ARCA biopharma, Inc.
Form S-1/A
May 24, 2013
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As filed with the Securities and Exchange Commission on May 23, 2013

Registration No. 333-187508

UNITED STATES

SECURITIES AND EXCHANGE COMMISSION

Washington, D.C. 20549

Amendment No. 3

to

FORM S-1

REGISTRATION STATEMENT

UNDER

THE SECURITIES ACT OF 1933

ARCA BIOPHARMA, INC.

(Exact name of registrant as specified in its charter)

Delaware	2835	36-3855489
(State or other jurisdiction of incorporation or organization)	(Primary Standard Industrial Classification Code Number)	(I.R.S. Employer Identification Number)

8001 Arista Place, Suite 430

Broomfield, CO 80021

720-940-2200

(Address, including zip code, and telephone number, including area code, of registrant s principal executive offices)

Michael R. Bristow

President and Chief Executive Officer

8001 Arista Place, Suite 430

Broomfield, CO 80021

720-940-2200

(Name, address, including zip code, and telephone number, including area code, of agent for service)

Copies to:

Brent D. Fassett	**Robert Charron**
Cooley LLP	**Ellenoff Grossman & Schole LLP**
380 Interlocken Crescent, Suite 900	**150 East 42nd Street**
Broomfield, Colorado 80021	**New York, New York 10017**
(720) 566-4000	**(212) 370-1300**

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

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

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

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

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

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

Large accelerated filer ¨	Accelerated filer ¨
Non-accelerated filer ¨ (Do not check if a smaller reporting company)	Smaller reporting company x

CALCULATION OF REGISTRATION FEE

Title of Each Class of Securities to be Registered	Proposed Maximum Aggregate Offering Price [1]	Amount of Registration Fee [2][3]
Series A Convertible Preferred Stock, $0.001 par value Warrants to purchase shares of common stock Shares of common stock issuable upon exercise of the Warrants and conversion of the Series A Convertible Preferred Stock Total:	$35,000,000	$4,774

(1) Estimated solely for the purpose of calculating the amount of the registration fee in accordance with Rule 457(o) of the Securities Act of 1933, as amended.
(2) Calculated pursuant to Rule 457(o) based on an estimate of the proposed maximum aggregate offering price.
(3) The registrant previously paid $2,728 of the registration fee with the initial filing of this Registration Statement.

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

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The information contained in this preliminary prospectus is not complete and may be changed. We may not sell these securities until the registration statement filed with the Securities and Exchange Commission is effective. This preliminary prospectus is not an offer to sell these securities and is not a soliciting an offer to buy these securities in any jurisdiction where the offer or sale is not permitted.

SUBJECT TO COMPLETION, DATED MAY 23, 2013

PRELIMINARY PROSPECTUS

104,167 Shares of Series A Convertible Preferred Stock

10,416,700 Shares of Common Stock Underlying the Preferred Stock

Warrants to Purchase up to 5,208,350 Shares of Common Stock and

5,208,350 Shares of Common Stock Underlying the Warrants

We are offering up to 104,167 shares of our Series A Convertible Preferred Stock (Preferred Stock) and warrants to purchase up to 5,208,350 shares of our common stock (and the common stock issuable from time to time upon conversion of the Preferred Stock and upon exercise of each of the warrants). Each warrant will have an exercise price of $ per share, will be immediately exercisable and will expire on the 5 year anniversary of the date of issuance. Each investor will receive a warrant to purchase 50 shares of our common stock for each share of Preferred Stock purchased. The shares of Preferred Stock and warrants are immediately separable and will be issued separately, but will be purchased together in this offering.

Our common stock is listed on The NASDAQ Capital Market under the symbol ABIO. On May 22, 2013, the last reported sale price of our common stock on The NASDAQ Capital Market was $2.56 per share. There is no established trading market for the Preferred Stock or the warrants and we do not expect a market to develop. In addition, we do not intend to apply for the listing of the Preferred Stock or warrants on any national securities exchange. The warrants will be issued in registered form pursuant to a warrant agency agreement between us and Computershare Trust Company, N.A., as warrant agent.

Each share of Preferred Stock is initially convertible into 100 shares of our common stock at any time at the option of the holder, provided that the holder will be prohibited from converting Preferred Stock into shares of our common stock if, as a result of such conversion, the holder, together with its affiliates, would beneficially own more than 9.99% of the total number of shares of our common stock then issued and outstanding. In the event of our liquidation, dissolution, or winding up, holders of our Preferred Stock will receive a payment equal to $0.001 per share of Preferred Stock before any proceeds are distributed to the holders of our common stock. Shares of Preferred Stock will have no voting rights, except as required by law.

Investing in our Preferred Stock and warrants (and the common stock underlying such securities) involves a high degree of risk. Please read Risk Factors beginning on page 5 of this prospectus.

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.

	PER SHARE AND ACCOMPANYING WARRANTS	TOTAL
Public Offering Price	$	$
Placement Agent s Fees (1)	$	$
Proceeds to ARCA biopharma before expenses	$	$

(1) In addition we have agreed to issue to the placement agent warrants to purchase up to an aggregate of 5.0% of the aggregate number of shares of common stock underlying the shares of Preferred Stock sold in this offering, to pay to the placement agent a non-accountable expense allowance equal to 1.75% of the aggregate gross proceeds raised in the offering and to reimburse legal expense of the placement agent in an amount up to $30,000.

Dawson James Securities, Inc. has agreed to act as our lead placement agent in connection with this offering. Dawson may engage one or more sub-placement agents or selected dealers. The placement agent is not purchasing or selling the securities offered by us, and is not required to sell any specific number or dollar amount of securities, but will use its reasonable best efforts to arrange for the sale of the securities offered. We have agreed to pay the placement agent a placement fee equal to 6.0% of the aggregate gross proceeds to us from the sale of the securities in the offering and to issue the placement agent warrants to purchase 5.0% of the common stock issuable upon conversion of the Preferred Stock sold in this offering, each with an exercise price equal to $. We estimate total expenses of this offering, excluding the placement agent fees, will be approximately $767,000. Because there is no minimum offering amount required as a condition to closing in this offering, the actual public offering amount, placement agent fees, and proceeds to us, if any, are not presently determinable and may be substantially less than the total maximum offering amounts set forth above. See Plan of Distribution beginning on page 60 of this prospectus for more information on this offering and the placement agent arrangements.

This offering will terminate on , 2013, unless the offering is fully subscribed before that date or we decide to terminate the offering prior to that date. In either event, the offering may be closed without further notice to you.

Investing in our Preferred Stock and warrants (and the common stock underlying such Preferred Stock and warrants) involves a high degree of risk. Before making any investment in such securities, you should read and carefully consider the risks described in this prospectus under Risk Factors beginning on page 5 of this prospectus. You should rely only on the information contained in this prospectus or any prospectus supplement or amendment thereto. We have not authorized anyone to provide you with different information. 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.

Dawson James Securities, Inc.

Prospectus dated , 2013

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We have not, and the placement agent has not, authorized anyone to provide you with information different than that contained or incorporated by reference in this prospectus and any free writing prospectus that we have authorized for use in connection with this offering. If anyone provides you with different or inconsistent information, you should not rely on it. We are not, and the placement agent is not, making an offer to sell these securities in any jurisdiction where the offer or sale is not permitted. You should assume that the information appearing in this prospectus, the documents incorporated by reference in this prospectus, and in any free writing prospectus that we have authorized for use in connection with this offering, is accurate only as of the date of those respective documents. Our business, financial condition, results of operations and prospects may have changed since those dates. You should read this prospectus, the documents incorporated by reference in this prospectus, and any free writing prospectus that we have authorized for use in connection with this offering, in their entirety before making an investment decision. You should also read and consider the information in the documents to which we have referred you in the sections of this prospectus entitled Where You Can Find Additional Information and Incorporation of Certain Information by Reference.

Unless the context indicates otherwise, the terms ARCA, ARCA biopharma, we, us and our refer to ARCA biopharma, Inc.

ARCA, the ARCA logo, and associated logo are trademarks of ARCA biopharma, Inc.

Other trademarks and trade names that are the property of their respective owners are also contained in this prospectus.

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PROSPECTUS SUMMARY

This summary highlights selected information contained elsewhere or incorporated by reference in this prospectus. This summary does not contain all the information you should consider before investing in our Preferred Stock and warrants. You should read and consider carefully the more detailed information in this prospectus, including the factors described under the heading Risk Factors in this prospectus beginning on page 5 and the financial and other information included and incorporated by reference in this prospectus, as well as the information included in any free writing prospectus that we have authorized for use in connection with this offering, before making an investment decision.

The terms ARCA, the Company, we, us, our and similar terms refer to ARCA biopharma, Inc.

Overview

We are a biopharmaceutical company whose principal focus is developing genetically-targeted therapies for cardiovascular diseases. Our lead product candidate is Gencaro (bucindolol hydrochloride), a pharmacologically unique beta-blocker and mild vasodilator that we plan to evaluate in a new clinical trial for the treatment of atrial fibrillation, or AF, in patients with heart failure and left ventricular dysfunction, or HFREF. We have identified common genetic variations in receptors in the cardiovascular system that we believe interact with Gencaro s pharmacology and may predict patient response to the drug.

We plan to test this hypothesis in a Phase 2b/3 clinical trial of Gencaro, known as GENETIC-AF. We plan to pursue this indication for Gencaro because data from the previously conducted Phase 3 heart failure (HF) trial of Gencaro in 2,708 HF patients, or the BEST trial, suggest that Gencaro may be successful in reducing or preventing AF.

AF is a disorder in which the normally regular and coordinated contraction pattern of the heart s two small upper chambers (the atria) becomes irregular and uncoordinated. The irregular contraction pattern associated with AF causes blood to pool in the atria, predisposing the formation of clots potentially resulting in stroke. AF is considered an epidemic cardiovascular disease with an estimated prevalence of at least 2.7 million Americans in 2010. The approved therapies for the treatment or prevention AF have certain disadvantages in HFREF patients, such as toxic or cardiovascular adverse effects, and most of the approved drugs for AF are contra indicated or have warnings in their prescribing information for such patients. We believe there is an unmet medical need for new AF treatments that have fewer side effects than currently available therapies and are more effective, particularly in HFREF patients.

The GENETIC-AF trial is designed to compare Gencaro to the beta-blocker metoprolol CR/XL in patients with the beta-1 389 arginine homozygous genotype, which we believe responds most favorably to Gencaro. We believe data from the BEST trial indicate that Gencaro may have a genetically regulated effect in reducing or preventing AF, whereas we believe the therapeutic benefit of metoprolol CR/XL does not appear to be enhanced in patients with this genotype. A retrospective analysis of data from the BEST trial shows that the entire cohort of patients in the BEST trial treated with Gencaro had a 41% reduction in the risk of new onset AF (time-to-event) compared to placebo ($p = 0.0004$). In the BEST DNA substudy, patients with the beta-1 389 arginine homozygous genotype experienced a 74% ($p = 0.0003$) reduction in risk of AF when receiving Gencaro, based on the same analysis. The beta-1 389 arginine homozygous genotype was present in about 47% of the patients in the BEST pharmacogenetic substudy, and we estimate it is present in about 50% of the US general population.

GENETIC-AF is planned as a multi-center, randomized, double-blind clinical trial designed to compare the safety and efficacy of Gencaro to an active comparator, metoprolol CR/XL, in beta-1 389 arginine homozygous genotype HFREF patients recently diagnosed with persistent AF. The primary endpoint will be measured over a twenty-four week period after the patient s AF has been electrically cardioverted through the administration of a direct current shock to restore normal heart rhythm.

We have created an adaptive design for GENETIC-AF, which we plan to initiate with a Phase 2b study in approximately 200 HFREF patients with recent onset, persistent AF who also have a genetic variant of the beta-1 adrenergic receptor which we believe responds most favorably to Gencaro. The secondary endpoint of the proposed Phase 2b portion of the trial will be AF burden, as defined as a patient s actual percentage of time in AF, regardless of symptoms. Under the proposed design, all 200 patients in the Phase 2b portion of the trial will have AF burden measured by continuous monitoring, either by previously implanted cardiac resynchronization or defibrillation devices, or newly or previously inserted loop recorders. At the end of enrollment of the first 200 patients, the primary endpoint of the combination of recurrent symptomatic AF or all-cause mortality, and the secondary endpoint of AF burden will be evaluated by the trial s Data and Safety Monitoring Board for evidence of an efficacy signal. If a sufficient efficacy signal is detected and acceptable safety is observed, the trial could then proceed to the Phase 3 portion of the trial. We estimate that GENETIC-AF could begin approximately six months after we obtain sufficient funding and we believe the Phase 2b study would take approximately two years to complete after initiation.

