs for finished materials are outlined in Exhibit 8.1.

8.2 DMF. To the extent required CMC information is not contained in the IND's submitted to the FDA, Trovogene shall establish with the FDA a drug master file for the Product ("DMF") and, if requested by Trovogene, Nerviano shall assist Trovogene in obtaining the DMF.

9 CONFIDENTIALITY

9.1 Confidential Information. During the term of this Agreement, and for a period of five (5) years following the expiration or earlier termination hereof, each Party shall maintain in confidence all Confidential Information, and shall not use, disclose or grant the use of the Confidential Information except on a need-to-know basis to those directors, officers, affiliates, employees, permitted licensees, permitted assignees and agents, consultants, clinical investigators or contractors, to the extent such disclosure is reasonably necessary in connection with performing its obligations or exercising its rights under this Agreement. To the extent that disclosure is authorized by this Agreement, prior to disclosure, each Party hereto shall obtain agreement of any such Person to hold in confidence and not make use of the Confidential Information for any purpose other than those permitted by this Agreement. Each Party shall notify the other promptly upon discovery of any unauthorized use or disclosure of the other Party's Confidential Information.

9.2 Permitted Disclosures. The confidentiality obligations contained in Section 9.1 shall not apply to the extent that (a) any receiving Party (the "Recipient") is required (i) to disclose information by law, regulation or order of a governmental agency or a court of competent jurisdiction, provided that the Recipient shall provide written notice thereof to the other Party and sufficient opportunity to object to any such disclosure or to request confidential treatment thereof, or (ii) to disclose information to any governmental agency for purposes of obtaining approval to test or market a product; or (b) to disclose to its employees, directors, consultants, Sublicensees or Affiliates who have a need to know for purposes of this Agreement and are under an obligation of confidentiality equivalent to that of the Recipient. Notwithstanding any other provision of this Agreement, Trovogene may disclose Confidential Information of Nerviano relating to information developed pursuant to this Agreement to any Person with whom Trovogene has, or is proposing to enter into, a business relationship, as long as such Person has entered into a confidentiality agreement with Trovogene.

9.3 Disclosure of Financial and Other Terms. Except as required by applicable laws, treaties and agreements (including securities laws), the Parties agree that the material terms of this Agreement will be considered Confidential Information of both Parties. Notwithstanding the foregoing, (a) either Party may disclose such terms as are required to be disclosed in its publicly-filed financial statements or other public statements, pursuant to applicable laws, regulations and stock exchange rules (e.g., the U.S. Securities and Exchange Commission, NASDAQ, NYSE, or any other stock exchange on which securities issued by Trovogene or Nerviano may be issued), (b) either Party shall have the further right to disclose the material financial terms of this Agreement on a confidential basis to any potential and actual Sublicensee, Acquiror, merger partner or potential providers of financing and their advisors in connection with due diligence investigations by, or presentations to, such entities, and (c) either Party shall have the right to disclose information regarding the development or commercialization status of a Product to the extent such disclosure is customary and material to their potential and actual Sublicensees, current investors, or required by applicable laws or stock exchange rules. Neither Party shall make any other statement to the public regarding the execution and/or any other aspect of the subject matter of this Agreement, except: (x) where a Party reasonably believes disclosure is required under applicable laws or ethical commercial practice, (y) for customary discussions with current or prospective investors and analysts, and (z) either Party may use the text of a statement previously approved by the other Party. Promptly after the Effective Date, the Parties will draft and issue a mutually acceptable press release.

9.4 Publications. Nerviano shall not publish, present or disclose any data, information or results regarding the API or its use without the prior written consent of Trovogene. If Nerviano desires to make any such publication, presentation or disclosure, Nerviano shall first submit to Trovogene for its review, a copy of any proposed publication, presentation or other disclosure at least thirty (30) days prior to the date of submission for publication, presentation or other disclosure. If Trovogene gives written notice to Nerviano that it does not desire that the data, information or results be published, presented or otherwise disclosed, or Trovogene requests that certain of such data, information or results be removed for confidentiality or patent filing purposes, then Nerviano will not make such publication, presentation or other disclosure or will remove such data, information or results, as applicable.

## 10 INTELLECTUAL PROPERTY

10.1 Trademarks. Trovogene shall select and own the trademarks used on the Products (the "Product Trademarks"); *provided*, that no Product Trademark shall be the same as or confusingly similar to a trademark used by Nerviano as of the date of Trovogene's intended first use for any of its other products nor contain the words "Nerviano Medical Sciences."

