

ATOSSA GENETICS INC
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PROSPECTUS Filed pursuant to Rule 424(b)(3)
Registration No. 333-192285

ATOSSA GENETICS INC.

4,200,000 shares of Common Stock

This prospectus covers the sale of an aggregate of 4,200,000 shares of our common stock, \$0.001 par value per share (the “*Common Stock*”), by Aspire Capital Fund, LLC (“*Aspire Capital*” or the “*Selling Stockholder*”).

The prices at which the Selling Stockholder may sell the shares of Common Stock will be determined by the prevailing market price for the shares or in negotiated transactions. We will not receive proceeds from the sale of the shares by the Selling Stockholder. However, in the future we may receive up to \$25 million in gross proceeds, from the sale of our Common Stock to the Selling Stockholder, pursuant to a common stock purchase agreement entered into with the Selling Stockholder on November 8, 2013 (the “*Purchase Agreement*”).

The Selling Stockholder is an “underwriter” within the meaning of the Securities Act of 1933, as amended. We will pay the expenses of registering these shares, but all selling and other expenses incurred by the Selling Stockholder will be paid by the Selling Stockholder.

The Company’s Common Stock is traded on the NASDAQ Capital Market under the symbol “ATOS”. On December 13, 2013, the closing sale price of our Common Stock on the NASDAQ Capital Market was \$2.38 per share. Our principal executive offices are located at 1616 Eastlake Ave. East, Suite 510, Seattle, Washington 98102 and our telephone number is (800) 351-3902.

Investing in our securities involves risks. You should carefully consider the risk factors beginning on page 8 of this prospectus before you make an investment in our securities.

Neither the Securities and Exchange Commission nor any state securities commission has approved or disapproved of these securities or determined if this prospectus is truthful or complete. Any representation to the contrary is a criminal offense.

The date of this prospectus is December 17, 2013

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You should read this prospectus, any applicable prospectus supplement and the information incorporated by reference in this prospectus before making an investment in the securities of Atossa Genetics Inc. See “Where You Can Find Additional Information” on page 21 for more information. You should rely only on the information contained in or incorporated by reference in this prospectus or a prospectus supplement. The Company has not authorized anyone to provide you with different information. This document may be used only in jurisdictions where offers and sales of these securities are permitted. You should assume that information contained in this prospectus, or in any document incorporated by reference, is accurate only as of any date on the front cover of the applicable document. Our business, financial condition, results of operations and prospects may have changed since that date.

NOTE REGARDING FORWARD-LOOKING STATEMENTS

This prospectus and the documents incorporated by reference into it contain, in addition to historical information, certain information, assumptions and discussions that may constitute forward-looking statements within the meaning of Section 27A of the Securities Act of 1933, as amended (the “*Securities Act*”) and Section 21E of the Securities Exchange Act of 1934, as amended (the “*Exchange Act*”). We have made these statements in reliance on the safe harbor provisions of the Private Securities Litigation Reform Act of 1995. These statements are subject to certain risks and uncertainties, which could cause actual results to differ materially from those projected or anticipated. Although we believe our assumptions underlying our forward-looking statements are reasonable as of the date of this prospectus, we cannot assure you that the forward-looking statements set out in this prospectus will prove to be accurate. We typically identify these forward-looking statements by the use of forward-looking words such as “expect,” “potential,” “continue,” “may,” “will,” “should,” “could,” “would,” “seek,” “intend,” “plan,” “estimate,” “anticipate” or the negative version of these words or other comparable words. Forward-looking statements contained in this prospectus include, but are not limited to, statements about:

our ability to successfully sell our products and services at currently expected prices or otherwise at prices acceptable to us;

whether we will obtain in a timely manner clearance from the Food and Drug Administration (“*FDA*”) to sell, market and distribute our MASCT System and ForeCYTE Test;

our ability to successfully re-launch our MASCT System and ForeCYTE Test;

the estimated costs associated with our product recall;

our ability to successfully develop and commercialize new tests, tools and technologies currently in development and in the time frames currently expected;

our ability to maintain our business relationships, including with our distributors, suppliers and customers, while we are undergoing the recall we commenced October 4, 2013 and while we seek additional regulatory clearance to market, sell and distribute our MASCT System and ForeCYTE Test;

our ability to engage third-party suppliers to manufacture the MASCT System, Microcatheter System, other devices under development and their components at quantities and costs acceptable to us;

our ability to satisfy ongoing FDA requirements for the MASCT System, ForeCYTE Test and Microcatheter System and to obtain regulatory approvals for our other products and services in development, including our ability to timely and adequately respond to the warning letter we received from the FDA on February 21, 2013 and any issues resulting therefrom;

our ability to defend the securities class action law suit filed against us on October 10, 2013, and other similar complaints that may be brought in the future, in a timely manner and within the coverage, scope and limits of our insurance policies;

the benefits and clinical accuracy of the ForeCYTE and ArgusCYTE tests and whether any product or service that we commercialize is safer or more effective than competing products and services;

our ability to establish and maintain intellectual property rights covering our products and services;

the willingness of health insurance companies, including those who are members of the MultiPlan, FedMed and HealthSmart networks, and other third-party payors to approve our products and services for coverage and reimbursement;

our ability to establish and maintain an independent sales representative force, including with our current and future distributors and their sub-distributors, to market our products and services that we may develop, both regionally and nationally;

- our expectations regarding, and our ability to satisfy federal, state and foreign regulatory requirements;

the accuracy of our estimates of the size and characteristics of the markets that our products and services may address;

- our expectations as to future financial performance, expense levels and liquidity sources;

- our ability to attract and retain key personnel; and

our ability to sell additional shares of our Common Stock to Aspire Capital under the terms of the Purchase Agreement.

This prospectus also contains estimates and other statistical data provided by independent parties and by us relating to market size and growth and other industry data. These and other forward-looking statements made in this prospectus are presented as of the date on which the statements are made. We have included important factors in the cautionary statements included in this prospectus, particularly in the section entitled “Risk Factors,” that we believe could cause actual results or events to differ materially from the forward-looking statements that we make. Our forward-looking statements do not reflect the potential impact of any new information, future events or circumstances that may affect our business after the date of this prospectus. Except as required by law, we do not intend to update any forward-looking statements after the date on which the statement is made, whether as a result of new information, future events or circumstances or otherwise.

PROSPECTUS SUMMARY

This summary highlights some information from this prospectus. It may not contain all the information important to making an investment decision. You should read the following summary together with the more detailed information regarding our Company and the securities being sold in this offering, including “Risk Factors” and other information incorporated by reference herein. Unless otherwise noted, (1) the term “Atossa Genetics” refers to Atossa Genetics Inc., a Delaware corporation, (2) the terms “Atossa,” the “Company,” “we,” “us,” and “our,” refer to the ongoing business operations of Atossa and its wholly-owned subsidiary, whether conducted through Atossa Genetics or its subsidiary and (3) the term “Common Stock” refers to shares of Atossa Genetics Inc.’s Common Stock and the term “stockholder(s)” refers to the holders of Common Stock or securities exercisable for Common Stock.

Overview

We are a healthcare company focused on breast health. We are developing a suite of tests and therapeutic medical devices, laboratory developed tests and services (LDT and/or in vitro diagnostics) that address each of the four stages of the breast health care path: the cytological analysis of cells in nipple aspirate fluid, or NAF; the cytological analysis of cells in ductal lavage fluid collected from each individual breast duct with manual breast duct microcatheters; the profiling of newly diagnosed breast cancers through the determination of gene expression profiles in formalin-fixed paraffin embedded breast cancer biopsy tissue; and the monitoring of breast cancer survivors for pre-clinical recurrence through a blood test for circulating tumor cells. We also have a therapeutic program to provide targeted, localized treatment of cancerous and pre-cancerous conditions through our patented microcatheters. All of our products and services are currently under development and are awaiting additional regulatory clearances prior to marketing and commercialization. Our products and services under development include:

ForeCYTE Breast Health Test System: a test system comprised of a medical device for the collection and preparation of NAF specimens that are then processed using cytological testing procedures in our wholly-owned CLIA-certified laboratory, National Reference Laboratory for Breast Health, Inc., or the NRLBH. The ForeCYTE Breast Health Test is not intended to be used to diagnose breast cancer or to serve as a replacement for mammography. We are currently seeking 510(k) clearances from the FDA for this test, which we anticipate receiving in the first quarter of 2014. Upon receiving the 510(k) clearances, we intend to re-launch the ForeCYTE Test.

FullCYTE Breast Health Test: a test system for women identified by their physician as being at high risk for breast cancer. The test is designed for a surgeon to use our patented Class II microcatheter medical devices to collect NAF specimens from individual breast ducts which are then analyzed using cytological testing procedures at the NRLBH. We plan to complete additional validation studies and regulatory clearance of our manufacturing procedures and processes for this test in 2014 and to launch the test in the second half of 2014.

NextCYTE Breast Cancer Test: a test for women newly diagnosed by their physician as having breast cancer that is a qualitative in vitro diagnostic test service, performed in a single laboratory, using the gene expression profile of formalin-fixed, paraffin embedded breast cancer tissue samples to assess a patient's risk for distant metastasis. It uses advanced microarray expression technologies to quantify and analyze the entire tumor genetic transcriptome, which represents all genes that are being actively expressed within the tumor. This test is in the validation phase and after receiving FDA regulatory clearance we anticipate launching it in the second half of 2014.

ArgusCYTE Breast Health Test: a blood sample test for breast cancer survivors which provides information on the presence of circulating tumor cells. We completed the development of this test and conducted a limited trial launch in 2012. We are completing enhancements to this test and, after receiving any necessary additional FDA clearances, we plan to re-launch it in mid-2014.

Therapeutic Program: we are also developing our patented microcatheters for the delivery of pharmaceutical formulations directly into the milk ducts. We plan to initially target pre-cancerous lesions and ductal carcinoma in situ, or DCIS, a condition diagnosed in more than 65,000 patients each year. By using this localized delivery method, patients are expected to receive high local concentrations of these drugs at the site of the pre-cancerous lesions or DCIS potentially promoting efficacy of the treatment while limiting systemic exposure, which has the potential to lower the overall toxicity of these treatments. This program has not been approved by the FDA. We plan to identify a partner for the clinical development of the pharmaceutical to be used with our device in the first half of 2014.

Our laboratory, the NRLBH, was established in part to receive and process NAF samples collected with our ForeCYTE Test device. The NRLBH has been certified pursuant to the Clinical Laboratory Improvement Amendments, or CLIA. CLIA certification is legally required to receive reimbursement from federal or state medical benefit programs, like Medicare and Medicaid, and is a practical requirement for most third-party insurance benefit programs. Our CLIA-certified laboratory, which is permitted to accept samples from all 50 states under its CLIA certification, its state licenses, or, in New York under recognized exemption provisions while its license application is pending, examines the specimens by cytological analysis.