Medtronic, Inc., a leader in medical technologies to improve the treatment of chronic diseases, including cardiac rhythm disorders, has entered into a Clinical Trial Collaboration Agreement, dated April 18, 2013 (the Agreement), with us to collaborate on the Phase 2b portion of GENETIC-AF. Under the collaboration, we plan, with the support of Medtronic, to conduct a substudy that will include continuous monitoring of the cardiac rhythms of all 200 patient enrolled during the Phase 2b portion of GENETIC-AF. Each patient will have heart rhythm monitoring via a Medtronic device, either a previously implanted cardiac resynchronization or defibrillation device, or a previously or newly inserted Reveal loop recorder. The collaboration substudy will measure AF burden, defined as a patient s actual time in AF regardless of symptoms. In determining the presence of an efficacy signal in the Phase 2b portion of the trial, AF burden will be evaluated along with time to mortality or recurrent AF, which will also be the Phase 3 primary endpoint.

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The collaboration will be administered by a joint ARCA-Medtronic committee. Medtronic will use its proprietary CareLink System to collect and analyze the cardiac rhythm data from the implanted Medtronic devices and provide the data to ARCA at the close of the Phase 2b portion of the trial. The parties will negotiate in good faith to agree on the substudy protocol, specifying the elements of the substudy and of the cardiac rhythm data collection and analysis to be provided for the substudy by Medtronic by August 15, 2013. Medtronic will support the reimbursement process for patients enrolled in the Phase 2b portion, and will provide financial support of unreimbursed costs for a certain number of patients in the Phase 2b portion up to a certain maximum amount per patient. If GENETIC-AF proceeds to Phase 3, ARCA will seek to enroll an additional 100 patients in the substudy, and Medtronic will provide the agreed-on CareLink System cardiac rhythm data collection and analysis for the Phase 3 portion of the substudy, and support the reimbursement process.

We have been granted patents in the U.S., Europe, and other jurisdictions for methods of treating AF and HF patients with Gencaro based on genetic testing, which we believe will provide market exclusivity for these uses of Gencaro into at least 2026 in the U.S. and into 2025 in Europe. In addition, we believe that if Gencaro is approved, a Gencaro patent will be eligible for patent term extension based on our current clinical trial plans which, if granted, may provide market exclusivity for Gencaro into 2029 or 2030 in the U.S. and Europe.

To support the continued development of Gencaro, including the planned GENETIC-AF clinical trial and our ongoing operations, we are pursuing a public equity offering to fund the Phase 2b portion of the GENETIC-AF trial and our general and administrative costs through its projected completion. We may also seek additional funding that could allow us to operate while we continue to pursue financing options, a strategic combination, partnering and licensing opportunities. If we are delayed in obtaining funding or are unable to complete a strategic transaction, we may discontinue our development activities on Gencaro or discontinue our operations. We believe our cash and cash equivalents balance as of March 31, 2013 will be sufficient to fund our operations, at our current cost structure, through September 2013. We are unable to assert that our current cash and cash equivalents are sufficient to fund operations beyond that date, and as a result, there is substantial doubt about our ability to continue as a going concern beyond September 2013. Changing circumstances may cause us to consume capital significantly faster or slower than we currently anticipate. We have based these estimates on assumptions that may prove to be wrong, and we could exhaust our available financial resources sooner than we currently anticipate.

Risks Associated with Our Business

Our business is subject to numerous risks, as more fully described in the section entitled Risk Factors immediately following this prospectus summary, beginning on page 5. You should read these risks before you invest in our Preferred Stock and warrants. We may be unable, for many reasons, including those that are beyond our control, to implement our business strategy. In particular, our risks include:

- Our management and our independent registered public accountant have concluded that due to our need for additional capital, and the uncertainties surrounding our ability to raise such funding, substantial doubt exists as to our ability to continue as a going concern.

- We will need to raise substantial additional funds through the public or private debt and equity securities, from government funding or complete one or more strategic transactions, to continue development of Gencaro. If we are unable to raise such financing or complete such a transaction, we may not be able to continue operations.

- If we are not able to successfully develop, obtain FDA approval for and provide for the commercialization of Gencaro in a timely manner, we may not be able to continue our business operations.

- Our clinical trials for our product candidates may not yield results that will enable us to further develop our products and obtain the regulatory approvals necessary to sell them.

- We expect to rely on contract research organizations to conduct clinical trials, and as a result, will be unable to directly control the timing, conduct and expense of clinical trials.

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

We expect to depend on existing and future collaborations with third parties for the development of some of our product candidates. If those collaborations are not succuessful, we may not be able to complete the development of these product candidates.

We must enter into another a separate agreement with Lab Corp or other provider to support the genetic test and we may never complete a binding agreement with Lab Corp or another provider.

We may not achieve our projected development goals in the time frames we announce and expect.

Our intellectual property rights may not preclude competitors from developing competing products and our business may suffer.

Corporate Information

On January 27, 2009, we completed a business combination (the Merger) with ARCA Colorado in accordance with the terms of that Agreement and Plan of Merger and Reorganization, dated September 24, 2008, and amended on October 28, 2008 in which a wholly-owned subsidiary of Nuvelo, Inc. merged with and into ARCA Colorado, with ARCA Colorado continuing after the Merger as the surviving corporation and a wholly-owned subsidiary of Nuvelo, Inc. Immediately following the Merger, we changed our name from Nuvelo, Inc. to ARCA biopharma, Inc. Nuvelo was originally incorporated as Hyseq, Inc. in Illinois in 1992 and reincorporated in Nevada in 1993. On January 31, 2003, Nuvelo merged with Variagenics, Inc., a publicly traded Delaware corporation based in Massachusetts, and, in connection with the merger, changed its name to Nuvelo, Inc. On March 25, 2004, Nuvelo was reincorporated from Nevada to Delaware. On January 27, 2009, in connection with the Merger with ARCA Colorado described above, Nuvelo changed its name to ARCA biopharma, Inc. On March 4, 2013, we executed a one for six reverse split of our common stock. Our principal offices are located in Broomfield, Colorado, and our telephone number is (720) 940-2200. Our website address is www.arcabiopharma.com. The information in or that can be accessed through our website is not part of this prospectus.

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THE OFFERING

Securities offered by us in this offering	Up to 104,167 shares of our Series A Convertible Preferred Stock (Preferred Stock), 10,416,700 shares of common stock issuable upon conversion of the Preferred Stock, warrants to purchase up to 5,208,350 shares of our common stock and 5,208,350 shares of our common stock issuable upon exercise of the warrants.
Preferred Stock offered by us	Up to 104,167 shares of Preferred Stock will be offered in this offering. This prospectus also relates to the offering of the shares of common stock issuable upon conversion of the Preferred Stock.
Conversion	Each share of our Preferred Stock is convertible into 100 shares of our common stock at any time at the option of the holder, provided that the holder will be prohibited from converting Preferred Stock if, as a result of such conversion, the holder, together with its affiliates, would beneficially own more than 9.99% of the total number of shares of our common stock then issued and outstanding.
Liquidation preference	In the event of our liquidation, dissolution or winding up, holders of our Preferred Stock will receive a payment equal to $0.001 per share of Preferred Stock before any proceeds are distributed to the holders of our common stock. In addition, each share of Preferred Stock will be entitled to receive, on an as-if-converted basis, pari passu with each share our common stock, any distributions of our assets or surplus funds which we make upon shares of our common stock.
Voting rights	Shares of Preferred Stock will have no voting rights, except as required by law.
Dividends	Except for stock dividends or certain other distributions, shares of Preferred Stock will be entitled to receive dividends (on an as-converted basis) in the same form as dividends actually paid on shares of our common stock when and if declared by our board of directors.
Warrants offered by us	Warrants to purchase up to 5,208,350 shares of our common stock. The warrants will be exercisable during the period commencing on the date of original issuance and ending five years from such issuance date at an exercise price of $ per share of common stock. This prospectus also relates to the offering of the shares of common stock issuable upon exercise of the warrants.
Common Stock outstanding prior to offering	3,185,562 shares of common stock.
Common stock outstanding after the offering	13,602,262 shares of common stock (assuming the conversion of 104,167 shares of Preferred Stock into 10,416,700 shares of common stock).
Use of Proceeds	We expect to use the proceeds received from the offering to fund the Phase 2b portion of the GENETIC-AF trial and working capital and general corporate purposes. See Use of Proceeds for more information.

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NASDAQ Capital Market listing	Our common stock is listed on The NASDAQ Capital Market under the symbol ABIO. There is no established trading market for the Preferred Stock or warrants and we do not expect a market to develop. In addition, we do not intend to apply for the listing of Preferred Stock or the warrants on any national securities exchange.
Risk Factors	Investing in our Preferred Stock and warrants (and the common stock underlying such Preferred Stock and warrants) involves a high degree of risk. See Risk Factors beginning on page 5 of this prospectus.

Outstanding Shares

The number of shares of common stock outstanding immediately after this offering is based on 3,185,562 shares of common stock outstanding as of March 31, 2013. This number excludes:

- 1,302,425 shares of common stock issuable upon the exercise of warrants outstanding as of March 31, 2013, at a weighted average exercise price of $7.25 per share;
- 137,760 shares of common stock issuable upon the exercise of options outstanding as of March 31, 2013, at a weighted average exercise price of $18.36 per share; and
- 85,445 additional shares of common stock reserved for future issuance under our Amended and Restated 2004 Equity Incentive Plan.

Except as otherwise indicated, all information in this prospectus reflects the 1-for-6 reverse stock split of our capital stock that became effective on March 4, 2013.

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RISK FACTORS

An investment in ARCA s securities involves certain risks, including those set forth below and elsewhere in this prospectus. In addition to the risks set forth below and elsewhere in this prospectus, other risks and uncertainties not known to ARCA, that are beyond its control or that ARCA deems to be immaterial may also materially adversely affect ARCA s business operations. You should carefully consider the risks described below as well as other information and data included in this prospectus.

Risks Related to Our Business and Financial Condition

Our management and our independent registered public accountant, in their report on our financial statements as of and for the year ended December 31, 2012, have concluded that due to our need for additional capital, and the uncertainties surrounding our ability to raise such funding, substantial doubt exists as to our ability to continue as a going concern.

Our audited consolidated financial statements for the fiscal year ended December 31, 2012 and our unaudited condensed consolidated financial statements for the three months ended March 31, 2013, were prepared assuming that we will continue as a going concern. The going concern basis of presentation assumes that we will continue in operation for the foreseeable future and will be able to realize our assets and discharge our liabilities and commitments in the normal course of business and do not include any adjustments to reflect the possible future effects on the recoverability and classification of assets or the amounts and classification of liabilities that may result from our inability to continue as a going concern. Our management and our independent registered public accountants have concluded that due to our need for additional capital, and the uncertainties surrounding our ability to raise such funding, substantial doubt exists as to our ability to continue as a going concern. We may be forced to reduce our operating expenses and raise additional funds to meet our working capital needs, principally through the additional sales of our securities or debt financings. However, we cannot guarantee that will be able to obtain sufficient additional funds when needed or that such funds, if available, will be obtainable on terms satisfactory to us. If we are unable to raise sufficient additional capital or complete a strategic transaction, we may be unable to continue to fund our operations, develop Gencaro or our other product candidates, or realize value from our assets and discharge our liabilities in the normal course of business. These uncertainties raise substantial doubt about our ability to continue as a going concern. If we become unable to continue as a going concern, we may have to liquidate our assets, and might realize significantly less than the values at which they are carried on our financial statements, and stockholders may lose all or part of their investment in our common stock and Preferred Stock.

We will need to raise substantial additional funds through public or private equity transactions complete one or more strategic transactions, to continue development of Gencaro. If we are unable to raise such financing or complete such a transaction, we may not be able to continue operations.

In light of the expected development timeline to potentially obtain FDA approval for Gencaro, if at all, the substantial additional costs associated with the development of Gencaro, including the costs associated with the planned GENETIC-AF clinical trial, the substantial cost of commercializing Gencaro, if it is approved, we will need to raise substantial additional funding through public or private equity transactions or a strategic combination or partnership. If we are delayed in obtaining funding or are unable to complete a strategic transaction, we may discontinue our development activities on Gencaro or discontinue our operations. Even if we are able to fund continued development and Gencaro is approved, we expect that we will need to complete a strategic transaction or raise substantial additional funding through public or private debt or equity securities to successfully commercialize Gencaro.