10.2 Ownership of Inventions. Subject to the terms hereof, including the licenses and other rights granted hereunder, all Inventions shall be owned as follows:

(a) Nerviano shall own the entire right, title and interest in and to all Inventions (including all patents and other intellectual property rights thereto) made solely by its employees or others acting on behalf of Nerviano (or solely by such persons and Third Parties performing work for Nerviano) in the performance of the Development Plan or other activities undertaken under this Agreement ("*After-Developed Nerviano Inventions*"). All After-Developed Nerviano Inventions will be included in the license and right granted under Article 3 above;

(b) Trovogene shall own the entire right, title and interest in and to all Inventions (including all patents and other intellectual property rights thereto) made solely by its employees or others acting on behalf of Trovogene (or solely by such persons and Third Parties performing work for Trovogene) in the performance of the Development Plan or other activities undertaken under this Agreement;

(c) The Parties shall jointly own all Joint Inventions (as defined below). Nerviano' rights in and to each Joint Invention (including all patent rights and other intellectual property rights to it) will be included in the license and rights granted under Article 2 above, and, subject to such license and rights, each Party may make, use, sell, keep, license or assign its interest in

Joint Inventions and otherwise undertake all activities a sole owner might undertake with respect to such Joint Inventions, without the consent of and without accounting to the other Party. “*Joint Inventions*” means Inventions for which it is determined, in accordance with United States patent law, that both: (i) one or more employees, consultants or agents of Nerviano or any other persons obligated to assign such Invention to Nerviano; and (ii) one or more employees, consultants or agents of Trovogene or any other persons obligated to assign such Invention to Trovogene, are joint inventors.

### 10.3 Prosecution of Patents.

(a) Sole Inventions. Subject to the provisions of paragraphs (b) and (c) below, each Party shall have the right to: (i) determine whether patent applications should be filed on Inventions owned by it (other than Joint Inventions), and if so, where and when; (ii) control the prosecution and procurement of any such patents and any other Nerviano Patents, in the case of Nerviano, including their issuance, reissuance, reexamination and the defense of any interference, revocation or opposition proceedings, and to decide in which countries to maintain such patents when issued and for how long; and (iii) select all counsel or other parties necessary to prepare, file, prosecute and maintain all Nerviano Patents, in the case of Nerviano, or to advise or represent it in connection with such patent applications or patents. Trovogene shall reimburse Nerviano for the reasonable costs and expenses of filing, prosecuting and maintaining the Nerviano Patents except for any Post Grant Proceedings, which will be negotiated in good faith on a case-by-case basis but Trovogene shall not be liable for such costs unless the parties have reached agreement. For the purpose of this Article 10.3, “prosecution” shall include any post-grant proceeding including patent interference proceeding, inter partes review, opposition proceeding and reexamination (collectively, “*Post Grant Proceedings*”).

(b) Joint Inventions. Trovogene shall be responsible for filing patent applications on, and directing the particulars (as described in Section 10.3(a)) of the patent prosecution for all Joint Inventions at its own cost and expense. Trovogene will exercise its reasonable efforts to keep Nerviano informed of significant steps taken in such matters. With respect to the prosecution of patent applications for Joint Inventions, Trovogene shall have the further right to take such actions as are necessary or appropriate to procure and maintain patents with respect thereto. All patent applications and patents directed to Joint Inventions (“*Joint Patents*”) shall be owned jointly between Nerviano and Trovogene. Upon request, unless and to the extent otherwise mutually agreed by each Party’s patent counsel, Trovogene, to the extent practicable, shall furnish Nerviano with copies of such Joint Patents and other related correspondence relating to the prosecution of the Joint Patents to and from patent offices throughout the Territory, and permit Nerviano to offer its comments thereon before Trovogene makes a submission to a patent office. Nerviano shall offer its comments promptly, including any request that the patents be filed in additional countries, although Trovogene shall determine the appropriate action after considering in good faith any comments or requests from Nerviano. If, in its sole discretion, Trovogene decides not to file a patent application on any Joint Invention, or ceases to diligently pursue prosecution or procurement, or fails to maintain the same in any country, that decision, cessation, or failure will not constitute a default under this Agreement. Rather, Nerviano shall then have the right, at its sole expense and in its sole discretion, to file patent applications, control prosecution and procurement, and maintain procured patents with respect to such Joint Invention. In respect of Joint Inventions, Trovogene shall pay all costs and expenses incurred in respect of patents prosecuted or maintained by it.