Our Diagnostic Tools

In September 2012, we acquired the assets of Acueity Healthcare, Inc., or Acueity. The assets we acquired from Acueity included 35 issued patents (18 issued in the U.S. and 17 issued in foreign countries) and 41 patent applications (32 in the U.S. and 9 in foreign countries), six 510(k) FDA marketing authorizations related to the manufacturing, use, and sale of the Viaduct Miniscope and accessories, the Manoa Breast Biopsy system, the Excisor Biotome, the Acueity Medical Light Source, the Viaduct Microendoscope and accessories, and cash in the amount of \$400,000. The microendoscopes are less than 0.9 mm outside diameter and can be inserted into a milk duct. This permits a physician to pass a microendoscope into the milk duct system of the breast and view the duct system via fiberoptic video images. Abnormalities that are visualized can then be biopsied from inside the duct with the biopsy tools that are inserted adjacent to the microendoscope. The patents relate to intraductal diagnostic and therapeutic devices and methods of use. We did not, however, acquire an inventory of these diagnostic tools, manufacturing capabilities or any personnel to market and sell the tools. We anticipate that we will not allocate human and financial resources to further develop and ultimately commercialize these medical devices until we are able to launch our four diagnostic tests in the United States. We intend to complete the steps necessary to begin marketing and selling these tools, such as re-establishment of the supply chain of component parts, securing manufacturers, performing test builds and commercial scale manufacturing, in the first half of 2014. This asset purchase is not expected to have an impact on the development and commercialization timetables of our existing product lines. We cannot, however, provide any assurances that delays related to the launch of our four diagnostic tests, independent of this asset purchase, would not delay the expected development of these diagnostic tools or that we will ultimately be successful selling these tools.

Intraductal Treatment Research

Our Intraductal Treatment Research Program comprises our patented microcatheter-delivery technology and our patented pharmaceutical formulations for the intraductal treatment of breast pre-cancerous changes and DCIS. The method uses our Mammary Ductal Microcatheter System, invented by Dr. Susan Love, President of the Dr. Susan Love Research Foundation, and her colleagues, and acquired by us, to administer proprietary pharmaceutical formulations into milk ducts that display pre-cancerous changes or DCIS with high local concentrations of the drugs in order to promote greater efficacy and limited systemic exposure, potentially lowering the overall toxicity of the treatment.

An October 2011 peer-reviewed paper published in *Science Translational Medicine* documented a study conducted at the Johns Hopkins Medical School demonstrating the prevention of breast cancer in rats with intraductal non-systemic chemotherapy, and a proof-of-principle Phase 1 clinical trial involving 17 women with breast cancer who subsequently received surgery. An accompanying editorial commented that “intraductal treatment could be especially useful for women with premalignant lesions or those at high risk of developing breast cancer, thus drastically improving upon their other, less attractive options of breast-removal surgery or surveillance (termed ‘watch and wait’).”

In a December 2012 peer-reviewed paper published in *Cancer Prevention Research*, Dr. Susan Love and her colleagues report a Phase I clinical trial to show the safety and feasibility of intraductal administration of chemotherapy drugs into multiple ducts within one breast in women awaiting mastectomy for treatment of invasive cancer. Thirty subjects were enrolled in this dose escalation study conducted at a single center in Beijing, China. Under local anesthetic, one of two chemotherapy drugs, carboplatin or pegylated liposomal doxorubicin, or PLD, was administered into five to eight ducts at three dose levels. Pharmacokinetic analysis has shown that carboplatin was rapidly absorbed into the bloodstream, whereas PLD, though more erratic, was absorbed after a delay. Pathologic analysis showed marked effects on breast duct epithelium in ducts treated with either drug compared with untreated ducts. The investigators concluded the study showed the safety and feasibility of intraductal administration of chemotherapy into multiple ducts for the purpose of breast cancer prevention and that this was an important step toward implementation of this strategy as a “chemical mastectomy,” potentially eliminating the need for surgery.

We intend to build on these academic studies with a research program targeted initially as neoadjuvant therapy in DCIS and to secure a partner in the first half of 2014 for the continued development of this program. We have not begun the process of applying for FDA approval of this program.

Current Operations

We launched our commercial operations in late 2011. In 2012 we initiated and completed the field experience trial of our first two tests, the ForeCYTE test and the ArgusCYTE test. In January 2013, we announced the national launch of the ForeCYTE Test. On April 30, 2013, we entered into a Distribution and Marketing Services Agreement with Millennium Medical Devices LLC, pursuant to which Millennium will market and distribute the ForeCYTE breast health test kits in New York City and Northern New Jersey. In May 2013, we entered into a distribution agreement with Fisher Healthcare, a division of Fisher Scientific Company, LLC, and in September 2013 we entered into a distribution agreement with McKesson Medical Surgical.

Our Voluntary Product Recall

On October 4, 2013 we initiated a voluntary recall to remove the ForeCYTE Breast Health Test and the MASCT device from the market. This voluntary recall includes the MASCT System Kit and Patient Sample Kit. The purpose of this voluntary recall is to address concerns raised by the FDA in a Warning Letter received by Atossa in February 2013. In that Warning Letter, the FDA raised concerns about (1) the current instructions for use, or IFU; (2) certain promotional claims used to market these devices; and (3) the need for FDA clearance for certain changes made to the NAF specimen collection process identified in the current IFU. We are in the process of removing existing product from the market. Virtually all of our revenue has been generated from the ForeCYTE Breast Health Test and the MASCT device. We do not expect to generate any significant revenue during the recall and while we are seeking additional regulatory clearance for the ForeCYTE Breast Health Test and MASCT device.

The MASCT device was originally cleared by the FDA for use as a sample collection device, with the provision that the fluid collected using this device can be used to determine and/or differentiate between normal, pre-cancerous, and cancerous cells. The MASCT device has not been cleared by the FDA for the screening or diagnosis of breast cancer. In addition, the ForeCYTE Breast Health Test has not been cleared or approved by the FDA for any indication as the company considered this to be a Laboratory Developed Test – or within a class of tests that has historically not required a 510(k) application. The ForeCYTE Breast Health Test and the MASCT device are not intended to serve as a replacement for screening mammograms, diagnostic imaging tests, or biopsies. Patients are instructed to follow the recommendations and instructions of their physician with respect to breast cancer screening and diagnosis.

To date, we are unaware of any adverse incidents or injuries associated with the use of the ForeCYTE Breast Health test and the MASCT device or the processing method identified in the latest version of the IFU. Additionally, we are unaware of any risk to health or injury for clinicians or the patient population that have used these devices. However, there is a risk that these devices may produce false positive or false negative results. Although not cleared or intended for this use, if these devices are used as a substitute for recommended screening or diagnosis of breast cancer, the FDA is concerned that patients may choose to forgo recommended mammograms and necessary biopsies.

We are working with the FDA on this matter and this voluntary recall. We have notified distributors and customers by certified mail and we are arranging for the return of all recalled products. As of December 5, 2013, approximately 58% of the MASCT pumps and 93% of the MASCT patient collection kits have been returned to our processing center. We also plan to prepare a new premarket notification or 510(k) application for submission to the FDA that covers the collection, preparation, and processing of NAF specimens at our laboratory and includes the spray method of fixing specimens to the collection membrane. However, we cannot market or distribute the modified product in the United States unless or until the new 510(k) is cleared by the FDA.

To ensure that the 510(k) includes the information that FDA feels is appropriate, we attended a pre-submission meeting with the FDA on November 14, 2013. Once the 510(k) is filed, we hope that the FDA will complete their review of our submission within 90 days; however, we cannot predict if they will ask us for additional information or otherwise complete their review within the 90 days.

We have recorded a loss contingency as of September 30, 2013 of \$402,840 related to the estimated costs of the recall, including the estimated costs of pursuing the additional 510(k) clearance. The recall and 510(k) process may take longer than expected and we may incur costs that we have not anticipated. Accordingly, the actual amount of the loss contingency may be higher than we currently expect.

If and when we are able to re-launch our ForeCYTE Test, we will incur additional sales and marketing expenses. If we re-launch our ForeCYTE test, we will need to revise our sales and marketing tools and continue hiring direct sales employees in an effort to build a regional, and ultimately national, sales force. We also expect to continue to hire clinical consultants to help healthcare providers begin to use our ForeCYTE Test.

From our inception (April 30, 2009) through September 30, 2013, 357 physicians have enrolled to provide the ForeCYTE Test and as of that date we have received, processed, and reported the results to physicians from 2,744 NAF samples processed and reported with our ForeCYTE Test (representing 1,372 patients) and 41 ArgusCYTE samples. From inception through September 30, 2013, we have generated \$1,068,687 in product and service revenue. We incurred net losses of \$3,501,045 and \$8,026,984 for the three months and nine months ended September 30, 2013 and \$17,758,892 since inception. As of September 30, 2013, we had an accumulated deficit of approximately \$17,758,892. We have not yet established an ongoing source of revenue sufficient to cover our operating costs and allow us to continue as a going concern. Our ability to continue as a going concern is dependent on obtaining adequate capital to fund operating losses until we become profitable. We plan to obtain additional capital resources by selling our equity securities, selling the ForeCYTE test kits and generating laboratory service revenue from our tests, and borrowing from stockholders or others when needed. However, we cannot assure you that we will be successful in accomplishing any of these plans and, if we are unable to obtain adequate capital, we could be forced to cease operations.

Recent Developments

On March 27, 2013 we entered into a stock purchase agreement with Aspire Capital Fund, LLC, and pursuant to that agreement we issued a total of 2,233,333 shares of common stock to Aspire Capital, receiving aggregate gross proceeds of \$11,303,745. That stock purchase agreement was terminated on November 8, 2013 and on that date we entered into a new stock purchase agreement with Aspire Capital Fund, LLC. The new stock purchase agreement provides that, upon the terms and subject to the conditions and limitations set forth therein, Aspire Capital is committed to purchase up to an aggregate of \$25 million of shares of our common stock over the 30-month term of the agreement.