We believe our cash and cash equivalents balance as of March 31, 2013 will be sufficient to fund our operations, at our current cost structure, through September 30, 2013. As a result of the significant additional development effort required for Gencaro, including the additional clinical trials, we may not be able to raise sufficient capital on acceptable terms, or at all, to continue development of Gencaro or to continue operation and may not be able to execute any strategic transaction. We are unable to assert that our current cash and cash equivalents are sufficient to fund operations beyond that date, and as a result, there is substantial doubt about our ability to continue as a going concern beyond September 30, 2013. Changing circumstances may cause us to consume capital significantly faster or slower than we currently anticipate. We have based these estimates on assumptions that may prove to be wrong, and we could exhaust our available financial resources sooner than we currently anticipate.

Our liquidity, and our ability to raise additional capital or complete any strategic transaction, depends on a number of factors, including, but not limited to, the following:

- the costs and timing for additional clinical trials in order to gain possible FDA approval for Gencaro;

the market price of our stock and the availability and cost of additional equity capital from existing and potential new investors;

our ability to retain the listing of our common stock on the Nasdaq Capital Market;

general economic and industry conditions affecting the availability and cost of capital;

our ability to control costs associated with our operations;

the costs of filing, prosecuting, defending and enforcing any patent claims and other intellectual property rights; and

the terms and conditions of our existing collaborative and licensing agreements.

The sale of additional equity or convertible debt securities would likely result in substantial dilution to our stockholders. If we raise additional funds through the incurrence of indebtedness, the obligations related to such indebtedness would be senior to rights of holders of our capital stock and could contain covenants that would restrict our operations. We also cannot predict what consideration might be available, if any, to us or our stockholders, in connection with any strategic transaction. Should strategic alternatives or additional capital not be available to us in the near term, or not be available on acceptable terms, we may be unable to realize value from our assets and discharge our liabilities in the normal course of business which may, among other alternatives, cause us to further delay, substantially reduce or discontinue operational activities to conserve our cash resources.

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If we are not able to maintain the requirements for listing on the Nasdaq Capital Market, we could be delisted, which could have a materially adverse effect on our ability to raise additional funds as well as the price and liquidity of our common stock.

Our common stock is currently listed on the Nasdaq Capital Market. To maintain the listing of our common stock on the Nasdaq Capital Market we are required to meet certain listing requirements, including, among others, either: (i) a minimum closing bid price of $1.00 per share, a market value of publicly held shares (excluding shares held by our executive officers, directors and 10% or more stockholders) of at least $1 million and stockholders equity of at least $2.5 million; or (ii) a minimum closing bid price of $1.00 per share, a market value of publicly held shares (excluding shares held by our executive officers, directors and 10% or more stockholders) of at least $1 million and a total market value of listed securities of at least $35 million.

During 2012 our stock price fell below the Nasdaq Capital Market s minimum bid price requirements and we became subject to delisting from the exchange. On March 4, 2013 we executed a 1 for 6 reverse split of our common stock and have subsequently regained compliance with the minimum bid price requirements. In future periods, if we do not meet the minimum stockholders equity, minimum closing bid price requirements, or any other listing requirements, we would be subject to delisting from the Nasdaq Capital Market.

As of May 22, 2013, the closing price of our common stock was $2.56 per share, and the total market value of our publicly held shares of our common stock (excluding shares held by our executive officers, directors and 10% or more stockholders) was approximately $6.4 million and the total market value of our listed securities was approximately $8.2 million. As of March 31, 2013, we had stockholders equity of $3.3 million.

Our failure to raise substantial additional funding or enter into a strategic transaction may materially and adversely affect our business.

Unless we are able to raise substantial additional funding through other means, we will need to complete a strategic transaction to continue the development of Gencaro or our other operations. The strategic transactions that we may consider include a potential combination or partnership. Our board of directors and management team has and will continue to devote substantial time and resources to obtaining additional capital or the consideration and implementation of any such strategic transaction. In addition, conditions in the financial markets may lead to an increased number of biotechnology companies that are also seeking to enter into strategic transactions, which may limit our ability to negotiate favorable terms for any such transaction. Further, our current employees do not have experience in the strategic transaction process, and our previous efforts to enter into a strategic transaction have not been successful. As a result of these and other factors, there is substantial risk that we may not be able to complete a strategic transaction on favorable terms, or at all. The failure to complete a strategic transaction may materially and adversely affect our business.

We may be limited in our ability to access sufficient funding through a private equity or convertible debt offering.

Nasdaq rules impose restrictions on our ability to raise funds through a private offering of our common stock, convertible debt or similar instruments without obtaining stockholder approval. Under Nasdaq rules, an offering of more than 20% of our total shares outstanding for less than the greater of book or market value requires stockholder approval unless the offering qualifies as a public offering for purposes of the Nasdaq rules. As of March 31, 2013, we had 3,185,562 shares of common stock outstanding, 20% of which is 637,112 shares. To the extent we seek to raise funds through a private offering of stock, convertible debt or similar instruments, we are limited in how much funding we could raise privately without requiring a stockholder vote.

In addition, we are currently subject to certain contractual rights of investors arising from our public and private equity financing transactions that limit the nature and price of future public and private financing transactions that we may effect. For example, in January 2013, we entered into separate subscription agreements with certain institutional investors in connection with a private investment in public equity, pursuant to which we sold shares of our common stock and warrants to purchase shares of our common stock to the investors. In connection with this transaction, we agreed that, subject to certain exceptions, we would not, while the warrants are outstanding, effect or enter into an agreement to effect any issuance of common stock or securities convertible into, exercisable for or exchangeable for common stock in a variable rate transaction, which means a transaction in which we issue or sell any convertible securities either (A) at a conversion price, exercise price or exchange rate or other price that is based upon and/or varies with the trading prices of, or quotations for, the shares of common stock at any time after the initial issuance of such convertible securities, or (B) with a conversion, exercise or exchange price that is subject to being reset at some future date after the initial issuance of the convertible securities or upon the occurrence of the specified or contingent events directly or indirectly related to our business or the market for our common stock. In addition, we agreed that, subject to certain exceptions, if we issue securities within one year following the closing of the offering, each investor would have the right to purchase its pro rata share of a specified portion of the securities in the future offering on the same terms, conditions and price provided for in the proposed issuance of securities.

The restrictions imposed by the terms of these offerings, and that could be imposed in future offerings, may limit our access to capital on agreeable terms and delay or make impossible certain otherwise available equity financing opportunities and could severely restrict our access to

the capital necessary to conduct our business.

If we are not able to successfully develop, obtain FDA approval for and provide for the commercialization of Gencaro in a timely manner, we may not be able to continue our business operations.

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We currently have no products that have received regulatory approval for commercial sale. The process to develop, obtain regulatory approval for and commercialize potential product candidates is long, complex and costly. We plan to conduct a Phase 2b/Phase 3 clinical study of Gencaro in approximately 620 HFREF patients with AF. Clinical trials are typically lengthy, complex and expensive and we do not currently have the resources to fund such a trial.

Failure to demonstrate that a product candidate, particularly Gencaro, is safe and effective, or significant delays in demonstrating such safety and efficacy, would adversely affect our business. Failure to obtain marketing approval of Gencaro from appropriate regulatory authorities, or significant delays in obtaining such approval, would also adversely affect our business and could, among other things, preclude us from completing a strategic transaction or obtaining additional financing necessary to continue as a going concern.

Even if approved for sale, a product candidate must be successfully commercialized to generate value. We do not currently have the capital resources or management expertise to commercialize Gencaro and, as a result, will need to complete a strategic transaction, or, alternatively, raise substantial additional funds to enable commercialization of Gencaro, if it is approved. Failure to successfully provide for the commercialization of Gencaro, if it is approved, would damage our business.

Our clinical trials for our product candidates may not yield results that will enable us to further develop our products and obtain the regulatory approvals necessary to sell them.

We will receive regulatory approval for our product candidates only if we can demonstrate in carefully designed and conducted clinical trials that the product candidate is safe and effective. We do not know whether any future clinical trials, including the planned GENETIC-AF clinical trial for Gencaro, will demonstrate sufficient safety and efficacy to obtain the requisite regulatory approvals or will result in marketable products. For example, GENETIC-AF is designed to be an adaptive trial. If we do not see sufficient efficacy and safety in the Phase 2b portion of the trial, we will not complete the Phase 3 portion of the trial. Clinical trials are lengthy, complex and expensive processes with uncertain results. We have spent, and expect to continue to spend, significant amounts of time and money in the clinical development of our product candidates. We have never conducted a Phase 2 or Phase 3 clinical trial and do not currently have sufficient staff with the requisite experience to do so, and we therefore expect that we will have to rely on contract research organizations to conduct certain of our clinical trials. While certain of our employees have experience in designing and administering clinical trials, these employees have no such experience since being with us.

The results we obtain in preclinical testing and early clinical trials may not be predictive of results that are obtained in later studies. We may suffer significant setbacks in advanced clinical trials, even after seeing promising results in earlier studies. Based on results at any stage of clinical trials, we may decide to repeat or redesign a trial or discontinue development of one or more of our product candidates. If we fail to adequately demonstrate the safety and efficacy of our products under development, we will not be able to obtain the required regulatory approvals to commercialize our product candidates, and our business, results of operations and financial condition would be materially adversely affected.

Administering our product candidates to humans may produce undesirable side effects. These side effects could interrupt, delay or halt clinical trials of our product candidates and could result in the FDA or other regulatory authorities denying approval of our product candidates for any or all targeted indications.

If clinical trials for a product candidate are unsuccessful, we will be unable to commercialize the product candidate. If one or more of our clinical trials are delayed, we will be unable to meet our anticipated development timelines. Either circumstance could cause the market price of our common stock to decline.

We expect to rely on contract research organizations to conduct clinical trials, and as a result, will be unable to directly control the timing, conduct and expense of clinical trials.

We expect that we, or any strategic partners, will rely primarily on third parties to conduct clinical trials, including the AF clinical trial that we plan to conduct. As a result, we will have less control over the conduct of the clinical trials, the timing and completion of the trials, the required reporting of adverse events and the management of data developed through the trials than would be the case if we were relying entirely upon our own staff. Communicating with outside parties can also be challenging, potentially leading to mistakes as well as difficulties in coordinating activities. Outside parties may have staffing difficulties, may undergo changes in priorities or may become financially distressed, adversely affecting their willingness or ability to conduct our trials. We may experience unexpected cost increases that are beyond our control. Problems with the timeliness or quality of the work of a contract research organization may lead us or any strategic partner to seek to terminate the relationship and use an alternative service provider. However, making this change may be costly and may delay ongoing trials, and contractual restrictions may make such a change difficult or impossible. Additionally, it may be impossible to find a replacement organization that can conduct clinical trials in an acceptable manner and at an acceptable cost.

Even if we do use a contract research organization to conduct clinical trials, we will have to devote substantial resources and rely on the expertise of our employees to manage the work being done by the contract research organization. We have never conducted a clinical trial and do not currently have sufficient staff with the requisite experience to do so. The inability of our current staff to adequately manage any contract research organization that we hire may exacerbate the risks associated with relying on a contract research organization.

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

Clinical trials for our product candidates require that we identify and enroll a large number of patients with the disorder or condition under investigation. We may not be able to enroll a sufficient number of patients to complete our clinical trials in a timely manner.

Patient enrollment is affected by factors including:

design of the protocol;

the size of the patient population;

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eligibility criteria for the study in question;

perceived risks and benefits of the drug under study;

availability of competing therapies, including the off-label use of therapies approved for related indications;

efforts to facilitate timely enrollment in clinical trials;

the success of our personnel in making the arrangements with potential clinical trial sites necessary for those sites to begin enrolling patients;

patient referral practices of physicians;

availability of clinical trial sites; and

other clinical trials seeking to enroll subjects with similar profiles.

If we have difficulty enrolling a sufficient number of patients to conduct our clinical trials as planned, we may need to delay or terminate ongoing or planned clinical trials, either of which would have a negative effect on our business. Delays in enrolling patients in our clinical trials would also adversely affect our ability to generate any product, milestone and royalty revenues under collaboration agreements, if any, and could impose significant additional costs on us or on any future collaborators.

We expect to depend on existing and future collaborations with third parties for the development of some of our product candidates. If those collaborations are not successful, we may not be able to complete the development of these product candidates.