(c) Nerviano Patents. Nerviano shall prepare, prosecute and maintain all Nerviano Patents. Nerviano will exercise its reasonable efforts to keep Trovogene currently informed of significant steps to be taken in such preparation, prosecution and maintenance of all Nerviano Patents. Upon request, unless and to the extent otherwise mutually agreed by each Party’s patent counsel, Nerviano, to the extent practicable, shall furnish Trovogene with copies of such Patents and other related correspondence relating to the prosecution of all Nerviano Patents to and from patent offices, and permit Trovogene to offer its comments thereon before Nerviano makes a submission to a patent office. Nerviano will reasonably incorporate the comments received from Trovogene. Trovogene will have the right to choose which countries in which to file patent applications, provided that Nerviano shall file in the following countries: \*. Trovogene shall offer its comments promptly, including the list of additional countries. Subject to its antecedent obligations below, Nerviano may discontinue the prosecution of any patent application or abandon any patent encompassed within the Nerviano Patents. If Nerviano decides not to file or to abandon or allow to lapse any patent application or patent within the Nerviano Patents in any country of the Territory, Nerviano will promptly inform Trovogene of such decision and in the case of abandonment, at least 30 days prior to such abandonment or lapse and will give Trovogene the opportunity to prosecute such patent application and/or maintain such patent at its expense and in Trovogene’s name. If Trovogene elects to undertake the prosecution of any Nerviano Patent, Nerviano will assign its right, title and interest in and to the pertinent Nerviano Patent to Trovogene, whereupon Trovogene will have no further obligation under this Agreement with respect to the payment of Royalties or otherwise pertaining to that Nerviano Patent.

10.4 Patent Term Extensions. The Parties shall: (a) notify each other of the issuance of each patent where extension is possible included within the Nerviano Patents or Joint Patents, giving the date of issue and patent number for each such patent; and (b) advise each other in a timely manner of approval by the FDA, EMA, or MHLW to use or market any Product and any other governmental approval that is pertinent to any patent term extension or restoration. The Parties shall use reasonable efforts to obtain all available patent term extensions or restorations of such Nerviano Patents or Joint Patents (including those available

under the Hatch-Waxman Act). To that end, each Party shall: (c) supply the other Party, in a timely manner, with any information in its possession or control pertaining to, or desirable for, the extension of any Nerviano Patents or Joint Patent; (d) execute and deliver to the other Party, in a timely manner, any authorizations, supporting affidavits and other documents required in connection with the extension of any Nerviano Patent or Joint Patent; and (e) take such other actions as may be

[\*] Certain information on this page has been omitted and filed separately with the Securities and Exchange Commission. Confidential treatment has been requested with respect to the omitted portion.

reasonably requested by the other Party to obtain such extensions. The Parties shall cooperate with each other in seeking or gaining patent term restorations or extensions wherever applicable to such Nerviano Patents or Joint Patents, and in determining which Nerviano Patents or Joint Patent the Parties should seek and obtain patent term extension or restoration. The Party first eligible to seek patent term restoration or extension of any such Nerviano Patents or Joint Patent related thereto shall have the right to do so; *provided*, that if in any country the first Party has an option to extend the patent term for only one of several patents, the first Party will consult with the other Party before making the election. If more than one Nerviano Patents or Joint Patent is eligible for extension or patent term restoration, the Parties shall agree upon a strategy that will maximize patent protection for the Product. Notwithstanding any of the foregoing, where consensus cannot be reached, Trovogene shall make the final determination after consultation with Nerviano and considering Nerviano's position in good faith; *provided, however*, that Trovogene shall not make any final determination that conflicts with the terms and conditions of this Agreement.

#### 10.5 Patent Certifications.

(a) Nerviano shall immediately give notice to Trovogene of any notice it receives of certification filed under the Hatch-Waxman Act claiming that any of the Nerviano Patents is invalid, unenforceable or that any infringement will not arise from the manufacture, use or sale of the Product by a Third Party. If Nerviano decides not to bring infringement proceedings against the entity making such a certification with respect to any such Nerviano Patents, Nerviano shall give notice to Trovogene of its decision not to bring suit within ten (10) days after receipt of notice of such certification (or, if the time period permitted by law is less than twenty (20) days, within half of the time period permitted by law for Nerviano to commence such action). Trovogene may then, but is not required to, bring suit against the Third Party that filed the certification. Any suit by either Party may be in the name of either or both Parties, as may be required by law. For this purpose, the Party not bringing suit shall execute such legal papers necessary for the prosecution of such suit as may be reasonably requested by the Party bringing suit.

(b) To the extent required by law or permitted by law, Trovogene shall use its Commercially Reasonable Efforts to maintain with the applicable regulatory authorities during the term of this Agreement correct and complete listings of applicable Patents for any Product then being commercialized by Trovogene, including all so called "Orange Book" listings required under the Hatch-Waxman Act.

#### 10.6 Enforcement of Patent Rights.

(a) In the event that either Party becomes aware of any product containing the API that is made, used, or sold in the Territory which it believes to (i) infringe a Nerviano Patent or a Joint Patent, or (ii) constitute a misappropriation of know-how covering the use of either API or a Product in the Field, such Party (the "Notifying Party") will promptly advise the other Party of all the relevant facts and circumstances known by the Notifying Party in connection with the infringement or misappropriation.