On October 10, 2013, a putative securities class action complaint was filed in the United States District Court for the Western District of Washington against us, certain of our directors and officers and the underwriter of our November 2012 initial public offering. The complaint alleges that all defendants violated Sections 11 and 12(a)(2), and that we and certain of our directors and officers violated Section 15 of the Securities Act by making false and misleading statements and omissions in the offering's registration statement, and that we and certain of our directors and officers violated Sections 10(b) and 20A of the Exchange Act and SEC Rule 10b-5 promulgated thereunder by making false and misleading statements and omissions in the registration statement and in certain of our subsequent press releases and SEC filings with respect to our NAF specimen collection process, our ForeCYTE Breast Health Test and our MASCT device. This action seeks, on behalf of persons who purchased our common stock between November 8, 2012 and October 4, 2013, inclusive, damages of an unspecified amount.

We believe this complaint is without merit and plan to defend ourselves vigorously. Failure by us to obtain a favorable resolution of the claims set forth in the complaint could have a material adverse effect on our business, results of operations and financial condition. Currently, the amount of such material adverse effect cannot be reasonably estimated, and no provision or liability has been recorded for these claims as of September 30, 2013. The costs associated with defending and resolving the complaint and ultimate outcome cannot be predicted. These matters are subject to inherent uncertainties and the actual cost, as well as the distraction from the conduct of our business, will depend upon many unknown factors and management's view of these may change in the future.

Risk Factors

Our business is subject to numerous risks as discussed more fully in the section entitled "Risk Factors" beginning on page 8. Principal risks of our business include, but are not limited to, the following:

our existing capital resources may only be sufficient for the next six to ten months and, as a result, we may face issues related to a lack of funding;

if we are not successful, or are delayed, in obtaining a new 510(k) clearance from the FDA for our ForeCYTE Test, our operations will be significantly and adversely affected;

the scope of any 510(k) clearance that we might receive from the FDA covering our ForeCYTE Test could be more limited than we expect, potentially limiting our ability to market the test;

our voluntary recall and market withdrawal of the ForeCYTE Test, and any future recalls and/or product withdrawals, will significantly and adversely affect our business, prospects, financial condition and results of operations;

we will need significant additional capital to execute our business strategy as currently contemplated and additional capital may not be available from Aspire Capital or otherwise;

we have a history of operating losses and expect to incur losses for the foreseeable future and may never achieve profitability;

our business may be affected by legal proceedings;

the products and services that we have developed or may develop may never achieve significant commercial market acceptance;

additional shares becoming available for sale on the market, for example because of the sale and subsequent resale of shares we may sell to Aspire Capital or other sources of capital, could adversely affect our stock price and could dilute our existing stockholders; and

if our patents do not adequately protect our products, others could compete with us more directly, which would adversely affect our business.

Implications of being an Emerging Growth Company

As a company with less than \$1 billion in revenue during our last fiscal year, we qualify as an “emerging growth company” as defined in the Jumpstart Our Business Startups Act of 2012, or the JOBS Act. As an emerging growth company, we may take advantage of specified reduced disclosure and other requirements that are otherwise applicable generally to public companies. These provisions include:

Only two years of audited financial statements in addition to any required unaudited interim financial statements with correspondingly reduced “Management’s Discussion and Analysis of Financial Condition and Results of Operations” disclosure.

Reduced disclosure about our executive compensation arrangements.

Not having to obtain non-binding advisory votes on executive compensation or golden parachute arrangements.

Exemption from the auditor attestation requirement in the assessment of our internal control over financial reporting.

We may take advantage of these exemptions for up to five years or such earlier time that we are no longer an emerging growth company. We would cease to be an emerging growth company if we have more than \$1 billion in annual revenue, we have more than \$700 million in market value of our stock held by non-affiliates, or we issue more than \$1 billion of non-convertible debt over a three-year period. We may choose to take advantage of some but not all of these reduced burdens. We have taken advantage of these reduced reporting burdens in this prospectus, and the information that we provide may be different than what you might get from other public companies in which you hold stock.

Corporate Information

We were incorporated in Delaware in April 2009. Our principal executive offices are located at 1616 Eastlake Ave. East, Suite 510, Seattle, Washington 98102 and our telephone number is (800) 351-3902. Our corporate website is located at www.atossagenetics.com and our laboratory website is located at www.nrlbh.com. Information contained on, or that can be accessed through, our websites is not a part of this prospectus.

MASCT is our registered trademark and Oxy-MASCT and our name and logo are our trademarks. ForeCYTE, FullCYTE, NextCYTE, and ArgusCYTE are our service marks. This prospectus also includes additional trademarks, trade names and service marks of third parties, which are the property of their respective owners.

THE OFFERING

Common stock covered by this Prospectus: Up to 4,200,000 shares of Common Stock, including 375,000 shares currently outstanding.

Common stock outstanding as of December 9, 2013: 18,024,824 shares, including 375,000 shares issued to Aspire Capital on November 8, 2013.

Use of proceeds: Aspire Capital will receive all of the proceeds from the sale of the shares offered for sale by it under this prospectus. We will not receive proceeds from the sale of the shares by Aspire Capital. However, we may receive up to \$25 million in gross proceeds from the sale of our Common Stock to Aspire Capital under the Purchase Agreement described below, which we currently intend to use for working capital and general corporate purposes. See “Use of Proceeds.”

Risk factors: The shares offered hereby involve a high degree of risk. See “Risk Factors” beginning on page 8.

Dividend policy: We currently intend to retain any future earnings to fund the development and growth of our business. Therefore, we do not currently anticipate paying cash dividends on our Common Stock.

Trading Symbol: Our Common Stock currently trades on the NASDAQ Capital Market under the symbol “ATOS”.

Our Common Stock Purchase Agreements with Aspire Capital Fund, LLC

On March 27, 2013 we entered into a stock purchase agreement with Aspire Capital Fund, LLC, and pursuant to that agreement we have sold Common Stock to Aspire with aggregate gross proceeds to us of approximately \$11.3 million. On November 8, 2013 we terminated that agreement and entered into a new stock purchase agreement with Aspire Capital.

The November 8, 2013 stock purchase agreement with Aspire Capital (the “*Purchase Agreement*”) provides that, upon the terms and subject to the conditions and limitations set forth therein, Aspire Capital is committed to purchase up to an aggregate of \$25 million of shares of our Common Stock (this amount is in addition to the proceeds we received from sales to Aspire Capital under the March 27, 2013 agreement with them) over the 30-month term of the agreement. Other terms and conditions of the Purchase Agreement are described below.

Concurrently with entering into the Purchase Agreement, we also entered into a registration rights agreement with Aspire Capital. The registration rights agreement provides that the Company will file one or more registration

statements, as necessary, to register under the Securities Act the sale of the shares of Common Stock that have been and may be issued to Aspire Capital under the Purchase Agreement. The Company agreed to file an initial registration statement registering the sale of the shares by Aspire Capital with the SEC within 10 days of entering into the Purchase Agreement. We further agreed to keep the registration statement effective and to indemnify Aspire Capital for liabilities in connection with the sale of the shares under the terms of the registration rights agreement.

As described in more detail below, generally under the Purchase Agreement we have two ways we can elect to sell shares of Common Stock to Aspire Capital on any business day we select: (1) through a regular purchase of up to 150,000 shares (but not to exceed a value of \$500,000) at a known price based on the market price of our Common Stock prior to the time of each sale, and (2) through a volume-weighted average price (“**VWAP**”) purchase of a number of shares up to 30% of the volume traded on the purchase date at a price equal to the lesser of the closing sale price on the purchase date or 95% of the next business day’s VWAP. Additionally, there are two milestone stock sales to Aspire Capital described below.

Under the Purchase Agreement, we issued 375,000 shares of our Common Stock (the “**Commitment Shares**”) to Aspire Capital in consideration for entering into the Purchase Agreement. On December 17, 2013, all of the conditions to commencement under the Purchase Agreement were met. Therefore, on any business day on which the closing sale price of our Common Stock equals or exceeds \$0.25 per share, over the 30-month term of the Purchase Agreement, we have the right, in our sole discretion, to present Aspire Capital with a purchase notice (each, a “**Purchase Notice**”) directing Aspire Capital to purchase up to 150,000 shares of our Common Stock per business day; however, no sale pursuant to such Purchase Notice may exceed \$500,000 per business day. The purchase price per share (the “**Regular Purchase Price**”) is the lower of (i) the lowest sale price for our Common Stock on the purchase date or (ii) the arithmetic average of the three lowest closing sale prices for our Common Stock during the 12 consecutive business days ending on the business day immediately preceding the purchase date. The applicable purchase price will be determined prior to delivery of any Purchase Notice.

In addition, on any date on which we have submitted a purchase notice to Aspire Capital in the amount of 150,000 shares, we also have the right, in our sole discretion, to present Aspire Capital with a volume-weighted average price purchase notice (each, a “**VWAP Purchase Notice**”) directing Aspire Capital to purchase an amount of our Common Stock equal to a percentage (not to exceed 30%) of the aggregate shares of Common Stock traded on the next business day subject to a maximum number of shares determined by us. The purchase price per share pursuant to such VWAP Purchase Notice shall be generally the lower of (i) the closing sale price on the purchase date, and (ii) 95% of the VWAP of our Common Stock traded on the NASDAQ Capital Market on the next business day.

In addition to the regular purchase and VWAP purchase describe above, we are also obligated to sell, and Aspire Capital is obligated to purchase, \$1 million worth of our Common Stock upon the occurrence each of two milestone events (each, a “**Milestone Purchase**”), for total potential proceeds to us of \$2 million. The first Milestone Purchase will occur upon the filing by us with the FDA of a premarket notification, or 510(k) application, covering the collection, preparation, and processing of nipple aspirate fluid specimens in regard to the ForeCYTE Breast Health Test and the Mammary Aspiration Specimen Cytology Test device. The purchase price for this milestone event will be equal to the lower of \$2.00 per share or the Regular Purchase Price on the date of the event. The second Milestone Purchase will occur upon the clearance by the FDA of the foregoing 510(k) application and the purchase price for the shares sold upon the occurrence of this Milestone Purchase is the lower of \$4.00 per share or the Regular Purchase Price on the date of the event.

We have the right to sell up to \$25 million of our shares of Common Stock to Aspire Capital. We are obligated to register these shares with the SEC. Also, we have agreed to initially register the Commitment Shares issued to Aspire Capital plus an additional 3,825,000 shares which we may sell to Aspire Capital in the future. Under the rules of the NASDAQ Capital Market, in no event may we issue more than 19.99% of our shares outstanding (which is approximately 3,528,199 shares based on 17,649,824 shares outstanding prior to the signing of the Purchase Agreement) under the Purchase Agreement unless we obtain stockholder approval or an exception pursuant to the rules of the NASDAQ Capital Market is obtained to issue more than 19.99%. This limitation shall not apply if, at any time the Exchange Cap is reached and at all times thereafter, the average price paid for all shares issued and sold under the Purchase Agreement is equal to or greater than \$1.98, which was the closing sale price of our Common Stock on November 7, 2013. We are not required or permitted to issue any shares of Common Stock under the Purchase Agreement if such issuance would breach our obligations under the rules or regulations of the NASDAQ Capital Market.