We currently have a collaboration agreement with Medtronic, Inc. or Medtronic for the support of our GENETIC-AF trial. Medtronic can terminate its collaboration with us for various reasons including uncured material breach, an ARCA bankruptcy, if, after FDA communication, it is reasonably concluded that the FDA will not allow GENETIC-AF to enroll or proceed, if the trial has not begun by December 1, 2014, if the substudy protocol is not agreed to by August 15, 2013, or if Medtronic s obligations are unilaterally expanded. We may seek additional third party collaborators for the development of Gencaro or other product candidates.

Under our current arrangement with Medtronic, we have limited control over the amount and timing of resources that they dedicate to the development of Gencaro. This is also likely to be true in any future collaborations with third parties. Our ability to generate revenues from these arrangements will depend on our collaborators abilities to successfully perform the functions assigned to them in these arrangements.

Collaborations involving our product candidates pose the following risks to us:

collaborators have significant discretion in determining the efforts and resources that they will apply to these collaborations;

collaborators may not pursue development and commercialization of our product candidates or may elect not to continue or renew development or commercialization programs based on clinical trial results, changes in the collaborator s strategic focus or available funding, or external factors such as an acquisition that diverts resources or creates competing priorities;

collaborators may delay clinical trials, provide insufficient funding for a clinical trial program, stop a clinical trial or abandon a product candidate, repeat or conduct new clinical trials or require a new formulation of a product candidate for clinical testing;

collaborators could independently develop, or develop with third parties, products that compete directly or indirectly with our product candidates if the collaborators believe that competitive products are more likely to be successfully developed or can be commercialized under terms that are more economically attractive than ours;

collaborators may not properly maintain or defend our intellectual property rights or may use our proprietary information in such a way as to invite litigation that could jeopardize or invalidate our proprietary information or expose us to potential litigation;

disputes may arise between the collaborators and us that result in the delay or termination of the research, development or commercialization of our product candidates or that result in costly litigation or arbitration that diverts management attention and resources;

collaborations may be terminated and, if terminated, may result in a need for additional capital to pursue further development or commercialization of the applicable product candidates;

collaborators may elect to take over manufacturing rather than retain us as manufacturers and may encounter problems in starting up or gaining approval for their manufacturing facility and so be unable to continue development of product candidates;

we may be required to undertake the expenditure of substantial operational, financial and management resources in connection with any collaboration;

we may be required to issue equity securities to collaborators that would dilute our existing stockholders percentage ownership;

we may be required to assume substantial actual or contingent liabilities;

collaborators may not commit adequate resources to the marketing and distribution of our product candidates, limiting our potential revenues from these products; and

collaborators may experience financial difficulties.

We face a number of challenges in seeking additional collaborations. Collaborations are complex and any potential discussions may not result in a definitive agreement for many reasons. For example, whether we reach a definitive agreement for a collaboration will depend, among other things, upon our assessment of the collaborator s resources and expertise, the terms and conditions of the proposed collaboration, and the proposed collaborator s evaluation of a number of factors, such as the design or results of our clinical

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trials, the potential market for our product candidates, the costs and complexities of manufacturing and delivering our product candidates to patients, the potential of competing products, the existence of uncertainty with respect to ownership or the coverage of our intellectual property, and industry and market conditions generally. If we were to determine that additional collaborations for our Gencaro development is necessary and were unable to enter into such collaborations on acceptable terms, we might elect to delay or scale back the development or commercialization of Gencaro in order to preserve our financial resources or to allow us adequate time to develop the required physical resources and systems and expertise ourselves.

Collaboration agreements may not lead to development or commercialization of product candidates in the most efficient manner, or at all. In addition, there have been a significant number of recent business combinations among large pharmaceutical companies that have resulted in a reduced number of potential future collaborators. If a present or future collaborator of ours were to be involved in a business combination, the continued pursuit and emphasis on our product development or commercialization program could be delayed, diminished or terminated.

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Our planned GENETIC-AF clinical trial will require the use of a third-party diagnostic services provider to administer the genetic test needed to identify the patient receptor genotypes of clinical trial participants. We do not currently have a third-party diagnostic services provider identified to perform this work for our planned clinical trial. If we have difficulty getting an arrangement for administering the Gencaro Test, the launch of our clinical trial could be delayed.

The planned GENETIC-AF clinical trial we intend to conduct with Gencaro requires a companion test that identifies the patient s receptor genotype, or Gencaro Test, and the trial will only enroll those patients with the receptor that has the potential for enhanced efficacy, the beta-1 389 Arg receptor as detected by a beta-1 389 Arg/Arg genotype. Accordingly, the GENETIC-AF trial will require use of a third-party diagnostic service to perform the Gencaro Test. Previously we entered into a collaboration arrangement with LabCorp to develop and commercialize the Gencaro Test for the treatment of patients with HF. Under the terms of that collaboration, we licensed to LabCorp certain rights to commercialize a receptor genotype diagnostic for the beta-1 and alpha-2C polymorphisms. We currently intend to pursue a separate arrangement with LabCorp or another third party to provide the diagnostic services of the Gencaro Test needed to support our GENETIC-AF trial. Obtaining an arrangement with a third party for developing or administering the Gencaro Test for the clinical trial could delay the launch and/or affect the cost and complexity of our planned study.

Unless we are able to generate sufficient product revenue, we will continue to incur losses from operations and may not achieve or maintain profitability. We are years away from commercializing a product and generating product revenue.

Our historical losses have had and will continue to have an adverse effect on our stockholders equity and working capital, among other things. We are years away from commercializing a product and generating any product revenue. As a result, we expect to continue to incur significant operating losses for the foreseeable future. Even if we ultimately receive regulatory approval for Gencaro or our other product candidates, sales of such products may not generate sufficient revenue for it to achieve or maintain profitability. Because of the numerous risks and uncertainties associated with developing therapeutic drugs, we may experience larger than expected future losses and may never reach profitability.

We may not achieve our projected development goals in the time frames we announce and expect.

We set goals for, and make public statements regarding, the timing of certain accomplishments, such as, the commencement and completion of clinical trials, particularly GENETIC-AF, the disclosure of trial results, the obtainment of regulatory approval and the sale of drug product, which we sometimes refer to as milestones. These milestones may not be achieved, and the actual timing of these events can vary dramatically due to a number of factors such as delays or failures in our clinical trials, disagreements with current or future collaborative partners, the uncertainties inherent in the regulatory approval process and manufacturing scale-up and delays in achieving manufacturing or marketing arrangements sufficient to commercialize our products. FDA approval of Gencaro, if it occurs, is expected to require years of additional clinical development, including the completion of a new multi-year clinical study of Gencaro in approximately 200 patients and, depending on the outcome of the Phase 2b portion, may be expanded to a Phase 3 study with up to an estimated additional 420 patients. There can be no assurance that our clinical trials will be completed, or that we will make regulatory submissions or receive regulatory approvals as planned. If we fail to achieve one or more of these milestones as planned, our business will be materially adversely affected.

Our product candidates are subject to extensive regulation, which can be costly and time-consuming, and unsuccessful or delayed regulatory approvals could increase our future development costs or impair our future revenue.

The preclinical and clinical development, testing, manufacture, safety, efficacy, labeling, storage, recordkeeping, and subsequent advertising, promotion, sale, marketing, and distribution, if approved, of our product candidates are subject to extensive regulation by the FDA and other regulatory authorities in the United States and elsewhere. These regulations also vary in important, meaningful ways from country to country. We are not permitted to market a potential drug in the United States until we receive approval of an NDA from the FDA. We have not received an NDA approval from the FDA for Gencaro or any of our other product candidates. There can be no guarantees with respect to our product candidates that clinical studies will adequately support an NDA, that the products will receive necessary regulatory approvals, or that they will prove to be commercially successful.

To receive regulatory approval for the commercial sale of any product candidates, we must demonstrate safety and efficacy in humans to the satisfaction of regulatory authorities through preclinical studies and adequate and well-controlled clinical trials of the product candidates. This process is expensive and can take many years, and failure can occur at any stage of the testing. Our failure to adequately demonstrate the safety and efficacy of our product candidates will prevent regulatory approval and commercialization of such products. In 2008, we submitted and the FDA accepted our NDA filing for Gencaro for the treatment of chronic HF. In 2009, the FDA issued a CRL in which the FDA stated that it could not approve the Gencaro NDA in its current form, and specified actions required for approval of the NDA, including conducting an additional Phase 3 clinical trial of Gencaro in patients with HF. We plan to conduct a clinical study of Gencaro in AF patients HREF to assess its efficacy in reducing or preventing AF. We anticipate that GENETIC-AF could begin approximately six months after we obtain sufficient funding. This trial is planned to begin as a Phase 2b study in approximately 200 patients and, depending on the outcome of the Phase 2b portion,

may be expanded to a Phase 3 study with up to an estimated additional 420 patients. We believe the Phase 2b study would take approximately two years to complete. This product candidate will require years of clinical development. Even if we conduct additional studies in accordance with further FDA guidance and submit or file a new or amended NDA, the FDA may ultimately decide that the NDA does not satisfy the criteria for approval.

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In the event that we or our collaborators conduct preclinical studies that do not comply with Good Laboratory Practices or GLP or incorrectly design or carry out human clinical trials in accordance with Good Clinical Practices or GCP or those clinical trials fail to demonstrate clinical significance, it is unlikely that we will be able to obtain FDA approval for product development candidates. Our inability to successfully and effectively complete clinical trials for any product candidate on schedule, or at all, will severely harm our business. Significant delays in clinical development could materially increase product development costs or allow our competitors to bring products to market before we do, impairing our ability to effectively commercialize any future product candidate. We do not know whether planned clinical trials will begin on time, will need to be redesigned or will be completed on schedule, if at all. Clinical trials can be delayed for a variety of reasons, including:

- delays or failures in obtaining regulatory authorization to commence a trial because of safety concerns of regulators relating to our product candidates or similar product candidates of our competitors or failure to follow regulatory guidelines;
- delays or failures in obtaining clinical materials and manufacturing sufficient quantities of the product candidates for use in trials;
- delays or failures in reaching agreement on acceptable terms with prospective study sites;
- delays or failures in obtaining approval of our clinical trial protocol from an institutional review board, or IRB, to conduct a clinical trial at a prospective study site;
- delays in recruiting patients to participate in a clinical trial, which may be due to the size of the patient population, eligibility criteria, protocol design, perceived risks and benefits of the drug, availability of other approved and standard of care therapies, availability of clinical trial sites;
- other clinical trials seeking to enroll subjects with similar profile;
- failure of our clinical trials and clinical investigators to be in compliance with the FDA s Good Clinical Practices;
- unforeseen safety issues, including negative results from ongoing preclinical studies;
- inability to monitor patients adequately during or after treatment;
- difficulty monitoring multiple study sites; and
- failure of our third-party contract research organizations, clinical site organizations and other clinical trial managers, to satisfy their contractual duties, comply with regulations or meet expected deadlines.

In addition, any approvals we may obtain may not cover all of the clinical indications for which we seek approval or permit us to make claims of superiority over currently marketed competitive products. Also, an approval might contain significant limitations in the form of narrow indications, warnings, precautions or contraindications with respect to conditions of use. If the FDA determines that a risk evaluation and mitigation strategy, or REMS, is necessary to ensure that the benefits of the drug outweigh the risks, we may be required to include as part of the NDA a proposed REMS that may include a package insert directed to patients, a plan for communication with healthcare providers, restrictions on a drug s distribution, or a Medication Guide, to provide better information to consumers about the drug s risks and benefits. Finally, an approval could be conditioned on our commitment to conduct further clinical trials, which we may not have the resources to conduct or which

may negatively impact our financial situation.

The manufacture and tableting of Gencaro is done by third party suppliers, who must also meet current Good Manufacturing Practices, or cGMP, requirements and pass a pre-approval inspection of their facilities before we can obtain marketing approval.

All of our product candidates are prone to the risks of failure inherent in drug development. The results from preclinical animal testing and early human clinical trials may not be predictive of results obtained in later human clinical trials. Further, although a new product may show promising results in preclinical or early human clinical trials, it may subsequently prove unfeasible or impossible to generate sufficient safety and efficacy data to obtain necessary regulatory approvals. The data obtained from preclinical and clinical studies are susceptible to varying interpretations that may delay, limit or prevent regulatory approval, and the FDA and other regulatory authorities in the United States and elsewhere exercise substantial discretion in the drug approval process. The numbers, size and design of preclinical studies and clinical trials that will be required for FDA or other regulatory approval will vary depending on the product candidate, the disease or condition for which the product candidate is intended to be used and the regulations and guidance documents applicable to any particular product candidate. The FDA or other regulators can delay, limit or deny approval of any product candidate for many reasons, including, but not limited to:

Side effects;

Safety and efficacy;

Defects in the design of clinical trials;

The fact that the FDA or other regulatory officials may not approve our or our third party manufacturer s processes or facilities; or

The fact that new regulations may be enacted by the FDA or other regulators may change their approval policies or adopt new regulations requiring new or different evidence of safety and efficacy for the intended use of a product candidate.