(b) Trovogene may enforce, and Nerviano does hereby grant to Trovogene the right to enforce, such Nerviano Patents or Joint Patents against such infringement or misappropriation in the Territory at Trovogene's sole expense and in Trovogene's sole discretion. Nerviano and its Affiliates will fully cooperate with Trovogene with respect to the investigation and prosecution of such alleged infringement or misappropriation by Trovogene including the joining of Nerviano and its Affiliates as a Party to such action, as may be required by the law of the particular forum where enforcement is being sought.

(c) Nerviano may enforce such Nerviano Patents and Joint Patents against such infringement or misappropriation in the Territory, at its sole expense and in its sole discretion, if: (i) within one hundred and twenty (120) days after receiving notice from Nerviano of the infringement or misappropriation, Trovogene elects, in its sole discretion, not to take action to investigate such alleged infringement or misappropriation and, if such infringement or misappropriation is subsequently reasonably demonstrated, and to timely institute an action to abate such alleged infringement or misappropriation and to prosecute such action diligently, or (ii) Trovogene notifies Nerviano that Trovogene does not plan to terminate the infringement or misappropriation or institute such action. Trovogene and its Affiliates will fully cooperate with Nerviano with respect to the investigation and prosecution of such alleged infringement or misappropriation including the joining of Trovogene and its Affiliates as a Party to such action, as may be required by the law of the particular forum where enforcement is being sought.

(d) Nerviano shall, at its own expense and discretion, enforce Nerviano Patents against such infringement or misappropriation to the extent that Nerviano has the right to enforce such Nerviano Patents in accordance with Section 10.6(c) above. Trovagine and its Affiliates will fully cooperate with Nerviano with respect to the investigation and prosecution of such alleged infringement or misappropriation by Nerviano including the joining of Trovagine and its Affiliates as a Party to such action, as may be required by the law of the particular forum where enforcement is being sought.

(e) The Party prosecuting such infringement or misappropriation action will control the litigation and will bear all legal expenses (including court costs and legal fees and expenses), including settlement thereof; *provided*, that no settlement or consent judgment or other voluntary final disposition of any infringement or misappropriation action brought by a Party pursuant to this Section 10.6 may be entered into without the prior written consent of the other Party if such settlement would require the other Party to be subject to an injunction or to make a monetary payment in excess of \$\* or significantly adversely affect the rights of the other Party to this Agreement.

(f) Any recovery obtained as a result of such action, whether by judgment, award, decree or settlement will first be applied to reimbursement of each Party's out-of-pocket expenses in bringing such suit or proceeding, and \* percent (\*%) of the remaining balance shall be distributed to the Party bringing such enforcement action, and \* percent (\*%) to the other Party.

#### 10.7 Patent Infringement Claims.

[\*] Certain information on this page has been omitted and filed separately with the Securities and Exchange Commission. Confidential treatment has been requested with respect to the omitted portion.

(a) Each Party shall notify the other Party promptly in writing of any claim of, or action for, infringement of any patents or misappropriation of trade secret rights of any Third Party which is threatened, made or brought against either Party by reason of the development, manufacture, use or sale of any Product by either Party. Trovagine shall be responsible for defense of all such claims against Trovagine in the Territory except as otherwise provided in Article 12.

(b) In any suit, action or pro-ceeding referred to in this Section 10.7 (regardless of which Party commences or defends), each Party shall, at its own expense, fully cooperate with the other Party and supply all assistance reasonably requested by the Party carrying on the proceeding, including provid-ing the other Party with such witnesses, documents and records and other evi-dence as may be reasonably requested.

10.8 Cooperation. In any suit to enforce and/or defend the Licensed IP Rights pursuant to this Section 10, the Party not in control of such suit shall, at the request and expense of the controlling Party, reasonably cooperate and, to the extent possible, have its employees testify when requested and make available relevant records, papers, information, samples, specimens, and the like.

### 11 TERMINATION

11.1 Term of Agreement. This Agreement shall become effective as of the Effective Date and, unless earlier terminated pursuant to other provisions of this Article 11, shall continue in full force and effect until Trovagine has duly and completely fulfilled its obligation to pay Royalties to Nerviano under Section 4.2. Following expiration of this Agreement - unless terminated by Nerviano in advance according to the provisions of Article 11.3 or by Trovagine in advance according to the Provisions of Article 11.2 - Trovagine shall have a fully paid-up, non-exclusive license under the Licensed IP Rights to conduct research and to develop, make, have made, use, sell, offer for sale and import Products in the Territory for use in the Field.