The number of Purchase Shares covered by, and the timing of, each purchase are determined by us, at our sole discretion; *provided, however*, that the Milestone Purchases described above will occur automatically upon the happening of the specified milestone event. We may deliver multiple purchase notices to Aspire Capital from time to time during the term of the Purchase Agreement, so long as the most recent purchase has been completed. There are no trading volume requirements or other restrictions under the Purchase Agreement. Aspire Capital has no right to require any sales from us, but is obligated to make purchases as directed in accordance with the Purchase Agreement.

The Purchase Agreement contains customary representations, warranties, covenants, closing conditions and indemnification and termination provisions. The Purchase Agreement may be terminated by us at any time, at our discretion, without any cost or penalty. Aspire Capital has covenanted not to cause or engage in any manner whatsoever, any direct or indirect short selling or hedging of our Common Stock. We did not pay any additional amounts to reimburse or otherwise compensate Aspire Capital in connection with the transaction other than the Commitment Shares. There are no limitations on use of proceeds, financial or business covenants, restrictions on future financings, rights of first refusal, participation rights, penalties or liquidated damages in the Purchase Agreement.

Our gross proceeds will depend on the purchase prices and the frequency of sales of shares to Aspire Capital; *provided, however*, that the maximum aggregate proceeds from sales of shares is \$25 million. The actual maximum proceeds we receive from sales of stock to Aspire Capital will depend on the price of our stock at the time of sales to Aspire Capital. Our delivery of purchase notices will be made subject to market conditions, in light of our anticipated capital needs from time to time and under the limitations contained in the purchase agreement. We expect to use proceeds from sales of shares for general corporate purposes and working capital requirements.

The issuance of the shares to Aspire Capital under the Purchase Agreement is exempt from registration under the Securities Act, pursuant to the exemption for transactions by an issuer not involving any public offering under Section 4(a)(2) of the Securities Act and Rule 506 of Regulation D promulgated thereunder.

RISK FACTORS

A purchase of our shares of Common Stock is an investment in our securities and involves a high degree of risk. You should carefully consider the risks and uncertainties and all other information contained in or incorporated by reference in this prospectus, including the risks and uncertainties discussed in our Annual Report on Form 10-K for the fiscal year ended December 31, 2012, as updated in our Quarterly Reports on Form 10-Q for the quarters ended March 31, 2013, June 30, 2013 and September 30, 2013. All of these risk factors are incorporated by reference herein in their entirety. If any of these risks actually occur, our business, financial condition and results of operations would likely suffer. In that case, the market price of the Common Stock could decline, and you may lose part or all of your investment in our company. Additional risks of which we are not presently aware or that we currently believe are immaterial may also harm our business and results of operations.

USE OF PROCEEDS

The Selling Stockholder will receive all of the proceeds from the sale of the shares offered for sale by it under this prospectus. We will not receive proceeds from the sale of the shares by the Selling Stockholder. However, we may receive up to an aggregate of \$25 million in proceeds from the sale of our Common Stock to the Selling Stockholder under the Purchase Agreement. We will bear all reasonable expenses incident to the registration of the shares under federal and state securities laws other than expenses incident to the delivery of the shares to be sold by the Selling Stockholder. Any transfer taxes payable on these shares and any commissions and discounts payable to underwriters, agents, brokers or dealers will be paid by the Selling Stockholder.

Assuming the sale by us of all \$25 million of shares of our Common Stock to the Selling Stockholder and estimated expenses of \$100,000, the total net proceeds to us under the Purchase Agreement would be \$24.9 million, which we currently intend to use for general corporate purposes, including capital expenditures, re-launch of the ForeCYTE Test, the advancement of NextCYTE, FullCYTE and our intraductal treatment program and to meet working capital needs. The amounts and timing of the expenditures will depend on numerous factors, such as if and when we are able to re-launch our ForeCYTE Test and our research and development efforts. We expect from time to time to evaluate the acquisition of businesses, products and technologies for which a portion of the net proceeds may be used, although we currently are not planning or negotiating any such transactions. As of the date of this prospectus, we cannot specify with certainty all of the particular uses for the net proceeds to us from the sale of shares to the Selling Stockholder. Accordingly, we will retain broad discretion over the use of these proceeds, if any.

DIVIDEND POLICY

We have has not declared any dividends and do not anticipate that we will declare dividends in the foreseeable future; rather, we intend to retain any future earnings for the development of the business. Payment of future cash dividends, if any, will be at the discretion of our Board of Directors after taking into account various factors, including our financial condition, operating results, current and anticipated cash needs, outstanding indebtedness and plans for expansion and restrictions imposed by lenders, if any.

SELLING STOCKHOLDER

We have included in this prospectus 375,000 shares of Common Stock issued to the Selling Stockholder, Aspire Capital Fund, LLC, on November 8, 2013 and up to an additional 3,825,000 shares of Common Stock that may be issued in the future to Aspire Capital pursuant to the Purchase Agreement.

The following table sets forth certain information regarding the Selling Stockholder and the shares of Common Stock beneficially owned by it, which information is available to us as of December 9, 2013. The Selling Stockholder may offer shares under this prospectus from time to time and may elect to sell none, some or all of the shares set forth below. As a result, we cannot estimate the number of shares of Common Stock that the Selling Stockholder will beneficially own after termination of sales under this prospectus. However, for the purposes of the table below, we have assumed that the Selling Stockholder will sell all shares covered by this prospectus.

Selling Stockholder	Shares Beneficially Owned Before Offering (1)	Percentage of Outstanding Shares Beneficially Owned Before Offering	Shares to be Sold in the Offering	Shares Beneficially Owned After Offering	Percentage of Outstanding Shares Beneficially Owned After Offering
Aspire Capital Fund, LLC (2)	886,200 (3)	4.9 %	4,200,000	511,200 (4)	2.3 %

Beneficial ownership is determined in accordance with the rules and regulations of the SEC. In general, a person is deemed to be the beneficial owner of (i) any shares of our Common Stock over which such person has sole or shared voting power or investment power, plus (ii) any shares which such person has the right to acquire beneficial ownership of within 60 days, whether through the exercise of options, warrants or otherwise. The percentage of ownership set forth above assumes the sale by the Company to Aspire Capital of all shares being offered pursuant to this prospectus and is based on 18,024,824 shares of our Common Stock outstanding as of December 9, 2013, which includes the 375,000 commitment shares previously issued to Aspire Capital pursuant to the Purchase Agreement, together with securities exercisable or convertible into shares of Common Stock within 60 days of the date hereof for the Selling Stockholder, plus the additional 3,825,000 shares of Common Stock being offered pursuant to this prospectus.

Steven G. Martin, Erik J. Brown and Christos Komissopoulos, who are the principals of Aspire Capital, are deemed to be beneficial owners of all of the shares of Common Stock owned by Aspire Capital. Although Messrs. Martin, Brown and Komissopoulos are deemed to have shared voting and investment power over the shares being offered under the prospectus filed with the SEC in connection with the transactions contemplated under the Purchase Agreement, each disclaims beneficial ownership of these shares except to the extent of their pecuniary interest therein. Aspire Capital is not a licensed broker dealer or an affiliate of a licensed broker dealer.

As of the date hereof, 375,000 shares of our Common Stock have been acquired by Aspire Capital under the Purchase Agreement. The Company may elect in its sole discretion to sell to Aspire Capital up to an additional number of shares under the Purchase Agreement equal to \$25 million in value, but Aspire Capital does not presently beneficially own those shares as determined in accordance with the rules of the SEC.

Amount equals 886,200 shares of Common Stock less 375,000 shares of Common Stock beneficially owned before the offering that are being sold in the offering and assumes no additional sales of the remaining 511,200 shares of Common Stock.

THE ASPIRE CAPITAL TRANSACTION

General

On November 8, 2013, we entered into the Purchase Agreement, which provides that, upon the terms and subject to the conditions and limitations set forth therein, Aspire Capital is committed to purchase up to an aggregate of \$25 million of shares of our Common Stock over the 30-month term of the Purchase Agreement. In consideration for entering into the Purchase Agreement, concurrently with the execution of the Purchase Agreement, we issued to Aspire Capital the Commitment Shares. Concurrently with entering into the Purchase Agreement, we also entered into the registration rights agreement, in which we agreed to file one or more registration statements, as permissible and necessary to register under the Securities Act, the sale of the shares of our Common Stock that have been and may be issued to Aspire Capital under the Purchase Agreement.

As of December 9, 2013, there were 18,024,824 shares of our Common Stock outstanding, including the Commitment Shares, but excluding the additional 3,825,000 shares offered pursuant to this prospectus that may be sold to Aspire Capital pursuant to the Purchase Agreement. If all of the 4,200,000 shares of our Common Stock offered hereby were issued and outstanding as of December 9, 2013, such shares would represent approximately 19.2% of the total Common Stock outstanding or approximately 25.0% of the non-affiliate shares of Common Stock outstanding as of December 9, 2013. The number of shares of our Common Stock ultimately offered for sale by Aspire Capital is dependent upon the number of shares purchased by Aspire Capital under the Purchase Agreement.

Pursuant to the Purchase Agreement and the Registration Rights Agreement, we are registering under the Securities Act 4,200,000 shares of our Common Stock, which includes the Commitment Shares that have already been issued to Aspire Capital, as well as an additional 3,825,000 shares of Common Stock that we may issue to Aspire Capital. All 4,200,000 shares of Common Stock are being offered pursuant to this prospectus.

Under the Purchase Agreement, we have the right, but not the obligation, to sell more than the 4,200,000 shares of Common Stock offered by this prospectus. The Purchase Agreement provides that the number of shares that may be sold pursuant to the Purchase Agreement shall be limited to 3,528,199, or the "Exchange Cap," which represents 19.99% of our outstanding shares as of November 8, 2013, unless shareholder approval or an exception pursuant to the rules of the NASDAQ Capital Market is obtained to issue more than 19.99%. This limitation shall not apply if, at any time the Exchange Cap is reached and at all times thereafter, the average price paid for all shares issued and sold under the Purchase Agreement is equal to or greater than \$1.98, which was the closing sale price of our Common Stock on November 7, 2013. We are not required or permitted to issue any shares of Common Stock under the Purchase Agreement if such issuance would breach our obligations under the rules or regulations of the NASDAQ Capital Market. If we elect to sell more than the 4,200,000 shares of Common Stock offered hereby, we must first obtain the approval of our stockholders to do so, if necessary, and register under the Securities Act the sale of any additional shares we may elect to sell to Aspire Capital before we can put such additional shares to Aspire Capital under the Purchase Agreement.