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In light of widely publicized events concerning the safety of certain drug products, regulatory authorities, members of Congress, the Government Accountability Office, medical professionals and the general public have raised concerns about potential drug safety issues. These events have resulted in the withdrawal of certain drug products, revisions to certain drug labeling that further limit use of the drug products and establishment of risk management programs that may, for instance, restrict distribution of drug products. The increased attention to drug safety issues may result in a more cautious approach by the FDA to clinical trials and approval. Data from clinical trials may receive greater scrutiny with respect to safety and the product s risk/benefit profile, which may make the FDA or other regulatory authorities more likely to terminate clinical trials before completion, or require longer or additional clinical trials that may result in substantial additional expense, and a delay or failure in obtaining approval or approval for a more limited indication than originally sought. Aside from issues concerning the quality and sufficiency of submitted preclinical and clinical data, the FDA may be constrained by limited resources from reviewing and determining the approvability of the Gencaro NDA in a timely manner.

In pursuing clinical development of Gencaro for an AF indication, we would likely be required to amend the Gencaro HF NDA or prepare a new NDA. The FDA could approve Gencaro, but without including some or all of the prescribing information that we have requested. For instance, the FDA could approve Gencaro for AF in a more limited patient population or included additional warnings in the drug s label. This, in turn, could substantially and detrimentally impact our ability to successfully commercialize Gencaro and effectively protect our intellectual property rights in Gencaro.

If our product candidates receive regulatory approval, we would be subject to ongoing regulatory obligations and restrictions, which may result in significant expenses and limit our ability to develop and commercialize other potential products.

If a product candidate of ours is approved by the FDA or by another regulatory authority, we would be held to extensive regulatory requirements over product manufacturing, testing, distribution, labeling, packaging, adverse event reporting and other reporting to regulatory authorities, storage, advertising, marketing, promotion, distribution, and record keeping. Regulatory approvals may also be subject to significant limitations on the indicated uses or marketing of the product candidates. Potentially costly follow-up or post-marketing clinical studies may be required as a condition of approval to further substantiate safety or efficacy, or to investigate specific issues of interest to the regulatory authority. Previously unknown problems with the product candidate, including adverse events of unanticipated severity or frequency, may result in additional regulatory controls or restrictions on the marketing or use of the product or the need for post marketing studies, and could include suspension or withdrawal of the products from the market.

Furthermore, our third-party manufacturers and the manufacturing facilities that they use to make our product candidates are regulated by the FDA. Quality control and manufacturing procedures must continue to conform to cGMP after approval. Drug manufacturers and their subcontractors are required to register their facilities and products manufactured annually with the FDA and certain state agencies and are subject to periodic unannounced inspections by the FDA, state and/or other foreign authorities. Any subsequent discovery of problems with a product, or a manufacturing or laboratory facility used by us or our collaborators, may result in restrictions on the product, or on the manufacturing or laboratory facility, including a withdrawal of the drug from the market or suspension of manufacturing. Any changes to an approved product, including the way it is manufactured or promoted, often require FDA approval before the product, as modified, can be marketed. We and our third-party manufacturers will also be subject to ongoing FDA requirements for submission of safety and other post-market information.

The marketing and advertising of our drug products by our collaborators or us will be regulated by the FDA, certain state agencies or foreign regulatory authorities. Violations of these laws and regulations, including promotion of our products for unapproved uses or failing to disclose risk information, are punishable by criminal and civil sanctions and may result in the issuance of enforcement letters or other enforcement action by the FDA, U.S. Department of Justice, state agencies, or foreign regulatory authorities that could jeopardize our ability to market the product.

In addition to the FDA, state or foreign regulations, the marketing of our drug products by us or our collaborators will be regulated by federal, state or foreign laws pertaining to health care fraud and abuse, such as the federal anti-kickback law prohibiting bribes, kickbacks or other remuneration for the order or recommendation of items or services reimbursed by federal health care programs. Many states have similar laws applicable to items or services reimbursed by commercial insurers. Violations of these laws are punishable by criminal and civil sanctions, including, in some instances, imprisonment and exclusion from participation in federal and state health care programs, including the Medicare, Medicaid and Veterans Affairs healthcare programs. Because of the far-reaching nature of these laws, we may be required to discontinue one or more of our practices to be in compliance with these laws. Health care fraud and abuse regulations are complex, and even minor irregularities can potentially give rise to claims that a statute or prohibition has been violated. Any violations of these laws, or any action against us for violations of these laws, even if we successfully defend against it, could have a material adverse effect on our business, financial condition and results of operations.

We could also become subject to false claims litigation under federal statutes, which can lead to civil money penalties, restitution, criminal fines and imprisonment, and exclusion from participation in Medicare, Medicaid and other federal and state health care programs. These false claims

statutes include the False Claims Act, which allows any person to bring a suit on behalf of the federal government alleging submission of false or fraudulent claims, or causing to present such false or fraudulent claims, under federal programs or contracts claims or other violations of the statute and to share in any amounts paid by the entity to the government in fines or settlement. These suits against pharmaceutical companies have increased significantly in volume and breadth in recent years. Some of these suits have been brought on the basis of certain sales practices promoting drug products for unapproved uses. This new growth in litigation has increased the risk that a pharmaceutical company will have to defend a false claim action, pay fines or restitution, or be excluded from the Medicare, Medicaid, Veterans Affairs and other federal and state healthcare programs as a result of an investigation arising out of such action. We may become subject to such litigation and, if we are not successful in defending against such actions, those actions may have a material adverse effect on our business, financial condition and results of operations. We could also become subject to false claims litigation and consumer protection claims under state statutes, which also could lead to civil monetary penalties, restitution, criminal fines and imprisonment, and exclusion from participation in state health care programs.

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Of note, over the past few years there has been an increased focus on the sales and marketing practices of the pharmaceutical industry at both the federal and state level. Additionally, the law or regulatory policies governing pharmaceuticals may change. New statutory requirements may be enacted or additional regulations may be adopted that could prevent or delay regulatory approval of our product candidates or limit our ability to commercialize our products. We cannot predict the likelihood, nature or extent of adverse government regulation that may arise from future legislation or administrative action, either in the U.S. or elsewhere.

If we, our collaborators or our third-party manufacturers fail to comply with applicable continuing regulatory requirements, our business could be seriously harmed because a regulatory agency may:

- issue untitled or warning letters;
- suspend or withdraw our regulatory approval for approved products;
- seize or detain products or recommend a product recall of a drug or medical device, or issue a mandatory recall of a medical device;
- refuse to approve pending applications or supplements to approved applications filed by us;
- suspend our ongoing clinical trials;
- restrict our operations, including costly new manufacturing requirements, or restrict the sale, marketing and/or distribution of our products;
- seek an injunction;
- pursue criminal prosecutions;
- close the facilities of our contract manufacturers; or
- impose civil or criminal penalties.

We will need to establish a collaborative arrangement with a third-party diagnostics services provider to obtain marketing clearance or approval of the companion Gencaro Test. There is no guarantee that the FDA will grant timely clearance or approval of the Gencaro Test, if at all, and failure to obtain such timely clearance or approval would adversely affect our ability to market Gencaro.

The drug label we intend to seek for Gencaro would identify the patient receptor genotype for which the drug is approved. Accordingly, we believe developing a Gencaro Test that is simple to administer and widely available will be critical to the successful commercialization of Gencaro and also to the ability to conduct our planned GENETIC-AF clinical trial. The Gencaro Test will be subject to regulation by the FDA and by comparable agencies in various foreign countries. The process of complying with the requirements of the FDA and comparable agencies is costly, time consuming and burdensome.

Despite the time and expense expended, regulatory clearance or approval is never guaranteed. If regulatory clearance or approval is delayed, or if a third-party diagnostic services provider is unable to obtain FDA approval of the Gencaro Test at all or in parallel with the approval of Gencaro, or is unable to commercialize the test successfully and in a manner that effectively supports the commercial efforts for Gencaro, or if the information concerning the differential response to Gencaro resulting from certain genetic variation is not included in the approval label for

Gencaro, the commercial launch of Gencaro may be significantly and adversely affected.

Reliance on third parties to commercialize Gencaro could negatively impact our business. If we are required to establish a direct sales force in the U.S. and are unable to do so, our business may be harmed.

Commercialization of Gencaro, particularly the establishment of a sales organization, will require substantial additional capital resources. We currently intend to pursue a strategic partnership alternative for the commercialization of Gencaro, if it is approved, and we have suspended our efforts to build internal sales, marketing and distribution capabilities. If we elect to rely on third parties to sell Gencaro and any other products, then we may receive less revenue than if we sold such products directly. In addition, we may have little or no control over the sales efforts of those third parties.

If we are unable to complete a strategic transaction, we would be unable to commercialize Gencaro or any other product candidate without substantial additional capital. Even if such capital were secured, we would be required to build internal sales, marketing and distribution capabilities to market Gencaro in the U.S. None of our current employees have experience in establishing and managing a sales force.

In the event we are unable to sell Gencaro and other selected product candidates, either directly or through third parties via a strategic transaction, the commercialization of Gencaro, if it is approved, may be delayed indefinitely.

Future sales of Gencaro may suffer if its marketplace acceptance is negatively affected by the Gencaro Test.

The Gencaro Test is an important component of the commercial strategy for Gencaro in addition to being required to proceed with our planned AF trial. We believe that the Gencaro Test helps predict patient response to Gencaro, and that this aspect of the drug is important to its ability to compete effectively with current therapies. The Gencaro Test adds an additional step in the prescribing process, an additional cost for the patient and payors, the risk that the test results may not be rapidly available and the possibility that it may not be available at all to hospitals and medical centers. Although we anticipate that Gencaro, if approved in a timely manner, would be the first genetically-targeted cardiovascular drug, Gencaro will be one of a number of successful drugs in the beta-blocker class currently on the market. Prescribers may be more familiar with these other beta-blockers, and may be resistant to prescribing Gencaro as an AF or HF therapy. Any one of these factors could affect prescriber behavior, which in turn may substantially impede market acceptance of the Gencaro Test, which could cause significant harm to Gencaro s ability to compete, and in turn harm our business.

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We are dependent on our key personnel.

The success of our business is highly dependent on the principal members of our board of directors and executive management, including our President and Chief Executive Officer, Michael R. Bristow. The loss of the services of any such individual might seriously harm our product development, partnering and financing efforts. Recruiting and training personnel with the requisite skills is challenging and we compete for talent with companies that are larger and have more financial resources.

We have no manufacturing capacity which puts us at risk of lengthy and costly delays of bringing our products to market.

We do not currently operate manufacturing facilities for clinical or commercial production of our product candidates, including their active pharmaceutical ingredients, or API. We have no experience in drug formulation or manufacturing, and we lack the resources and the capabilities to manufacture any of our product candidates on a clinical or commercial scale. We do not intend to develop facilities for the manufacture of product candidates for clinical trials or commercial purposes in the foreseeable future. We have contracted with Groupe Novasep to manufacture commercial quantities of the API for Gencaro. For drug production, we have contracted with Patheon, Inc. to manufacture the Gencaro tablets. These contract manufacturers may not perform as agreed or may not remain in the contract manufacturing business for the time required to successfully produce, store and distribute our products. In addition, these manufacturers may have staffing difficulties, may not be able to manufacture our products on a timely basis or may become financially distressed. In the event of errors in forecasting production quantities required to meet demand, natural disaster, equipment malfunctions or failures, technology malfunctions, strikes, lock-outs or work stoppages, regional power outages, product tampering, war or terrorist activities, actions of regulatory authorities, business failure, strike or other difficulty, we may be unable to find an alternative third-party manufacturer in a timely manner and the production of our product candidates would be interrupted, resulting in delays and additional costs, which could impact our ability to commercialize and sell our product candidates. We or our contract manufacturers may also fail to achieve and maintain required manufacturing standards, which could result in patient injury or death, product recalls or withdrawals, an order by governmental authorities to halt production, delays or failures in product testing or delivery, cost overruns or other problems that could seriously hurt our business. Contract manufacturers also often encounter difficulties involving production yields, quality control and quality assurance, as well as shortages of qualified personnel. In addition, our contract manufacturers are subject to ongoing inspections and regulation by the FDA, the U.S. Drug Enforcement Agency and corresponding foreign and state agencies and they may fail to meet these agencies acceptable standards of compliance. If our contract manufacturers fail to comply with applicable governmental regulations, such as quality control, quality assurance and the maintenance of records and documentation, we may not be able to continue production of the API or finished product. If the safety of any API or product supplied is compromised due to failure to adhere to applicable laws or for other reasons, this may jeopardize our regulatory approval for Gencaro and other product candidates, and we may be held liable for any injuries sustained as a result. Upon the occurrence of one of the aforementioned events, the ability to switch manufacturers may be difficult for a number of reasons, including:

- the number of potential manufacturers is limited and we may not be able to negotiate agreements with alternative manufacturers on commercially reasonable terms, if at all;
- long lead times are often needed to manufacture drugs;
- the manufacturing process is complex and may require a significant learning curve; and
- the FDA must approve any replacement prior to manufacturing, which requires new testing and compliance inspections.