11.2 Termination by Trovagine. The Agreement may be terminated by Trovagine at any time as follows:

(a) prior to the First Commercial Sale of the Product, Trovagine may terminate this Agreement upon providing Nerviano with \* day written notice of its intent to terminate; or

(b) after the First Commercial Sale of the Product, Trovagine may terminate this Agreement upon \* months' prior written notice: *provided*, that Nerviano may then accelerate the effective date of termination to not less than \* days after such notice from Trovagine.

11.3 Termination for Cause. Upon the material breach by one Party under this Agreement, the other Party shall notify the breaching Party of such breach, and require that the breaching Party cure such breach within sixty (60) days (or, in the case of payment defaults, within thirty (30) days), provided that, in the case of any default other than the payment default, such cure period shall be reasonably extended (not to exceed one hundred and twenty (120) days) if, despite the Commercially Reasonable Efforts of the breaching Party, such default may not be cured within

[\*] Certain information on this page has been omitted and filed separately with the Securities and Exchange Commission. Confidential treatment has been requested with respect to the omitted portion.

such sixty (60) day period. In the event that the material breach is not cured within the applicable cure period, the notifying Party shall be entitled, without prejudice to any of its other rights conferred on it by this Agreement and any other remedies available to it by law or in equity, to terminate this Agreement.

#### 11.4 Effect of Termination.

(a) Termination of this Agreement pursuant to Section 11.1 shall not entitle any Party to claims for indemnification or other claims whatsoever between Parties other than for the case of noncompliance in respect to the Surviving Provisions in 11.5.

(b) Upon termination by Trovogene pursuant to Section 11.2 or by Nerviano pursuant to Section 11.3:

(i) All sublicenses granted by Trovogene to its Sublicensees under this Agreement pursuant to Section 3.3 shall survive the termination of this Agreement provided that such Sublicensees are not in breach of their respective Sublicense Agreements and assume in writing all obligations under such Sublicense Agreements to Nerviano directly; and

(ii) All rights and licenses granted by Nerviano to Trovogene will terminate.

(iii) Provided that as of the date of termination, no Sublicense exists, Trovogene will assign to Nerviano all regulatory filings and Regulatory Approvals for the Product and the Development Data;

(iv) If termination occurs after submission of materials seeking Regulatory Approvals for the Product, and provided that as of the date of termination, no Sublicense exists, all rights to all Product Trademarks for use with the Product (excluding Trovogene's name) will be assigned to Nerviano;

(v) Trovogene will, at Nerviano's option, and provided that as of the date of termination, no Sublicense exists, transfer to Nerviano responsibility for any then-ongoing clinical trials of Products in which patient dosing has commenced, and Nerviano shall be solely responsible for the costs of conducting such trials incurred after the effective date of termination of this Agreement;

(vi) Trovogene shall, provided that as of the date of termination, no Sublicense exists, grant to Nerviano a royalty-bearing, exclusive license (with right to sublicense) under the Joint Inventions, Trovogene Patents and Trovogene Know-How existing as of the date of termination solely for the API or its manufacture or use in any indication (and no other active pharmaceutical ingredient or diagnostic).

(vii) If Trovogene has commenced a Phase III Clinical Trial as of the date of termination, then Nerviano shall pay Trovogene royalties amounting to \* percent (\*%) of Annual Net

[\*] Certain information on this page has been omitted and filed separately with the Securities and Exchange Commission. Confidential treatment has been requested with respect to the omitted portion.

Sales (as such definition is revised to encompass sales by Nerviano or its Affiliates or sublicensees).

(viii) Provided that as of the date of termination, no Sublicense exists, Trovogene will cooperate in any reasonable manner requested by Nerviano to achieve a smooth transition of the development, manufacturing, marketing and sales of the Product to Nerviano or its licensees, such as transfer of Manufacturing Technology and assistance in connection with regulatory matters relating to the transfer of the Product.

11.5 Surviving Provisions. The following Articles and Sections of this Agreement shall survive any expiration or termination of this Agreement for any reason: Sections 1.,2.4, 9, 10, 11.4, 11.5, 12 and 13. The following Articles and Sections of this Agreement shall survive expiration or termination of this Agreement by Trovogene pursuant to Section 11.3: Section 3.

## 12 INDEMNIFICATION

12.1 Mutual Indemnification. Each Party shall defend, indemnify and hold the other Party and its Affiliates, and their respective directors, officers, employees, agents, contractors, sublicensees, and consultants harmless from and against any and all liabilities, losses, damages, settlements, claims, actions, suits, penalties, fines, costs or expenses (including reasonable



attorneys' fees and other expenses of litigation actually incurred) arising out of any claim or action brought by a Third Party (any of the foregoing, a "Loss") arising out of or resulting from:

(a) the gross negligence, recklessness or intentional acts or omissions of the indemnifying Party and its Affiliates, and their respective directors, officers, employees and agents with respect to this Agreement and the transactions contemplated hereby;

(b) any breach of a representation, warranty, covenant or agreement of the indemnifying Party hereunder; and

(c) any personal injury or property damage occurring at a location owned, leased, or under the control of the indemnifying Party in connection with the transactions contemplated by this Agreement (except to the extent such Loss arose out of or resulted from the negligence, recklessness or intentional acts or omissions of the other Party or its Affiliates, and their respective directors, officers, employees and agents).