Under the Purchase Agreement, Aspire Capital is obligated to purchase \$2 million of our Common Stock in two separate \$1 million Milestone Purchases. The first Milestone Purchase shall occur on the date of the submission by the Company of a new 510(k) application to the FDA that covers the collection, preparation, and processing of NAF specimens in regard to the ForeCYTE Breast Health Test and the MASCT device. The purchase price for this first Milestone Purchase shall be equal to the lower of \$2.00 per share or the Regular Purchase Price on the FDA submission date. The second Milestone Purchase shall occur on the date of clearance by the FDA of the 510(k) Application that covers the collection, preparation, and processing of NAF specimens in regard to the ForeCYTE test and the MASCT device. The purchase price for this second Milestone Purchase shall be equal to the lower of \$4.00 per share or the Regular Purchase Price on the date of clearance by the FDA of the 510(k) application.

On December 17, 2013, all of the conditions to commencement under the Purchase Agreement were met. Therefore, on any day that the closing sales price of our shares equals or exceeds \$0.25 per share, we have the right, in our sole discretion, to present Aspire Capital with a Purchase Notice, directing Aspire Capital (as principal) to purchase up to 150,000 shares of our Common Stock per business day, up to \$23 million of our Common Stock in the aggregate (not including the \$2 million of our Common Stock purchased pursuant to the Milestone Purchases) at a purchase price calculated by reference to the prevailing market price of our Common Stock (as more specifically described below); however, no sale pursuant to a Purchase Notice may exceed \$500,000 per trading day.

In addition, on any date on which (1) we submit a Purchase Notice to Aspire Capital in an amount equal to 150,000 shares and (2) the closing sale price of our Common Stock exceeds \$0.50, we also have the right, in our sole discretion, to present Aspire Capital with a VWAP Purchase Notice directing Aspire Capital to purchase an amount of stock equal to up to 30% of the aggregate shares of the Company's Common Stock traded on the NASDAQ Capital Market on the purchase date, subject to the VWAP Purchase Share Volume Maximum and the VWAP Minimum Price Threshold. The VWAP Purchase Price is calculated by reference to the prevailing market price of our Common Stock (as more specifically described below).

The Purchase Agreement provides that in no event will any shares of Common Stock be sold on any date that the closing sale price of our Common Stock is less than \$0.25 (the “**Floor Price**”). This Floor Price and the respective prices and share numbers in the preceding paragraphs shall be appropriately adjusted for any reorganization, recapitalization, non-cash dividend, stock split, reverse stock split or other similar transaction. Additionally, the Purchase Agreement provides that the Company and Aspire Capital shall not effect any sales under the Purchase Agreement if such shares proposed to be issued and sold, when aggregated with all other shares of the Company’s Common Stock that Aspire Capital and its affiliates beneficially own, would result in Aspire Capital and its affiliates beneficially owning more than 19.99% of the Company’s then issued and outstanding Common Stock.

There are no trading volume requirements or restrictions under the Purchase Agreement, and we will control the timing and amount of any sales of our Common Stock to Aspire Capital. Aspire Capital has no right to require any sales by us, but is obligated to make purchases from us as we direct in accordance with the Purchase Agreement. There are no limitations on use of proceeds, financial or business covenants, restrictions on future financings, rights of first refusal, participation rights, penalties or liquidated damages in the Purchase Agreement. The Purchase Agreement may be terminated by us at any time, at our discretion, without any penalty or cost to us. The rights and obligations of Aspire Capital under the Purchase Agreement are not assignable or transferable.

Purchase of shares under the Purchase Agreement

Under the Purchase Agreement, on any trading day selected by us on which the closing price of our Common Stock is not less than \$0.25 per share, we may direct Aspire Capital to purchase up to 150,000 shares of our Common Stock per trading day so long as sales pursuant to such Purchase Notice do not exceed \$500,000 per trading day. The purchase price of such shares (*i.e.*, the Regular Purchase Price) is equal to the lesser of:

· the lowest sale price of our Common Stock on the purchase date; or

the arithmetic average of the three lowest closing sale prices for our Common Stock during the twelve consecutive trading days ending on the trading day immediately preceding the purchase date.

In addition, on any date on which (1) we submit a Purchase Notice to Aspire Capital in an amount equal to 150,000 shares and (2) the closing sale price of our Common Stock is higher than \$0.50 per share, we also have the right to direct Aspire Capital to purchase an amount of stock equal to up to 30% of the aggregate shares of the Company's Common Stock traded on the NASDAQ Capital Market on the purchase date, subject to the VWAP Purchase Share Volume Maximum and the VWAP Minimum Price Threshold, which is equal to the greater of (a) 90% of the closing price on the NASDAQ Capital Market on the business day immediately preceding the VWAP Purchase Date or (b) such higher price as set forth by the Company in the VWAP Purchase Notice. The VWAP Purchase Price of such shares is the lower of:

the closing sale price on the VWAP Purchase Date; or

95% of the volume-weighted average price for our Common Stock traded on the NASDAQ Capital Market during normal trading hours:

on the VWAP Purchase Date, if the aggregate shares traded on the NASDAQ Capital Market have not exceeded the a. VWAP Purchase Share Volume Maximum; or

b. the portion of the VWAP Purchase Date until such time as the sooner to occur of (i) the time at which the aggregate shares traded on the NASDAQ Capital Market has exceeded the VWAP Purchase Share Volume Maximum or (ii) the time at which the sale price of the Common Stock falls below the VWAP Minimum Price Threshold.

The Purchase Price will be adjusted for any reorganization, recapitalization, non-cash dividend, stock split, reverse stock split or other similar transaction occurring during the period(s) used to compute the Regular Purchase Price. We may deliver multiple Purchase Notices and VWAP Purchase Notices to Aspire Capital from time to time during the term of the Purchase Agreement, so long as the most recent purchase has been completed.

Minimum Share Price

Under the Purchase Agreement, the Company and Aspire Capital may not effect any sales of shares of our Common Stock on any trading day that the closing sale price of our Common Stock is less than \$0.25 per share.

Compliance with the NASDAQ Capital Market Price

The Purchase Agreement provides that the number of shares that may be sold pursuant to the Purchase Agreement shall be limited to 3,528,199, or the Exchange Cap, which represents 19.99% of our outstanding shares as of November 8, 2013, unless shareholder approval or an exception pursuant to the rules of the NASDAQ Capital Market is obtained to issue more than 19.99%, to be in compliance with the applicable listing maintenance rules of the NASDAQ Capital Market. This limitation shall not apply if, at any time the Exchange Cap is reached and at all times thereafter, the average price paid for all shares issued and sold under the Purchase Agreement is equal to or greater than \$1.98, which was the closing sale price of our Common Stock on November 7, 2013. We are not required or permitted to issue any shares of Common Stock under the Purchase Agreement if such issuance would breach our obligations under the rules or regulations of the NASDAQ Capital Market.

Beneficial Ownership Limitation

Under the Purchase Agreement, we and Aspire Capital may not effect any sales of shares of our Common Stock if such shares proposed to be issued and sold, when aggregated with all other shares of our Common Stock beneficially owned by Aspire Capital and its affiliates, would result in the beneficial ownership by Aspire Capital and its affiliates of more than 19.99% of our then issued and outstanding shares of Common Stock.

Events of Default

Generally, Aspire Capital may terminate the Purchase Agreement upon the occurrence of any of the following events of default:

the effectiveness of any registration statement that is required to be maintained effective pursuant to the terms of the registration rights agreement between us and Aspire Capital lapses for any reason (including, without limitation, the issuance of a stop order) or is unavailable to Aspire Capital for sale of our shares of Common Stock, and such lapse or unavailability continues for a period of ten consecutive business days or for more than an aggregate of thirty business days in any 365-day period, which is not in connection with a post-effective amendment to any such registration statement; provided, however, that in connection with any post-effective amendment to such registration statement that is required to be declared effective by the SEC, such lapse or unavailability may continue for a period of no more than twenty consecutive business days, which such period shall be extended for an additional thirty business days if we receive a comment letter from the SEC in connection therewith;

the suspension from trading or failure of our Common Stock to be listed on a Principal Market (as defined in the Purchase Agreement) for a period of three consecutive business days;

the delisting of our Common Stock from the NASDAQ Capital Market, provided our Common Stock is not immediately thereafter trading on the New York Stock Exchange, the NASDAQ Global Select Market, the NASDAQ Global Market, the NYSE MKT, the OTC Bulletin Board or the OTCOB or OTCOX market places of the OTC markets;

our transfer agent's failure to issue to Aspire Capital shares of our Common Stock which Aspire Capital is entitled to receive under the Purchase Agreement within five business days after an applicable purchase date;

any breach by us of the representations, warranties, covenants or other term or condition contained in the Purchase Agreement or any related agreements that would reasonably be expected to have a material adverse effect except, in the case of a breach of a covenant which is reasonably curable, only if such breach continues for a period of at least five business days;

if at any time the issuance of shares of Common Stock upon the submission of a Purchase Notice or VWAP Purchase Notice under the Purchase Agreement would result in the issuance of an aggregate of number of shares of Common Stock that would exceed the number of shares of Common Stock that we may issue under this agreement without breaching our obligations under the rules or regulations of the NASDAQ Capital Market;

if we become insolvent or are generally unable to pay our debts as they become due; or

any participation or threatened participation in insolvency or bankruptcy proceedings by or against us.

Our Termination Rights

The Purchase Agreement may be terminated by us at any time after the completion of both Milestone Purchases, at our discretion, without any cost to us.

No Short-Selling or Hedging by Aspire Capital

Aspire Capital has agreed that neither it nor any of its agents, representatives and affiliates shall engage in any direct or indirect short-selling or hedging, which establishes a net short position with respect to our Common Stock during any time prior to the termination of the Purchase Agreement.

Effect of Performance of the Purchase Agreement on Our Stockholders

The Purchase Agreement does not limit the ability of Aspire Capital to sell any or all of the 4,200,000 shares registered in this offering. It is anticipated that shares registered in this offering will be sold over a period of up to approximately 30 months from the date we entered into the Purchase Agreement. The sale by Aspire Capital of a significant amount of shares registered in this offering at any given time could cause the market price of our Common Stock to decline or to be highly volatile. Sales to Aspire Capital by us pursuant to the Purchase Agreement also may result in dilution to the interests of other holders of our Common Stock. However, we have the right to control the timing and amount of sales of our shares to Aspire Capital, and the Purchase Agreement may be terminated by us at any time at our discretion without any penalty or cost to us.