If a third-party diagnostics provider responsible for the Gencaro Test or certain of its third-party suppliers fail to comply with ongoing FDA or other foreign regulatory authority requirements, or if there are unanticipated problems with the Gencaro Test, these products could be subject to restrictions or withdrawal from use in trial or from the market.

Any medical device for which a third-party diagnostics provider obtains clearance or approval, and the manufacturing processes, reporting requirements, post-approval clinical data and promotional activities for such product, will be subject to continued regulatory review, oversight and periodic inspections by the FDA and other domestic and foreign regulatory bodies. With respect to the Gencaro Test, to the extent applicable, any third-party diagnostics provider and certain of its suppliers will be required to comply with the FDA s Quality System Regulation, or QSR, and International Standards Organization, or ISO, requirements which cover the methods and documentation of the design, testing, production, control, quality assurance, labeling, packaging, storage and shipping of any product for which clearance or approval is obtained.

Regulatory bodies, such as the FDA, enforce the QSR and other regulations through periodic inspections. The failure by a third-party diagnostics provider, or certain of its third-party manufacturers or suppliers, as the case may be, to comply with applicable statutes and regulations administered by the FDA and other regulatory bodies, or the failure to timely and adequately respond to any adverse inspectional observations or product safety issues, could result in, among other things, enforcement actions. If any of these actions were to occur, it could harm our reputation and cause product sales and profitability of Gencaro to suffer and may prevent us from generating revenue or utilizing the Gencaro Test further in any clinical trial. Even if regulatory clearance or approval is granted, such clearance or approval may be subject to limitations on the intended uses for which the product may be marketed and reduce our potential to successfully commercialize the product and generate revenue from the product.

A third-party diagnostics provider may need to conduct clinical trials to support current or future versions of the Gencaro Test. Delays or failures in any such clinical trials may prevent a third-party diagnostics provider from commercializing any modified or new versions of the Gencaro Test and will adversely affect our business, operating results and prospects.

Based on discussions with the FDA, we do not believe that additional clinical data are needed for the Gencaro Test submission. However, the FDA may require clinical data for the Gencaro Test submission and/or future products. Initiating and completing clinical trials necessary to support 510(k)s or PMAs, if required, for current or future products will be time consuming and expensive and the outcome uncertain. Moreover, the results of early clinical trials are not necessarily predictive of future results, and any product we or our third party suppliers advance into clinical trials may not have favorable results in later clinical trials.

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Conducting successful clinical studies may require the enrollment of large numbers of patients, and suitable patients may be difficult to identify and recruit. Patient enrollment in clinical trials and completion of patient participation and follow-up depends on many factors, including: the size of the patient population; the number of patients to be enrolled; the nature of the trial protocol; the attractiveness of, or the discomforts and risks associated with, the treatments received by enrolled subjects; the availability of appropriate clinical trial investigators, support staff, and proximity of patients to clinical sites; and the patients ability to meet the eligibility and exclusion criteria for participation in the clinical trial and patient compliance. For example, patients may be discouraged from enrolling in clinical trials if the trial protocol requires them to undergo extensive post-treatment procedures or follow-up to assess the safety and effectiveness of our products or if they determine that the treatments received under the trial protocol are not attractive or involve unacceptable risks or discomforts. In addition, patients participating in clinical trials may die before completion of the trial or suffer adverse medical events unrelated to investigational products.

Development of sufficient and appropriate clinical protocols to demonstrate safety and efficacy are required, and we or the third-party diagnostics provider may not adequately develop such protocols to support clearance and approval. The trials will require the submission and approval of an investigational device exemption, or IDE, from the FDA. There is no guarantee that the FDA will approve the third-party diagnostics provider s or our future IDE submissions. Further, the FDA may require them or us to submit data on a greater number of patients than originally anticipated and/or for a longer follow-up period or change the data collection requirements or data analysis applicable to our clinical trials. Delays in patient enrollment or failure of patients to continue to participate in a clinical trial may cause an increase in costs and delays in the approval and attempted commercialization of future products or result in the failure of the clinical trial. In addition, despite considerable time and expense invested in such clinical trials, the FDA may not consider the data to be adequate to demonstrate safety and efficacy. Such increased costs and delays or failures could adversely affect our or our third party suppliers business, operating results and prospects.

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Transitioning from a developmental stage company will require successful completion of a number of steps, many of which are outside of our control and, consequently, we can provide no assurance of our successful and timely transition from a developmental stage company.

We are a development stage biopharmaceutical company with a limited operating history. To date we have not generated any product revenue and have historically funded our operations through investment capital. Our future growth depends on our ability to emerge from the developmental stage and successfully commercialize or provide for the commercialization of Gencaro and our other product candidates, which in turn, will depend, among other things, on our ability to:

- conduct an additional clinical trial and develop and obtain regulatory approval for Gencaro or other product candidates;
- successfully partner a companion genetic test with the commercial launch of Gencaro;
- enter into a strategic transaction enabling the continued development and commercialization of Gencaro, or alternatively, raise significant additional capital to enable these activities;
- pursue additional indications for Gencaro and develop other product candidates, including other cardiovascular therapies; and
- obtain commercial quantities of Gencaro or other product candidates at acceptable cost levels.

Any one of these factors or other factors discussed in this prospectus could affect our ability to successfully commercialize Gencaro and other product candidates, which could impact our ability to earn sufficient revenues to transition from a developmental stage company and continue our business.

If approved by the FDA, Gencaro will be entering a competitive marketplace and may not succeed.

Gencaro is a new type of beta-blocker and vasodilator being developed for AF. While we anticipate that this drug, if approved, would be the first genetically-targeted cardiovascular drug, and potentially the only beta-blocker approved for AF. Gencaro will be one of a number of successful drugs in the beta-blocker class currently on the market. For example, currently, there are three branded beta-blockers indicated for chronic HF in New York Health Association, or NYHA, class II-IV patients: Toprol-XL (once-a-day formulation), Coreg and Coreg CR (once-a-day). Toprol-XL and Coreg have generic equivalents commercially available in the U.S. (metoprolol succinate and carvedilol, respectively). The price of the generic forms of these drugs will be less than the anticipated price of Gencaro, if approved. As a result, Gencaro may not be successful in competing against these existing drugs.

Our commercial opportunity may be reduced or eliminated if competitors develop and commercialize products that are safer, more effective, have fewer side effects, are more convenient or are less expensive than Gencaro. If products with any of these properties are developed, or any of the existing products are better marketed, then prescriptions of Gencaro by physicians and patient use of Gencaro could be significantly reduced or rendered obsolete and noncompetitive. Further, public announcements regarding the development of any such competing drugs could adversely affect the market price of our common stock and the value of our assets.

Future sales of our products may suffer if they are not accepted in the marketplace by physicians, patients and the medical community.

Gencaro or our other product candidates may not gain market acceptance among physicians, patients and the medical community. The degree of market acceptance of Gencaro or our other product candidates will depend on a number of factors, such as its effectiveness and tolerability, as compared with competitive drugs. Also, prevalence and severity of side-effects could negatively affect market acceptance of Gencaro or our other product candidates. Failure to achieve market acceptance of Gencaro would significantly harm our business.

If we are unable to obtain acceptable prices or adequate reimbursement from third-party payors for Gencaro, or any other product candidates that we may seek to commercialize, then our revenues and prospects for profitability will suffer.

Our or any strategic partner s ability to commercialize Gencaro, or any other product candidates that we may seek to commercialize, is highly dependent on the extent to which coverage and reimbursement for these product candidates will be available from:

- governmental payors, such as Medicare and Medicaid;
- private health insurers, including managed-care organizations; and
- other third-party payors.

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Many patients will not be capable of paying for our potential products themselves and will rely on third-party payors to pay for their medical needs. A primary current trend in the U.S. health care industry is toward cost containment. Large private payors, managed-care organizations, group purchasing organizations and similar organizations are exerting increasing influence on decisions regarding the use of, and reimbursement levels for, particular treatments. Such third-party payors, including Medicare, are challenging the prices charged for medical products and services, and many third-party payors limit reimbursement for newly approved health care products.

Cost-control initiatives could decrease the price we might establish for products, which could result in product revenues lower than anticipated. If the prices for our product candidates decrease, or if governmental and other third-party payors do not provide adequate coverage and reimbursement levels, then our revenue and prospects for profitability will suffer.

Health care reform measures could materially and adversely affect our business.

The business and financial condition of pharmaceutical and biotechnology companies are affected by the efforts of governmental and third-party payors to contain or reduce the costs of health care. The U.S. Congress has enacted legislation to reform the health care system. While we anticipate that this legislation may, over time, increase the number of patients who have insurance coverage for pharmaceutical products, it also imposes cost containment measures that may adversely affect the amount of reimbursement for pharmaceutical products. These measures include increasing the minimum rebates for products covered by Medicaid programs and extending such rebates to drugs dispensed to Medicaid beneficiaries enrolled in Medicaid managed care organizations as well as expansion of the 340(B) Public Health Services drug discount program. In addition, such legislation contains a number of provisions designed to generate the revenues necessary to fund the coverage expansion, including new fees or taxes on certain health-related industries, including medical device manufacturers. Beginning in 2013, each medical device manufacturer will have to pay an excise tax (or sales tax) in an amount equal to 2.3% of the price for which such manufacturer sells its medical devices. Such excise taxes may impact any potential sales of the Gencaro Test if it is approved for marketing. In foreign jurisdictions there have been, and we expect that there will continue to be, a number of legislative and regulatory proposals aimed at changing the health care system. For example, in some countries other than the United States, pricing of prescription drugs is subject to government control and we expect to see continued efforts to reduce healthcare costs in international markets.

Some states are also considering legislation that would control the prices of drugs, and state Medicaid programs are increasingly requesting manufacturers to pay supplemental rebates and requiring prior authorization by the state program for use of any drug for which supplemental rebates are not being paid. Managed care organizations continue to seek price discounts and, in some cases, to impose restrictions on the coverage of particular drugs. Government efforts to reduce Medicaid expenses may lead to increased use of managed care organizations by Medicaid programs. This may result in managed care organizations influencing prescription decisions for a larger segment of the population and a corresponding constraint on prices and reimbursement for drugs. It is likely that federal and state legislatures and health agencies will continue to focus on additional health care reform in the future although we are unable to predict what additional legislation or regulation, if any, relating to the health care industry or third-party coverage and reimbursement may be enacted in the future or what effect such legislation or regulation would have on our business. We or any strategic partner s ability to commercialize Gencaro, or any other product candidates that we may seek to commercialize, is highly dependent on the extent to which coverage and reimbursement for these product candidates will be available from government payors, such as Medicare and Medicaid, private health insurers, including managed care organizations, and other third-party payors, and any change in reimbursement levels could materially and adversely affect our business. Further, the pendency or approval of future proposals or reforms could result in a decrease in our stock price or limit our ability to raise capital or to obtain strategic partnerships or licenses.

Our competitors may be better positioned in the marketplace and thereby may be more successful than us at developing, manufacturing and marketing approved products.

Many of our competitors currently have significantly greater financial resources and expertise in conducting clinical trials, obtaining regulatory approvals, managing manufacturing and marketing approved products than us. Other early-stage companies may also prove to be significant competitors, particularly through collaborative arrangements with large and established companies. In addition, these third parties compete with us in recruiting and retaining qualified scientific and management personnel, establishing clinical trial sites and patient registration for clinical trials, as well as in acquiring therapies and therapy licenses complementary to our programs or advantageous to our business. We expect that our ability to compete effectively will depend upon our ability to:

- successfully and rapidly complete clinical trials for any product candidates and obtain all requisite regulatory approvals in a cost-effective manner;

build an adequate sales and marketing infrastructure, raise additional funding, or enter into strategic transactions enabling the commercialization of our products;

develop competitive formulations of our product candidates;

attract and retain key personnel; and

identify and obtain other product candidates on commercially reasonable terms.