In each case, except to the extent that such Loss was caused by the gross negligence or willful misconduct of the indemnified Party.

12.2 Trovagene. Except to the extent required to be indemnified by Nerviano under Section 11.3 or the Supply Agreement, Trovagene shall defend, indemnify and hold Nerviano, its Affiliates, and their respective directors, officers, employees, licensees, harmless from and against any and all Losses arising out of the development, non-clinical or clinical testing, use or sale of the Product in the Territory by Trovagene or its Affiliates or Sublicensees, including any patent infringement or product liability claims (including any product defects, failure to comply with regulatory and other legal requirements, failure to provide adequate warnings and misuse of the Product); except the foregoing obligations of Trovagene will not apply to any Loss that arises from, or is due to any of: (a) actions or claims alleging that the method of manufacturing the Product used by Nerviano to manufacture the Product under the Supply Agreement infringes any patent rights of any Third Party; (b) Nerviano's breach of its obligations under this Agreement including its representations and warranties; or (c) Nerviano's negligence or willful misconduct.

12.3 Nerviano. Nerviano shall defend, indemnify and hold Trovagene, its Affiliates, and their respective directors, officers, employees, licensees, harmless from and against any and all Losses to which such persons may become subject as a result of any claim, demand, action or other proceeding by any Third Party to the extent such Losses arise out of (a) a claim that the method of manufacturing the Product used by Nerviano to manufacture the Product under the Supply Agreement infringes any patent rights of any Third Party; (b) Nerviano's breach of its obligations under this Agreement including its representations and warranties; or (c) Nerviano's negligence or willful misconduct. Nerviano's indemnification obligations under this Section 12.3 are in addition to Nerviano's indemnification obligations set forth in the Supply Agreement.

12.4 Indemnification Procedure. In the event that either Party seeks indemnification under this Article 12, such Party shall inform the other Party of the claim as soon as reasonably practicable after it receives notice of the claim and, in any event, not later than twenty (20) days after it receives such notice, and shall (a) permit the indemnifying Party to assume direction and control of the defense of the claim (including the right to settle such claim at its discretion; *provided*, that no such settlement may be entered into without the indemnified Party's consent if such settlement may adversely impact such Party's rights hereunder), and (b) cooperate as requested (at the expense of the indemnifying Party) in the defense of such claim. If both Parties are sued and it is reasonably likely that the Parties may have conflicting interests or if it is otherwise not advisable under applicable legal and ethical requirements for the indemnifying Party's defense counsel to represent both Parties, separate independent counsel shall be retained for each Party at the expense of the indemnifying Party.

12.5 Insurance. Immediately upon the first administration of API or Product to a human in the Territory by Trovagene, its Affiliates or its Sublicensees, and for a period of three (3) years after the filing of an NDA in all Major Market Countries, Trovagene shall obtain and maintain, at its sole cost and expense, clinical trial insurance standard in the pharmaceutical trade in amounts of at least US\$\* per occurrence (or claim) and US\$\* in the aggregate limit of liability per year. Prior to the first NDA Approval, and for a period of five (5) years after the expiration of this Agreement or the earlier termination thereof, Trovagene shall obtain and maintain, at its sole cost and expense, product liability insurance standard in the pharmaceutical trade in amounts of at least US\$\* per occurrence (or claim) and US\$\* in the aggregate limit of liability per year. Trovagene shall provide written proof of the existence of such insurance to Nerviano upon request. If Trovagene sublicenses its rights to sell the Product in accordance with Section 3.3, such insurance obligations may be satisfied by its Sublicensees.

[\*] Certain information on this page has been omitted and filed separately with the Securities and Exchange Commission. Confidential treatment has been requested with respect to the omitted portion.

13.1 Notices. Any consent, notice or report required or permitted to be given or made under this Agreement by one of the Parties hereto to the other Party shall be in writing, delivered by any lawful means to such other Party at its address indicated below, or to such other address as the addressee shall have last furnished in writing to the addressor and (except as otherwise provided in this Agreement) shall be effective upon receipt by the addressee.

If to Nerviano: Nerviano Medical Sciences S.r.l.  
Viale Pasteur 10  
20014 Nerviano (Milano)  
Italy  
Attention: President

With required copy to:

Nerviano Medical Sciences S.r.l.  
Viale Pasteur 10  
20014 Nerviano (Milano)  
Italy  
Attention: Head of Business Development

If to Trovagene: Trovagene, Inc.  
11055 Flintkote Avenue,  
San Diego, CA 92121,  
U.S.A  
Attention: Chief Executive Officer

13.2 Governing Law. This Agreement shall be governed by and construed in accordance with the laws of the State of New York (USA), without regard to the conflicts of law principles thereof.