Amount of Potential Proceeds to be Received under the Purchase Agreement

In connection with entering into the Purchase Agreement, we authorized the sale to Aspire Capital of up to \$25 million of shares of our Common Stock. However, we estimate that we will sell no more than 4,200,000 shares to Aspire Capital under the Purchase Agreement (inclusive of the Commitment Shares), all of which are included in this offering. Subject to any required approval by our Board of Directors and our stockholders, we have the right but not the obligation to issue more than the 4,200,000 shares included in this prospectus to Aspire Capital under the Purchase Agreement. In the event we elect to issue more than 4,200,000 shares under the Purchase Agreement, we will be required to file a new registration statement and have it declared effective by the SEC. The number of shares ultimately offered for sale by Aspire Capital in this offering is dependent upon the number of shares purchased by Aspire Capital under the Purchase Agreement. The following table sets forth the number and percentage of outstanding shares to be held by Aspire Capital after giving effect to the sale of shares of Common Stock issued to Aspire Capital covered by the registration statement, and irrespective of any applicable Exchange Cap, of which this prospectus is a part at varying purchase prices in addition to the Commitment Shares.

Assumed Average Purchase Price of the Additional Shares Sold Under the Purchase Agreement	Number of Additional Shares to be Sold if Full Purchase (1)	Percentage of Outstanding Shares After Giving Effect to the Aspire Capital Transaction (2)	Proceeds from the Sale of Shares to Aspire Capital Under the Purchase Agreement
\$ 0.25	3,825,000	17.51	% \$ 956,250
\$ 1.00	3,825,000	17.51	% \$ 3,825,000
\$ 2.00	3,825,000	17.51	% \$ 7,650,000
\$ 4.00	3,825,000	17.51	% \$ 15,300,000
\$ 6.00	3,825,000	17.51	% \$ 22,950,000
\$ 8.00	3,125,000	14.78	% \$ 25,000,000
\$ 10.00	2,500,000	12.18	% \$ 25,000,000
\$ 12.00	2,083,333	10.36	% \$ 25,000,000
\$ 14.00	1,785,714	9.01	% \$ 25,000,000

(1) Based on total aggregate sales of the lesser of (a) \$25 million of shares of Common Stock and (b) the 3,825,000 additional Purchase Shares registered herein. Excludes the Commitment Shares.

The denominator is based on 18,024,824 shares outstanding on December 9, 2013, plus the number of shares set forth in the adjacent column which we would have sold to Aspire Capital at the assumed price in the first column.

(2) The numerator is based on the number of shares which we would have sold under the Purchase Agreement at the corresponding assumed purchase price set forth in the first column and assuming a maximum of \$25 million of shares are sold to Aspire Capital.

PLAN OF DISTRIBUTION

The shares may be sold or distributed from time to time by the Selling Stockholder directly to one or more purchasers or through brokers, dealers, or underwriters who may act solely as agents at market prices prevailing at the time of sale, at prices related to the prevailing market prices, at negotiated prices, or at fixed prices, which may be changed. The sale of the shares offered by this prospectus may be effected in one or more of the following methods:

ordinary brokers' transactions;

transactions involving cross or block trades;

through brokers, dealers, or underwriters who may act solely as agents;

“at the market” into an existing market for the Common Stock;

in other ways not involving market makers or established business markets, including direct sales to purchasers or sales effected through agents in privately negotiated transactions; or any combination of the foregoing.

In order to comply with the securities laws of certain states, if applicable, the shares may be sold only through registered or licensed brokers or dealers. In addition, in certain states, the shares may not be sold unless they have been registered or qualified for sale in the state or an exemption from the registration or qualification requirement is available and complied with.

The Selling Stockholder may also sell shares of Common Stock under Rule 144 promulgated under the Securities Act, if available, rather than under this prospectus. In addition, the Selling Stockholder may transfer the shares of Common Stock by other means not described in this prospectus.

Brokers, dealers, underwriters, or agents participating in the distribution of the shares as agents may receive compensation in the form of commissions, discounts, or concessions from the Selling Stockholder and/or purchasers of the Common Stock for whom the broker-dealers may act as agent. The Selling Stockholder has informed us that each such broker-dealer will receive commissions from Aspire Capital which will not exceed customary brokerage commissions.

The Selling Stockholder and its affiliates have agreed not to engage in any direct or indirect short selling or hedging of our Common Stock during the term of the Purchase Agreement.

The Selling Stockholder is an “underwriter” within the meaning of the Securities Act.

We have advised Selling Stockholder that while it is engaged in a distribution of the shares included in this prospectus it is required to comply with Regulation M promulgated under the Exchange Act. With certain exceptions, Regulation M precludes the Selling Stockholder, any affiliated purchasers, and any broker-dealer or other person who participates in the distribution from bidding for or purchasing, or attempting to induce any person to bid for or purchase any security which is the subject of the distribution until the entire distribution is complete. Regulation M also prohibits any bids or purchases made in order to stabilize the price of a security in connection with the distribution of that security. All of the foregoing may affect the marketability of the shares offered hereby this prospectus.

We may suspend the sale of shares by Aspire Capital pursuant to this prospectus for certain periods of time for certain reasons, including if the prospectus is required to be supplemented or amended to include additional material information.

This offering will terminate on the date that all shares offered by this prospectus have been sold by the Selling Stockholder.

CERTAIN RELATIONSHIPS AND RELATED TRANSACTIONS

Dr. Quay is the President, Chief Executive Officer and Chairman of the Board of Directors of the Company. Dr. Chen is the Chief Scientific Officer and a director of the Company. Drs. Quay and Chen are husband and wife. Drs. Quay and Chen are significant minority stockholders. Ensisheim Partners, LLC (“*Ensisheim*”), which holds approximately 24% of the outstanding Common Stock of the Company prior to this offering, is wholly owned by Drs. Quay and Chen, and they are the beneficial owners of the shares of the Company’s stock owned by that entity.

Ensisheim was the original owner of the patents covering the MASCT System, which were acquired by the Company in June 2010. Ensisheim has no further interest or right to the U.S. patents and foreign counterparts that cover the manufacture, use, and sale of the MASCT System, the pending patent applications for improvements, or the FDA marketing authorization for the MASCT System that was transferred to the Company. Ensisheim did not receive any monetary compensation in connection with the transfer and assignment to the Company of the patents, patent applications and FDA marketing authorization but received shares of Common Stock of the Company in consideration for its contribution of these assets. Ensisheim holds patents and patent applications for inventions created by the owners in fields unrelated to the Company’s business and provides a corporate structure for consulting activities of the owners in fields unrelated to the Company’s business. Drs. Quay and Chen currently devote substantially all of their professional efforts to the business of the Company.

Loans from Officer

On May 26, 2009, the Company borrowed \$5,000 from its Chairman of the Board and Chief Executive Officer as a short-term, unsecured loan via an oral agreement and did not bear any interest. Commencing June 30, 2010, the loan was converted into a written Promissory Note bearing an annual interest rate of 10%, with a maturity date of December 31, 2010. This note was repaid in full on May 16, 2011, including approximately \$439 in accrued interest.

On June 30, 2010, the Company borrowed an additional \$100,000 from its Chairman of the Board and Chief Executive Officer pursuant to a promissory note. The loan under the note was funded to the Company on July 12, 2010. The note bore interest at a rate of 10% per annum and carried a \$4,000 loan origination fee, which accreted to the loan balance over the life of the loan. The \$4,000 loan origination fee was fully accreted to the loan balance as of March 31, 2011 and December 31, 2010, and recorded as interest expense for the year ended December 31, 2010. This note (including the \$4,000 origination fee) was repaid in full on May 19, 2011, including approximately \$8,959 in accrued interest.

On November 3, 2010, the Company entered into a line of credit for borrowing up to \$500,000 from its Chairman of the Board and Chief Executive Officer pursuant to a promissory note. The note bore interest at a rate of 10% per

annum. An aggregate of \$140,000 was funded to the Company under the line of credit through March 31, 2011, which was repaid on May 31, 2011, including approximately \$6,093 in accrued interest. As of December 31, 2011, the unpaid principal balance drawn from the line of credit was \$10,000. The note is payable in full on or before December 31, 2011 for the outstanding balance borrowed. As of December 31, 2011, the unpaid principal balance drawn from the line of credit was \$5,078, which was fully repaid on March 31, 2012, as well as \$823 in interest.

Exclusive License Agreement

On July 27, 2009, the Company entered into an exclusive license agreement with Ensisheim, an entity solely owned by the Chairman and Chief Executive Officer of the Company and the Chief Scientific Officer of the Company, who is also the Company's Chairman and CEO's wife. Pursuant to that agreement, Ensisheim granted the Company an exclusive, worldwide, perpetual, irrevocable, royalty-bearing, license to the MASCT System, with the right to grant and authorize sublicenses. The license agreement provided that the Company would pay Ensisheim a royalty equal to 2% of net sales revenue, with a minimum royalty of \$12,500 per fiscal quarter during the term of the agreement, which would have increased to a minimum royalty of \$25,000 per fiscal quarter beginning in the quarter in which the first commercial sale of a licensed product would have taken place. As of December 31, 2009, a total of \$12,500 was payable to Ensisheim under the minimum royalty provisions. From inception through December 31, 2010, the Company had incurred \$16,250 in patent-related expenses under the license agreement with Ensisheim. The \$16,250 in patent-related expenses relates to legal fees in connection with filing and prosecuting the related patent applications and has been paid in full by the Company.

On June 17, 2010, the Company and Ensisheim entered into an Assignment Agreement whereby Ensisheim assigned to the Company all rights to the patents and patent applications underlying the MASCT System. Pursuant to the assignment, the Company will have all responsibility for prosecution, maintenance, and enforcement and will indemnify Ensisheim from any and all claims against the patent estate. Ensisheim retained no residual rights with respect to the patents and patent applications. In conjunction with the assignment, the Company terminated the exclusive license agreement between the Company and Ensisheim dated July 27, 2009. As a result of the termination, the Company has no further obligations with respect to royalty payments to Ensisheim due under the old licensing agreement. As a result, the \$12,500 of patent royalty payable to Ensisheim recorded as accrued royalty payable at December 31, 2009 has been reversed through royalty expense during the second quarter of 2010. Ensisheim did not receive further cash or equity consideration under the Assignment Agreement other than the shares of Common Stock it had already received in April 2009 as a result of its contribution of intellectual property rights and FDA marketing authorization for the MASCT System. Neither the Chief Executive Officer nor the Chief Technology Officer of the Company received consideration under the Assignment Agreement. However, since Ensisheim has at all times held a substantial equity position in the Company, the potential increased profits of the Company as a result of the removal of this royalty payment obligation may provide more potential economic value to Ensisheim than the royalty payment would have provided.