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If we fail to identify and license or acquire other products or product candidates, then we may be unable to expand our business, and the acquisition or licensing of other products or product candidates may put a strain on our operations and will likely require us to seek additional financing.

One of our strategies is to license or acquire clinical-stage products or product candidates and further develop them for commercialization. The market for licensing and acquiring products and product candidates is intensely competitive and many of our competitors may have greater resources than us. If we undertake any additional acquisitions, whether of product candidates or other biopharmaceutical companies, the process of integrating an acquired product candidate or complementary company into our business may put a strain on our operations, divert personnel, financial resources and management s attention. In 2013, we expect our research and development activities will be dedicated to Gencaro. If we are not able to substantially expand our research and development efforts, or identify, or license or acquire other products or product candidates or complete future acquisitions, then we will likely be unable expand our pipeline of product candidates. In addition, any future acquisition would give rise to additional operating costs and will likely require us to seek additional financing. Future acquisitions could result in additional issuances of equity securities that would dilute the ownership of existing stockholders. Future acquisitions could also result in the incurrence of debt, contingent liabilities or the amortization of expenses related to other intangible assets, any of which could adversely affect our operating results.

We would be subject to applicable regulatory approval requirements of the foreign countries in which we market our products, which are costly and may prevent or delay us from marketing our products in those countries.

In addition to regulatory requirements in the United States, we would be subject to the regulatory approval requirements in each foreign country where we market our products. In addition, we might be required to identify one or more collaborators in these foreign countries to develop, seek approval for and manufacture our products and any companion genetic test for Gencaro. If we decide to pursue regulatory approvals and commercialization of our product candidates internationally, we may not be able to obtain the required foreign regulatory approvals on a timely basis, if at all, and any failure to do so may cause us to incur additional costs or prevent us from marketing our products in foreign countries, which may have a material adverse effect on our business, financial condition and results of operations.

If our internal control over financial reporting is not considered effective, our business and stock price could be adversely affected.

Section 404 of the Sarbanes-Oxley Act of 2002 requires us to evaluate the effectiveness of our internal control over financial reporting as of the end of each fiscal year, and to include a management report assessing the effectiveness of our internal control over financial reporting in our annual report on Form 10-K for that fiscal year. Our management, including our chief executive officer and chief financial officer, does not expect that our internal control over financial reporting will prevent all error and all fraud. During the first quarter of 2011 there was a reduction in our workforce which included personnel involved in financial reporting and our internal control processes. Since that time we have continued to operate with a reduced staff for financial reporting. Though the process and design of our internal controls over financial reporting have not been altered, the reduced number of staff may limit our ability to properly segregate internal control procedures which could result in deficiencies or material weaknesses in our internal controls in the future. A control system, no matter how well designed and operated, can provide only reasonable, not absolute, assurance that the control system s objectives will be met. Further, the design of a control system must reflect the fact that there are resource constraints, and the benefits of controls must be considered relative to their costs. Because of the inherent limitations in all control systems, no evaluation of controls can provide absolute assurance that all control issues and instances of fraud involving a company have been, or will be, detected. The design of any system of controls is based in part on certain assumptions about the likelihood of future events, and we cannot assure you that any design will succeed in achieving its stated goals under all potential future conditions. Over time, controls may become ineffective because of changes in conditions or deterioration in the degree of compliance with policies or procedures. Because of the inherent limitations in a cost-effective control system, misstatements due to error or fraud may occur and not be detected. We cannot assure you that we or our independent registered public accounting firm will not identify a material weakness in our internal control over financial reporting in the future. A material weakness in our internal control over financial reporting would require management to consider our internal control over financial reporting as ineffective. If our internal control over financial reporting is not considered effective, we may experience a loss of public confidence, which could have an adverse effect on our business and on the market price of our common stock.

Risks Related to Intellectual Property and Other Legal Matters

If product liability lawsuits are successfully brought against us, then we will incur substantial liabilities and may be required to limit commercialization of Gencaro or other product candidates.

We face product liability exposure related to the testing of our product candidates in human clinical trials, and may face exposure to claims by an even greater number of persons once we begin marketing and distributing our products commercially. If we cannot successfully defend against product liability claims, then we will incur substantial liabilities.

Regardless of merit or eventual outcome, liability claims may result in:

- decreased demand for our products and product candidates;
- injury to our reputation;
- withdrawal of clinical trial participants;
- costs of related litigation;
- substantial monetary awards to patients and others;
- loss of revenues; and
- the inability to commercialize our products and product candidates.

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We have obtained limited product liability insurance coverage. Such coverage, however, may not be adequate or may not continue to be available to us in sufficient amounts or at an acceptable cost, or at all. We may not be able to obtain commercially reasonable product liability insurance for any product candidate.

Defending against claims relating to improper handling, storage or disposal of hazardous chemicals, radioactive or biological materials could be time consuming and expensive.

Our research and development of product candidates may involve the controlled use of hazardous materials, including chemicals, radioactive and biological materials. We cannot eliminate the risk of accidental contamination or discharge and any resultant injury from the materials. Various laws and regulations govern the use, manufacture, storage, handling and disposal of hazardous materials. We may be sued or be required to pay fines for any injury or contamination that results from our use or the use by third parties of these materials. Compliance with environmental laws and regulations may be expensive, and current or future environmental regulations may impair our research, development and production efforts.

The loss of any rights to market key products would significantly impair our operating results.

We have licensed from CPEC, who has licensed rights in Gencaro from Bristol Meyers Squibb (BMS), the exclusive rights to Gencaro for all therapeutic and diagnostic uses in any country until the later of (i) 10 years from the first commercial sale of Gencaro in such country, or (ii) the termination of our commercial exclusivity in such country. This license includes a sublicense to us from BMS. We are obligated to use commercially reasonable efforts to develop and commercialize Gencaro, including obtaining regulatory approvals. Our ability to develop and commercialize Gencaro is dependent on numerous factors, including some factors that are outside of our control. CPEC has the right to terminate our license if we materially breach our obligations under the license agreement and fail to cure any such breach within the terms of the license.

If our license agreement with CPEC is terminated for reasons related to non-payment of fees, or for any other breach, then we would have no further rights to develop and commercialize Gencaro for any indication. The termination of this license, or of any other agreement which enables us to market a key product or product candidate, could significantly and adversely affect our business.

Certain intellectual property licensed by us is the subject of additional licensing arrangements to which the party that has licensed rights to us is subject. If such parties were to breach the terms of such licenses or such licenses were otherwise to terminate, our and our partners rights to use such technology and develop and commercialize their products such as the Gencaro Test may terminate and our business would be materially harmed.

Third parties may own or control patents or patent applications that we may be required to license to commercialize our product candidates or that could result in litigation that would be costly and time consuming.

Our or any strategic partner s ability to commercialize Gencaro and other product candidates depends upon our ability to develop, manufacture, market and sell these drugs without infringing the proprietary rights of third parties. A number of pharmaceutical and biotechnology companies, universities and research institutions have or may be granted patents that cover technologies similar to the technologies owned by or licensed to us. We may choose to seek, or be required to seek, licenses under third party patents, which would likely require the payment of license fees or royalties or both. We may also be unaware of existing patents that may be infringed by Gencaro, the genetic testing we intend to use in connection with Gencaro or our other product candidates. Because patent applications can take many years to issue, there may be other currently pending applications that may later result in issued patents that are infringed by Gencaro or our other product candidates. Moreover, a license may not be available to us on commercially reasonable terms, or at all.

There is a substantial amount of litigation involving patent and other intellectual property rights in the biotechnology and biopharmaceutical industries generally. If a third party claims that we are infringing on its technology, then our business and results of operations could be harmed by a number of factors, including:

- infringement and other intellectual property claims, even if without merit, are expensive and time-consuming to litigate and can divert management s attention from our core business;

monetary damage awards for past infringement can be substantial;

a court may prohibit us from selling or licensing product candidates unless the patent holder chooses to license the patent to us; and

if a license is available from a patent holder, we may have to pay substantial royalties.

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We may also be forced to bring an infringement action if we believe that a competitor is infringing our protected intellectual property. Any such litigation will be costly, time-consuming and divert management s attention, and the outcome of any such litigation may not be favorable to us.

Our intellectual property rights may not preclude competitors from developing competing products and our business may suffer.

Our competitive success will depend, in part, on our ability to obtain and maintain patent protection for our inventions, technologies and discoveries, including intellectual property that we license. The patent positions of biotechnology companies involve complex legal and factual questions, and we cannot be certain that our patents and licenses will successfully preclude others from using our technology. Consequently, we cannot be certain that any of our patents will provide significant market protection or will not be circumvented or challenged and found to be unenforceable or invalid. In some cases, patent applications in the U.S. and certain other jurisdictions are maintained in secrecy until patents issue, and since publication of discoveries in the scientific or patent literature often lags behind actual discoveries, we cannot be certain of the priority of inventions covered by pending patent applications. Moreover, we may have to participate in interference proceedings declared by the U.S. Patent and Trademark Office to determine priority of invention or in opposition proceedings in a foreign patent office, any of which could result in substantial cost to us, even if the eventual outcome is favorable. There can be no assurance that a court of competent jurisdiction would hold any claims in any issued patent to be valid. An adverse outcome could subject us to significant liabilities to third parties, require disputed rights to be licensed from third parties or require us to cease using such technology. Regardless of merit, the listing of patents in the FDA Orange Book for Gencaro may be challenged as being improperly listed. We may have to defend against such claims and possible associated antitrust issues. We could also incur substantial costs in seeking to enforce our proprietary rights against infringement.

While the composition of matter patents on the compound that comprises Gencaro have expired, we hold the intellectual property concerning the interaction of Gencaro with the polymorphisms of the ß1 and 2C receptors. We have obtained patents that claim methods involving Gencaro after a patient s receptor genotype has been determined. Our NDA requested a label that will include a claim that efficacy varies based on receptor genotype and a recommendation in the prescribing information that prospective patients be tested for their receptor genotype. We believe that under applicable law, a generic bucindolol label would likely be required to include this recommendation as it pertains directly to the safe or efficacious use of the drug. Such a label may be considered as inducing infringement, carrying the same liability as direct infringement. If the label with the genotype information for Gencaro is not approved, or if generic labels are not required to copy the approved label, competitors could have an easier path to introduce competing products and our business may suffer. The approved label may not contain language covered by the patents, or we may be unsuccessful in enforcing them.

We may not be able to effectively protect our intellectual property rights in some foreign countries, as our patents are limited by jurisdiction and many countries do not offer the same level of legal protection for intellectual property as the U.S.

We require our employees, consultants, business partners and members of our scientific advisory board to execute confidentiality agreements upon the commencement of employment, consulting or business relationships with us. These agreements provide that all confidential information developed or made known during the course of the relationship with us be kept confidential and not disclosed to third parties except in specific circumstances. In the case of employees, the agreements provide that all inventions resulting from work performed for us, utilizing the property or relating to our business and conceived or completed by the individual during employment shall be our exclusive property to the extent permitted by applicable law.

Third parties may breach these and other agreements with us regarding our intellectual property and we may not have adequate remedies for the breach. Third parties could also fail to take necessary steps to protect our licensed intellectual property, which could seriously harm our intellectual property position.

If we are not able to protect our proprietary technology, trade secrets and know-how, then our competitors may develop competing products. Any issued patent may not be sufficient to prevent others from competing with us. Further, we have trade secrets relating to Gencaro, and such trade secrets may become known or independently discovered. Our issued patents and those that may issue in the future, or those licensed to us, may be challenged, opposed, invalidated or circumvented, which could allow competitors to market similar products or limit the patent protection term of our product candidates. All of these factors may affect our competitive position.

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If the manufacture, use or sale of our products infringe on the intellectual property rights of others, we could face costly litigation, which could cause us to pay substantial damages or licensing fees and limit our ability to sell some or all of our products.

Extensive litigation regarding patents and other intellectual property rights has been common in the biopharmaceutical industry. Litigation may be necessary to assert infringement claims, enforce patent rights, protect trade secrets or know-how and determine the enforceability, scope and validity of certain proprietary rights. Litigation may even be necessary to defend disputes of inventorship or ownership of proprietary rights. The defense and prosecution of intellectual property lawsuits, U.S. Patent and Trademark Office interference proceedings, and related legal and administrative proceedings (e.g., a reexamination) in the U.S. and internationally involve complex legal and factual questions. As a result, such proceedings are costly and time-consuming to pursue, and their outcome is uncertain.