13.3 Force Majeure. Neither Party shall be held liable or responsible to the other Party nor be deemed to have defaulted under or breached this Agreement for failure or delay in fulfilling or performing any term of this Agreement to the extent, and for so long as, such failure or delay is caused by or results from causes beyond the reasonable control of the affected Party including but not limited to fire, floods, embargoes, war, acts of war (whether war be declared or not), acts of terrorism, insurrections, riots, civil commotions, strikes, lockouts or other labor disturbances, acts of God or acts, omissions or delays in acting by any governmental authority or the other Party; *provided*, that the Party so affected shall give prompt notice thereof to the other. If any such cause prevents either Party from performing any of its material obligations hereunder for more than six months, the other Party may then terminate this Agreement upon ninety (90) days' prior notice. Except as provided in the immediately preceding sentence, no such failure or delay shall terminate this Agreement, and each Party shall complete its obligations hereunder as promptly as reasonably practicable following cessation of the cause or circumstances of such failure or delay.

13.4 Dispute Resolution.

(a) The Parties recognize that a bona fide dispute as to certain matters may from time to time arise during the term of this Agreement that relate to any Party's rights or obligations hereunder. In the event of the occurrence of any dispute arising out of or relating to this Agreement, including any question regarding its existence, validity or termination, any Party may, by written notice to the other, have such dispute referred to their respective officer designated below or their successors, for attempted resolution by good faith negotiations within sixty (60) days after such notice is received. Said designated officers are as follows:

For Nerviano: President

For Trovagene: Chief Executive Officer

(b) In the event that they shall be unable to resolve the dispute by executive mediation within thirty (30) days of the disputing Party's notice, then the dispute shall be finally settled by binding arbitration as provided below. The arbitration shall be conducted in English. The award of arbitration shall be final and binding upon both Parties.

(c) Any arbitration proceeding shall be conducted in accordance with the arbitration rules of the London Court of International Arbitration ("LCIA"). The place of arbitration shall be London, England. The procedures specified in this Section 13.3 shall not prevent either Party from seeking preliminary or permanent injunctive relief with respect to breaches of obligations under this Agreement in any appropriate jurisdiction.

13.5 Assignment. Neither Party shall assign its rights or obligations under this Agreement without the prior written consent of the other Party; provided, however, that each Party may assign without prior written consent, this Agreement and its rights and obligations hereunder (a) to any Affiliate, or (b) in connection with the transfer or sale of all or substantially all of its business to which this Agreement relates, or in the event of its merger, consolidation, Change of Control or similar transaction. Any attempt to assign this Agreement in breach of the foregoing shall be void. This Agreement shall be binding upon and inure to the benefit of the Parties hereto and each of their successors and permitted assigns.

13.6 Amendments. No change, modification, extension, termination of this Agreement, or any of the provisions herein contained, shall be valid unless made in writing and signed by duly authorized representatives of the Parties hereto.

13.7 Entire Agreement. This Agreement embodies the entire agreement between the Parties and supersedes any prior representations, understandings and agreements between the Parties regarding the subject matter hereof. There are no representations, understandings or agreements, oral or written, between the Parties regarding the subject matter hereof that are not fully expressed herein.

13.8 Severability. Any of the provisions of this Agreement which are determined to be invalid or unenforceable in any jurisdiction shall be ineffective to the extent of such invalidity or unenforceability in such jurisdiction, without rendering invalid or unenforceable the remaining provisions hereof and without affecting the validity or enforceability of any of the terms of this Agreement in any other jurisdiction.

13.9 Waiver. The waiver by either Party hereto of any right hereunder or the failure to perform or of a breach by the other Party shall not be deemed a waiver of any other right hereunder or of any other breach or failure by said other Party whether of a similar nature or otherwise.

13.10 Counterparts. This Agreement may be executed in two or more counterparts, each of which shall be deemed an original, but all of which together shall constitute one and the same instrument. This Agreement may be executed by facsimile signature or by other electronic means, which shall be accepted as if they were original signatures.

13.11 No Third-Party Beneficiaries. None of the provisions of this Agreement shall be for the benefit of, or enforceable by, any Third Party. The agreements herein contained are made for the sole benefit of the Parties hereto and no other person or entity is intended to or shall have any rights or benefits hereunder, whether as a third-party beneficiary or otherwise.

IN WITNESS WHEREOF, the Parties have executed this Agreement effective as of the Effective Date.