Executive Compensation

On May 19, 2010, the Company entered into employment agreements with three executives, including its Chief Executive Officer, its former President, and its Chief Scientific Officer. The annual base salaries under each agreement were calculated based on combined consideration of the success of capital raise and the operating results of the Company, and capped at \$360,000, \$350,000, and \$250,000, respectively for the three executives.

On July 22, 2010, the Company amended and restated the employment agreements with its Chief Executive Officer and Chief Scientific Officer. The agreements modified the annual base salary amounts to \$250,000 and \$200,000, respectively, effective retroactively to May 19, 2010. These salaries were accrued and amounted to \$391,071 and \$278,571 as of March 31, 2011 and December 31, 2010, respectively, and paid in full in April 2011. For the twelve-month periods ended December 31, 2011 and 2010, salaries and bonuses of the Chief Executive Officer and Chief Scientific Officer amounted to \$693,048 and \$377,620, of which \$492,095 and \$0 was recorded to research and development expense, respectively.

Share-Based Compensation

The amended and restated employment agreement with the Chief Executive Officer granted options to purchase 250,000 shares (or 565,830 shares prior to the reverse stock split on September 28, 2010) at a price of \$5.00 per share (or \$2.64 per share prior to the reverse stock split on September 28, 2010), in consideration of his service to the Company. Of these options, 25% (or 62,500 shares) vested on December 31, 2010 with the remaining 75% (or 187,500 shares) to vest in equal quarterly installments over the next three years so long as the executive remains employed with the Company. These options have five-year contractual terms.

The amended employment agreement with the Chief Scientific Officer granted options to purchase 100,000 shares (or 226,332 shares prior to the reverse stock split on September 28, 2010) at a price of \$5.00 per share (or \$2.64 per share prior to the reverse stock split on September 28, 2010) in consideration of her service to the Company. Of these options, 25% (or 25,000 shares) vested on December 31, 2010 with the remaining 75% (or 75,000 shares) to vest in equal quarterly installments over the next three years so long as the executive remains employed with the Company. These options have five-year contractual terms.

The 2012 bonuses payable to Drs. Quay and Chen for 2012, in the amount of \$72,590 and \$43,554, respectively, were paid on March 11, 2013 in the form of fully-vested options with Dr. Quay receiving an option to purchase 44,194 shares of Common Stock at \$6.57 per share, the fair market value of our Common Stock on the date of grant, and Dr. Chen receiving an option to purchase 26,516 shares at \$6.57 per share, the fair market value of our Common Stock on the date of grant. See "Employment Agreements" above for a further description of the compensation arrangements with

these officers.

On April 4, 2011, 45,000 non-qualified stock options were granted under the 2010 Stock Option and Incentive Plan to Dr. Tim Hunkapiller for being a member of the Company's Scientific Advisory Board and consulting services to be provided to the Company, at an exercise price of \$1.25 per share. These options have a ten-year contractual term and shall vest as follows:

- (i) 11,250 option shares vest ninety (90) days after the date of grant;
- (ii) 11,000 option shares vest one hundred and eighty (180) days after the date of grant;
- (iii) 11,500 option shares vest two hundred and seventy (270) days after the date of grant; and
- (iv) 11,250 option shares vest three hundred and sixty (360) days after the date of grant.

On September 1, 2011, 219,000 incentive stock options were granted under the 2010 Stock Option and Incentive Plan to employees and officers as part of their employment agreements, at an exercise price of \$1.25 per share. These options have a ten-year contractual term and shall vest and become exercisable as follows:

- (i) twenty-five percent (25%) of the underlying shares on the first anniversary of the date of grant; and
- (ii) one-forty eighth (1/48) of the underlying shares monthly thereafter.

On September 1, 2011, 200,000 non-qualified stock options were granted under the 2010 Stock Option and Incentive Plan to non-employee directors for services to be provided to the Company, at an exercise price of \$1.25 per share. These options have a ten-year contractual term and shall vest and become exercisable as follows:

- (i) 80,000 option shares vest on September 1, 2011;
- (ii) 30,000 option shares vest on December 1, 2011;
- (iii) 30,000 option shares vest on March 1, 2012;
- (iv) 30,000 option shares vest on June 1, 2012; and
- (v) 30,000 option shares vest on September 1, 2012.

On April 30, 2012, 19,757 non-qualified stock options were granted under the 2010 Stock Option and Incentive Plan to non-employee directors for serving as directors of the Company, at an exercise price of \$6.00 per share. These options have a ten-year term and shall vest and become exercisable in full immediately as of the grant date.

On May 7, 2013, an option to purchase 41,243 shares of Common Stock at an exercise price of \$6.595 per share was granted to Alexander Cross for prior service on the board of directors. The option was fully vested and exercisable on the date of grant. Also on May 7, 2013, an option to purchase 41,243 shares of Common Stock at an exercise price of \$6.595 per share was granted to Alexander Cross for future service on the board of directors. The option vests and becomes exercisable with respect to 25% of the underlying shares quarterly over one year from the date of grant.

On May 7, 2013, an option to purchase 40,030 shares of Common Stock at an exercise price of \$6.595 per share was granted to Stephen Galli for prior service on the board of directors. The option was fully vested and exercisable on the date of grant. Also on May 7, 2013, an option to purchase 40,030 shares of Common Stock at an exercise price of \$6.595 per share was granted to Stephen Galli for future service on the board of directors. The option vests and becomes exercisable with respect to 25% of the underlying shares quarterly over one year from the date of grant.

On May 7, 2013, an option to purchase 44,882 shares of Common Stock at an exercise price of \$6.595 per share was granted to John Barnhart for prior service on the board of directors. The option was fully vested and exercisable on the date of grant. Also on May 7, 2013, an option to purchase 44,882 shares of Common Stock at an exercise price of \$6.595 per share was granted to John Barnhart for future service on the board of directors. The option vests and becomes exercisable with respect to 25% of the underlying shares quarterly over one year from the date of grant.

On June 4, 2013, an option to purchase 60,000 shares of Common Stock at an exercise price of \$4.31 per share was granted under the 2010 Stock Option and Incentive Plan to Mr. Guse in lieu of a signing and relocation payable to him by the Company. The option vested and became exercisable upon the achievement of certain performance goals by the Company.

On October 10, 2013, 24,510 shares of restricted stock that vest quarterly over one year from October 10, 2013, as well as an option to purchase 57,190 shares of Common Stock was granted under the 2010 Stock Option and Incentive Plan to Mr. Weaver for serving as director of the Company through the 2014 annual meeting of stockholders, at an exercise price of \$2.04 per share. The option vests and becomes exercisable in three equal installments between the date of grant and the 2014 annual meeting of stockholders.

Indemnification Agreements

The Company has entered into indemnification agreements with each of its directors and certain of its executive officers. These agreements require the Company to indemnify these individuals to the fullest extent permitted under Delaware law against liabilities that may arise by reason of their service to the Company, and to advance expenses incurred as a result of any proceeding against them as to which they could be indemnified.

Related Party Transaction Policies

Related party transactions that the Company is required to disclose publicly under the federal securities laws will require prior approval of the Company's independent directors without the participation of any director who may have a direct or indirect interest in the transaction in question. Related parties include directors, nominees for director, principal stockholders, executive officers and members of their immediate families. For these purposes, a "transaction" will include all financial transactions, arrangements or relationships, ranging from extending credit to the provision of goods and services for value and will include any transaction with a company in which a director, executive officer immediate family member of a director or executive officer, or principal stockholder (that is, any person who beneficially owns five percent or more of any class of the Company's voting securities) has an interest by virtue of a 10% or greater equity interest. The Company's policies and procedures regarding related party transactions are not expected to be a part of a formal written policy, but rather, will represent a course of practice determined to be appropriate by the Board of Directors of the Company.

PRINCIPAL STOCKHOLDERS

The following table sets forth information as of December 9, 2013 regarding the beneficial ownership of our Common Stock by each of our executive officers and directors, individually and as a group and by each person who beneficially owns in excess of five percent of the Common Stock after giving effect to any exercise of warrants or options held by that person within 60 days after December 9, 2013. Unless indicated otherwise, the address for the beneficial holders is c/o Atossa Genetics Inc., 1616 Eastlake Ave. E., Suite 510, Seattle, Washington, 98102.

Name of Beneficial Owner	Shares Beneficially Owned	Percentage of Common Stock Beneficially Owned (1)	
Steven C. Quay, M.D., Ph.D. (2)	5,146,052	28.1	%
Shu-Chih Chen, Ph.D. (3)	4,394,831	24.2	%
John Barnhart (4)	263,885	1.5	%
Kyle Guse (5)	185,000	1.0	%
Stephen Galli, M.D. (6)	133,653	*	
Alexander D. Cross, Ph.D. (7)	206,968	1.1	%
H. Lawrence Rimmel, Esq. (8)	4,000	*	
Gregory Weaver (9)	54,253	*	
All Current Officers and Directors as a Group (8 persons)	6,120,327	32.0	%

*

Less than 1%

(1) Based on 18,024,824 shares of Common Stock issued and outstanding as of December 9, 2013, including the Commitment Shares issued to Aspire Capital.

(2) Consists of (i) 583,543 shares of Common Stock directly owned by Dr. Quay, (ii) 4,268,315 shares of Common Stock owned by Ensisheim and (iii) 294,194 shares of Common Stock issuable upon the exercise of stock options held by Dr. Quay and exercisable within 60 days after December 9, 2013. Drs. Quay and Chen share voting and investment power over the securities held by Ensisheim. Ensisheim is solely owned and controlled by Drs. Quay and Chen, and, as a result, Drs. Quay and Chen are deemed to be beneficial owners of the shares held by this entity.

(3) Consists of (i) 4,268,315 shares of Common Stock owned by Ensisheim and (ii) 126,516 shares of Common Stock issuable upon the exercise of stock options held by Dr. Chen and exercisable within 60 days after December 9, 2013. Drs. Quay and Chen share voting and investment power over the securities held by Ensisheim. Ensisheim is solely owned and controlled by Drs. Quay and Chen, and, as a result, Drs. Quay and Chen are deemed to be beneficial owners of the shares held by this entity.

(4) Consists of (i) 39,765 shares of Common Stock held by Mr. Barnhart (ii) 17,674 shares of Common Stock held by certain family members and for which Mr. Barnhart is the beneficial owner and (iii) 206,446 shares of Common Stock issuable upon the exercise of stock options held by Mr. Barnhart and exercisable within 60 days of December 9, 2013.

(5) Consists of 185,000 shares of Common Stock issuable upon the exercise of stock options held by Mr. Guse and exercisable within 60 days of December 9, 2013.

(6) Consists of 17,674 shares of Common Stock held by Dr. Galli and 115,979 shares of Common Stock issuable upon the exercise of stock options held by Dr. Galli and exercisable within 60 days of December 9, 2013.

Consists of 88,866 shares of Common Stock held by the Alexander D. Cross Family Trust (Mr. Alexander D. Cross has sole voting and investment power over the securities held by the trust and as such, is deemed to be the beneficial owner of the shares held by this entity) and 118,102 shares of Common Stock issuable upon the exercise of stock options held by Dr. Cross and exercisable within 60 days of December 9, 2013.

(8) Consists of 2,000 shares of Common Stock held by Mr. Rimmel and 2,000 shares of Common Stock held by Mr. Rimmel's spouse. Mr. Rimmel disclaims beneficial ownership of the 2,000 shares of Common Stock held by his spouse.

(9) Consists of 16,127 shares of Common Stock held by Mr. Weaver and 38,126 shares of Common Stock issuable upon exercise of stock options held by Mr. Weaver and exercisable within 60 days of December 9, 2013.

DESCRIPTION OF SECURITIES TO BE REGISTERED

Our authorized capital stock consists of 75,000,000 shares of Common Stock, \$0.001 par value per share, and 10,000,000 shares of preferred stock, \$0.001 par value per share.

As of the date of this prospectus, there were approximately 261 record holders of the Company's Common Stock. The number of shares of our Common Stock outstanding as of the date of this prospectus is 18,024,824, which excludes 1,478,651 shares issuable upon the exercise of options outstanding as of December 9, 2013 under our 2010 Stock Option and Incentive Plan, or 2010 Plan, as well as 471,624 shares of Common Stock reserved for future issuance under our 2010 Plan, and 768,000 shares issuable upon exercise of options granted outside of our 2010 plan as inducement grants. The 2010 Plan contains an evergreen feature by which the initial 2010 Plan limit of 1,000,000 will increase on each January 1 by the lesser of (i) the 4% annual increase applicable to the 2010 Plan for such year or (ii) 500,000 shares. The 18,024,824 shares of Common Stock outstanding as of the date of this prospectus also excludes:

4,332,050 shares of Common Stock underlying outstanding warrants, substantially all with an exercise price of \$1.60 per share;

325,000 shares of Common Stock issuable upon the exercise of warrants with an exercise price of \$5.00 per share issued in connection with our acquisition of substantially all the assets of Acueity Healthcare, Inc.;

60,000 shares of Common Stock issuable upon exercise of a warrant exercisable at \$4.24 per share; and

58,500 shares of Common Stock issuable upon exercise of warrants issued to Dawson James Securities, or its designee, for acting as placement agent in connection with the March 27, 2013 stock purchase agreement with Aspire Capital at exercise prices ranging from \$2.31 to \$12.43 per share.

Common Stock

Holders of Common Stock are entitled to receive ratably dividends out of funds legally available, if and when declared from time to time by our Board of Directors. We have never paid any cash dividends on our Common Stock and our Board of Directors does not anticipate that we will pay cash dividends in the foreseeable future. The future payment of dividends, if any, on our Common Stock is within the discretion of the Board of Directors and will depend upon earnings, capital requirements, financial condition and other relevant factors. Holders of Common Stock are entitled to one vote for each share held on each matter to be voted on by stockholders. There is no cumulative voting in the election of directors. In the event of liquidation, dissolution or winding up of the affairs of us, holders of Common Stock are to share in all assets remaining after the payment of liabilities and any preferential distributions

payable to preferred stockholders, if any. The holders of Common Stock have no preemptive or conversion rights and are not subject to further calls or assessments. There are no redemption or sinking fund provisions applicable to the Common Stock. The rights of the holders of the Common Stock are subject to any rights that may be fixed for holders of preferred stock, if any. All of the outstanding shares of Common Stock are fully paid and non-assessable.

Certificate of Incorporation

Under our Certificate of Incorporation, as amended, our Board of Directors, without further action by our stockholders, currently has the authority to issue up to 10,000,000 shares of preferred stock and to fix the rights (including voting rights), preferences and privileges of these “blank check” preferred shares. Such preferred stock may have rights, including economic rights, senior to our Common Stock. As a result, the issuance of the preferred stock could have a material adverse effect on the price of our Common Stock and could make it more difficult for a third party to acquire a majority of our outstanding Common Stock.

Anti-Takeover Devices

Our certificate of incorporation and bylaws include a number of provisions that may have the effect of delaying, deferring or preventing another party from acquiring control of us and encouraging persons considering unsolicited tender offers or other unilateral takeover proposals to negotiate with our Board of Directors rather than pursue non-negotiated takeover attempts. These provisions include the items described below.

Board Composition and Filling Vacancies. In accordance with our certificate of incorporation, our Board of Directors is divided into three classes serving staggered three-year terms, with one class being elected each year. Our certificate of incorporation also provides that directors may only be removed from office for cause and only by the affirmative vote of holders of 75% or more of the outstanding shares of capital stock then entitled to vote at an election of directors. Furthermore, any vacancy on our Board of Directors, however occurring, including any vacancy resulting from an increase in the size of the board, may only be filled by the affirmative vote of a majority of our directors then in office even if less than a quorum. The classification of directors, together with the limitations on removal of directors and treatment of vacancies, has the effect of making it more difficult for stockholders to change the composition of our Board of Directors.

Undesignated Preferred Stock. Our certificate of incorporation authorizes “blank-check” preferred stock, which means that our Board of Directors has the authority to designate one or more series of preferred stock without stockholder approval. These series of preferred stock may have superior rights, preferences and privileges over our Common Stock, including dividend rights, voting rights and liquidation preferences. The ability of our Board of Directors to issue shares of our preferred stock without stockholder approval could deter takeover offers and make it more difficult or costly for a third party to acquire us without the consent of our Board of Directors.

Section 203 of the Delaware General Corporation Law. In addition, our certificate of incorporation does not opt out of Section 203 of the Delaware General Corporation Law, which protects a corporation against an unapproved takeover by prohibiting a company from engaging in any business combination with any interested stockholder (defined as a stockholder owning more than 15% of the outstanding shares) for a period of three years from the time such stockholder became a 15% holder unless approved by our Board of Directors.

Transfer Agent and Registrar

We have appointed VStock Transfer, LLC, 77 Spruce Street, Suite 201, Cedarhurst, New York 11516 (Telephone: (212) 828-8436; Facsimile (646) 536-3179) as our transfer agent and registrar.

Listing

Our Common Stock is listed on the NASDAQ Capital Market under the symbol “ATOS”. Our Common Stock began trading on the NASDAQ Capital Market on November 8, 2012 and, since that time through December 9, 2013, the high sales price has been \$12.40 per share and the low price has been \$1.74 per share.

DISCLOSURE OF COMMISSION POSITION ON INDEMNIFICATION FOR SECURITIES ACT LIABILITIES

Insofar as indemnification for liabilities arising under the Securities Act may be permitted to directors, officers, and controlling persons of the registrant pursuant to the foregoing provisions, or otherwise, the registrant has been advised that in the opinion of the Securities and Exchange Commission such indemnification is against public policy as expressed in the Securities Act and is, therefore, unenforceable.

LEGAL MATTERS

Certain legal matters relating to the validity of the Common Stock offered by this prospectus will be passed upon for us by Ropes & Gray LLP, San Francisco, California.

EXPERTS

KCCW Accountancy Corp., an independent PCAOB registered public accounting firm, has audited the Company's consolidated balance sheets as of December 31, 2012 and 2011 and the related consolidated statements of operations, stockholders' equity, and cash flows for the years then ended and since inception (April 30, 2009), which are incorporated by reference in this prospectus. The consolidated financial statements are included in reliance on the report of KCCW Accountancy Corp., given their authority as experts in accounting and auditing.

WHERE YOU CAN FIND ADDITIONAL INFORMATION

We are required to file annual, quarterly and special reports, proxy statements and other information with the SEC. You may read and copy any document filed by us at the SEC's Public Reference Room at 100 F Street, N.E., Washington, D.C. 20549. Please call the SEC at 1-800-SEC-0330 for further information on the public reference room. Our filings with the SEC are also available to the public at the SEC's Internet web site at <http://www.sec.gov>.

We have filed a registration statement, of which this prospectus is a part, covering the securities offered hereby. As allowed by SEC rules, this prospectus does not include all of the information contained in the registration statement and the included exhibits, financial statements and schedules. You are referred to the registration statement, the included exhibits, financial statements and schedules for further information. This prospectus is qualified in its entirety by such other information.

INCORPORATION OF CERTAIN INFORMATION BY REFERENCE

The SEC allows us to “incorporate by reference” information from other documents that we file with it, which means that we can disclose important information to you by referring you to those documents. The information incorporated by reference is considered to be part of this prospectus. Information in this prospectus supersedes information incorporated by reference that we filed with the SEC prior to the date of this prospectus.

We incorporate by reference into this prospectus and the registration statement of which this prospectus is a part the information or documents listed below that we have filed with the SEC (Commission File No. 001-35610):

- our annual report on Form 10-K for the year ended December 31, 2012, filed with the SEC on March 28, 2013;
- our quarterly reports on Form 10-Q for the quarters ended March 31, 2013, June 30, 2013 and September 30, 2013;
- portions of our definitive Proxy Statement on Schedule 14A, filed with the SEC on April 15, 2013; and
- our current reports on Form 8-K filed with the SEC on January 4, 2013, February 25, 2013, February 28, 2013, March 13, 2013, May 9, 2013 (as amended on August 15, 2013), October 4, 2013, October 15, 2013 and December 16, 2013 (other than the portions of those reports not deemed to be filed).

We will furnish without charge to you, on written or oral request, a copy of any or all of the documents incorporated by reference, including exhibits to these documents. You should direct any requests for documents to Kyle Guse, Chief Financial Officer, Atossa Genetics Inc., 1616 Eastlake Ave. E., Suite 510, Seattle, Washington, 98102. Copies of the above reports may also be accessed from our web site at <http://www.atossagenetics.com>.

Any statement contained in a document incorporated or deemed to be incorporated by reference in this prospectus will be deemed modified, superseded or replaced for purposes of this prospectus to the extent that a statement contained in this prospectus modifies, supersedes or replaces such statement.

Up to 4,200,000 shares of Common Stock

ATOSSA GENETICS INC.