NERVIANO MEDICAL SCIENCES S.r.l.

By: /s/ Barbara Marengo

Name: Barbara Marengo

Title: President

By: /s/ Andrea Agazzi

Name: Andrea Agazzi

Title: President NMS Group

TROVAGENE, INC.

By: /s/ William Welch

Name: William Welch

Title CEO

**EXHIBIT 1.4**

**API**

\*

\*

**PLK -1 Inhibitor, NMS-1286937**

[\*] Certain information on this page has been omitted and filed separately with the Securities and Exchange Commission. Confidential treatment has been requested with respect to the omitted portion.

**EXHIBIT 1.13  
INITIAL DEVELOPMENT PLAN**

<b>Activity</b>	<b>Anticipated Timing</b>
Y Technology & Data Transfer	*
Y Request IND transferred from the Division of Oncology Drug Products to the the Division of Hematology Products (DHP)	*
Y Qualify and create new drug product from Nerviano in selected capsuls for clinical studies	*
Y Submit phase I/II dose-expansion and response study that targets AML patients	*
Y Initiate first patient on drug in AML	*

[\*] Certain information on this page has been omitted and filed separately with the Securities and Exchange Commission. Confidential treatment has been requested with respect to the omitted portion.

**EXHIBIT 1.25**  
**NERVIANO PATENTS**  
**NMS-1286937**

\*

[\*] Certain information on this page has been omitted and filed separately with the Securities and Exchange Commission. Confidential treatment has been requested with respect to the omitted portion.



\*

[\*] Certain information on this page has been omitted and filed separately with the Securities and Exchange Commission. Confidential treatment has been requested with respect to the omitted portion.

\*

[\*] Certain information on this page has been omitted and filed separately with the Securities and Exchange Commission. Confidential treatment has been requested with respect to the omitted portion.

\*

[\*] Certain information on this page has been omitted and filed separately with the Securities and Exchange Commission. Confidential treatment has been requested with respect to the omitted portion.

\*

[\*] Certain information on this page has been omitted and filed separately with the Securities and Exchange Commission. Confidential treatment has been requested with respect to the omitted portion.

\*

[\*] Certain information on this page has been omitted and filed separately with the Securities and Exchange Commission. Confidential treatment has been requested with respect to the omitted portion.

**EXHIBIT 7.2**

**MASTER DEVELOPMENT PLAN**

**To be completed after Execution**

**Exhibit 8.1**

**Supply of existing API and estimated cost of capsules**

\*

[\*] Certain information on this page has been omitted and filed separately with the Securities and Exchange Commission. Confidential treatment has been requested with respect to the omitted portion.

List of Subsidiary

Name of Subsidiary	Percentage of Ownership	Jurisdiction of Incorporation
Trovagene Srl	100%	Italy



Consent of Independent Registered Public Accounting Firm

Trovogene, Inc.  
San Diego, California

We hereby consent to the incorporation by reference in the Registration Statements on Form S3 (No. 333-211705 and No. 333-208010) and Form S-8 (No. 333-211846, No. 333-205424 and No. 333-190415) of Trovogene, Inc. of our reports dated March 15, 2017, relating to the consolidated financial statements, and the effectiveness of Trovogene, Inc.'s internal control over financial reporting, which appear in this Form 10-K.

/s/ BDO USA, LLP

San Diego, California  
March 15, 2017

**CERTIFICATION OF PRINCIPAL EXECUTIVE OFFICER AND PRINCIPAL FINANCIAL OFFICER**

I, William J. Welch, certify that:

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

March 15, 2017

/s/ William J. Welch

---

William J. Welch  
*Chief Executive Officer (Principal Executive Officer and Principal  
Financial Officer)*

**CERTIFICATION OF PRINCIPAL EXECUTIVE OFFICER AND PRINCIPAL FINANCIAL OFFICER  
PURSUANT TO 18 U.S.C. SECTION 1350,  
AS ADOPTED PURSUANT TO  
SECTION 906 OF THE SARBANES-OXLEY ACT OF 2002**

In connection with the Annual Report of Trovogene, Inc. (the "Company") on Form 10-K for the year ended December 31, 2016 as filed with the Securities and Exchange Commission on the date hereof (the "Report"), I, William J. Welch, Chief Executive Officer of the Company, certify, pursuant to 18 U.S.C. § 1350, as adopted pursuant to § 906 of the Sarbanes-Oxley Act of 2002, that:

- (1) The Report fully complies with the requirements of Section 13(a) or 15(d) of the Securities Exchange Act of 1934; and
- (2) The information contained in the Report fairly presents, in all material respects, the financial condition and results of operations of the Company.

March 15, 2017

/s/ William J. Welch

---

William J. Welch  
*Chief Executive Officer (Principal Executive Officer and Principal Financial Officer)*