Regardless of merit or outcome, our involvement in any litigation, interference or other administrative proceedings could cause us to incur substantial expense and could significantly divert the efforts of our technical and management personnel. Any public announcements related to litigation or interference proceedings initiated or threatened against us could cause our stock price to decline. Adverse outcomes in patent litigation may potentially subject us to antitrust litigation which, regardless of the outcome, would adversely affect our business. An adverse determination may subject us to the loss of our proprietary position or to significant liabilities, or require us to seek licenses that may include substantial cost and ongoing royalties. Licenses may not be available from third parties, or may not be obtainable on satisfactory terms. An adverse determination or a failure to obtain necessary licenses may restrict or prevent us from manufacturing and selling our products, if any. These outcomes could materially harm our business, financial condition and results of operations.

Risks Related to Stock Price Volatility and the Offering

Ownership of our common stock is highly concentrated, and it may prevent you and other stockholders from influencing significant corporate decisions and may result in conflicts of interest that could cause our stock price to decline.

Our executive officers, directors and their affiliates beneficially owned approximately 29% of our outstanding common stock as of March 31, 2013 Accordingly, these executive officers, directors and their affiliates, acting individually or as a group, have substantial influence over the outcome of a corporate action of ours requiring stockholder approval, including the election of directors, any merger, consolidation or sale of all or substantially all of our assets or any other significant corporate transaction. These stockholders may also delay or prevent a change in control of us, even if such change in control would benefit our other stockholders. The significant concentration of stock ownership may adversely affect the value of our common stock due to investors perception that conflicts of interest may exist or arise.

Our stock price is expected to be volatile.

Our common stock could be subject to significant fluctuations. Market prices for securities of early-stage pharmaceutical, biotechnology and other life sciences companies have historically been particularly volatile. Some of the factors that may cause the market price of our common stock to fluctuate include:

- the regulatory status of Gencaro and the Gencaro Test, and whether and when they are approved for sale, if at all, and the labeling or other conditions of use imposed by the FDA;
- our ability to secure substantial additional funding or complete a strategic transaction or to complete development of and commercialize Gencaro;
- potential receipt of government or third party funding to further develop Gencaro;
- the results of our future clinical trials and any future NDAs of our current and future product candidates;
- the entry into, or termination of, key agreements, including key strategic alliance agreements;

the results and timing of regulatory reviews relating to our product candidates;

failure of any of our product candidates, if approved, to achieve commercial success;

general and industry-specific economic conditions that may affect our research and development expenditures;

the results of clinical trials conducted by others on drugs that would compete with our product candidates;

issues in manufacturing our product candidates or any approved products;

the initiation of or material developments in or the conclusion of litigation to enforce or defend any of our intellectual property rights;

the loss of key employees;

the introduction of technological innovations or new commercial products by our competitors;

changes in estimates or recommendations by securities analysts, if any, who cover our common stock;

future sales of our common stock;

changes in the structure of health care payment systems;

period-to-period fluctuations in our financial results; and

our ability to retain the listing of our common stock on the Nasdaq Capital Market.

Moreover, the stock markets in general have experienced substantial volatility that has often been unrelated to the operating performance of individual companies. These broad market fluctuations may also adversely affect the trading price of our common stock. In the past, following periods of volatility in the market price of a company s securities, stockholders have often instituted class action securities litigation against those companies. Such litigation, if instituted, could result in substantial costs and diversion of management attention and resources, which could significantly harm our profitability and reputation.

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Future sales or the possibility of future sales of our common stock may depress the market price of our common stock.

Sales in the public market of substantial amounts of our common stock could depress prevailing market prices of our common stock. As of March 31, 2013 3,185,562 shares of common stock were outstanding. All of these shares are freely transferable without restriction or further registration under the Securities Act, except for shares held by our directors, officers and other affiliates and unregistered shares held by non-affiliates. The sale of these additional shares, or the perception that such sales may occur, could depress the market price of our common stock.

As of March 31, 2013 approximately 1.3 million shares of our common stock were issuable upon the exercise of outstanding warrants. Once a warrant is exercised, if the shares of our common stock issued upon the exercise of any such warrant are not available for sale in the open market without further registration under the Securities Act, then the holder can arrange for the resale of shares either by invoking any applicable registration rights, causing the shares to be registered under the Securities Act and thus freely transferable, or by relying on an exemption to the Securities Act. If these registration rights, or similar registration rights that may apply to securities we may issue in the future, are exercised, it could result in additional sales of our common stock in the market, which may have an adverse effect on our stock price.

As of March 31, 2013, there were approximately 138,000 shares of our common stock which may be issued upon exercise of outstanding stock options. If and when these options are exercised, such shares will be available for sale in the open market without further registration under the Securities Act. The existence of these outstanding options may negatively affect our ability to complete future equity financings at acceptable prices and on acceptable terms. The exercise of those options, and the prompt resale of shares of our common stock received, may also result in downward pressure on the price of our common stock.

In the absence of a significant strategic transaction, we will need to raise significant additional capital to finance our capital requirements, including the research, development and commercialization of our drug products. If future securities offerings occur, they would dilute our current stockholders equity interests and could reduce the market price of our common stock.

We do not expect to pay cash dividends, and accordingly, stockholders must rely on stock appreciation for any return on their investment.

We anticipate that we will retain our earnings, if any, for future growth and therefore do not anticipate paying cash dividends in the future. As a result, only appreciation of the price of our common stock will provide a return to stockholders. Investors seeking cash dividends should not invest in our common stock or Preferred Stock.

We have implemented anti-takeover provisions that could discourage, prevent or delay a takeover, even if the acquisition would be beneficial to our stockholders.

Provisions of our certificate of incorporation and bylaws, as well as provisions of Delaware law, could make it more difficult for a third party to acquire us, even if doing so would benefit our stockholders. These provisions:

- establish a classified board of directors so that not all members of our board may be elected at one time;
- authorize the issuance of up to approximately 4.9 million additional shares of preferred stock that could be issued by our board of directors to increase the number of outstanding shares and hinder a takeover attempt;
- limit who may call a special meeting of stockholders;
- prohibit stockholder action by written consent, thereby requiring all stockholder actions to be taken at a meeting of our stockholders; and
- establish advance notice requirements for nominations for election to our board of directors or for proposing matters that can be acted upon at a stockholder meeting.

Specifically, our certificate of incorporation provides that all stockholder action must be effected at a duly called meeting and not by a written consent. The bylaws provide, however, that our stockholders may call a special meeting of stockholders only upon a request of stockholders owning at least 50% of our outstanding common stock. These provisions of our certificate of incorporation and bylaws could discourage potential acquisition proposals and could delay or prevent a change in control. We designed these provisions to reduce our vulnerability to unsolicited acquisition proposals and to discourage certain tactics that may be used in proxy fights. These provisions, however, could also have the effect of discouraging others from making tender offers for our shares. As a consequence, they also may inhibit fluctuations in the market price of our shares that could result from actual or rumored takeover attempts. Such provisions also may have the effect of preventing changes in our management.

We are permitted to issue shares of our preferred stock without stockholder approval upon such terms as our board of directors determines. Therefore, the rights of the holders of our common stock are subject to, and may be adversely affected by, the rights of the holders of our preferred stock that may be issued in the future. In addition, the issuance of preferred stock could have a dilutive effect on the holdings of our current stockholders.

We are subject to the Delaware anti-takeover laws regulating corporate takeovers. These anti-takeover laws prevent a Delaware corporation from engaging in a merger or sale of more than 10% of its assets with any stockholder, including all affiliates and associates of the stockholder, who owns 15% or more of the corporation s outstanding voting stock, for three years following the date that the stockholder acquired 15% or more of the corporation s stock unless:

the board of directors approved the transaction where the stockholder acquired 15% or more of the corporation s stock;

after the transaction in which the stockholder acquired 15% or more of the corporation s stock, the stockholder owned at least 85% of the corporation s outstanding voting stock, excluding shares owned by directors, officers and employee stock plans in which employee participants do not have the right to determine confidentially whether shares held under the plan will be tendered in a tender or exchange offer; or

on or after this date, the merger or sale is approved by the board of directors and the holders of at least two-thirds of the outstanding voting stock that is not owned by the stockholder.

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The provisions of our governing documents and current Delaware law may, collectively:

- lengthen the time required for a person or entity to acquire control of us through a proxy contest for the election of a majority of our board of directors;
- discourage bids for our common stock at a premium over market price; and
- generally deter efforts to obtain control of us.

If you purchase the Preferred Stock sold in this offering and assuming its conversion into shares of our common stock, you will experience immediate and substantial dilution in your investment.

Since the price per share of our Preferred Stock being offered in this offering is substantially higher than the net tangible book value of the common stock, you will suffer substantial dilution with respect to the net tangible book value of the Preferred Stock you purchase in this offering, assuming conversion of the Preferred Stock into shares of our common stock. Assuming the sale of all securities offered by us in this offering, based on the assumed public offering price of $192.00 per share of Preferred Stock and accompanying warrant (which is equal to $1.92 per share on an as-converted-to-common stock basis) and our net tangible book value as of March 31, 2013, if you purchase shares of Preferred Stock and warrants in this offering, assuming conversion of the Preferred Stock into shares of our common stock, you will suffer immediate and substantial dilution of $0.35 per share with respect to the net tangible book value of the common stock. For the purpose of this calculation, the entire purchase price for the shares of Preferred Stock and accompanying warrants is being allocated to the shares of Preferred Stock, and shares issuable upon exercise of the warrants have not been included. See the section entitled Dilution below for a more detailed discussion of the dilution you will incur if you purchase Preferred Stock and warrants in this offering.

There is no public market for the Preferred Stock or warrants being offered in this offering.

There is no established public trading market for the Preferred Stock or warrants being offered in this offering, and we do not expect a market to develop. In addition, we do not intend to apply for listing of the Preferred Stock or warrants on any national securities exchange or other nationally recognized trading system. Without an active market, the liquidity of the Preferred Stock or warrants will be limited.

Aspects of the treatment of the securities may be uncertain.

The tax treatment of the Preferred Stock and warrants is uncertain and may vary depending upon whether you are an individual or a legal entity and whether or not you are domiciled in the United States. In the event you are a non-U.S. investor, you should consult your tax advisors as to the consequences, under the tax laws of the country where you are resident for tax purposes, of acquiring, holding and disposing of the Preferred Stock and warrants.

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SPECIAL NOTE REGARDING FORWARD-LOOKING STATEMENTS

This prospectus, including the information that we incorporate by reference, contains various forward-looking statements within the meaning of Section 27A of the Securities Act of 1933, as amended, or the Securities Act, and Section 21E of the Securities Exchange Act of 1934, as amended, or the Exchange Act. These statements relate to future events or our future financial performance and involve known and unknown risks, uncertainties and other factors that may cause our actual results, levels of activity, performance or achievements to differ materially from any future results, levels of activity, performance or achievements expressed or implied by these forward-looking statements. In some cases, you can identify forward-looking statements by terminology such as anticipates, believes, continue estimates, expects, intends, may, plan predicts, should, will, or the negative of these terms or other comparable terminology. These forward-looking statements may also use different phrases. These statements involve risks, uncertainties and other factors that may cause our actual results, levels of activity, performance or achievements to be materially different from the information expressed or implied by these forward-looking statements. Although we believe that we have a reasonable basis for each forward-looking statement contained in this prospectus, including the information that we incorporate by reference, we caution you that these statements are based on a combination of facts and factors currently known by us and our projections of the future, about which we cannot be certain. Many important factors affect our ability to achieve our objectives, including:

- the success, cost and timing of our product development activities and clinical trials;
- our ability to obtain and maintain regulatory approval of our product candidates, and any related restrictions, limitations, and/or warnings in the label of an approved product candidate;
- our ability to obtain funding for our operations, including funding necessary for the planned clinical trials for Gencaro;
- our plans to research, develop and commercialize our product candidates, particularly Gencaro;
- our ability to attract collaborators with development, regulatory and commercialization expertise;
- the size and growth potential of the markets for our product candidates, particularly Gencaro, and our ability to serve those markets;
- our ability to successfully commercialize our product candidates, particularly Gencaro;
- the rate and degree of market acceptance of our product candidates, particularly Gencaro;
- our ability to develop sales and marketing capabilities, whether alone or with potential future collaborators;
- regulatory developments in the United States and foreign countries;
- the performance of our third party suppliers and manufacturers;
- the success of competing therapies that are or become available;

the loss of key scientific or management personnel;

our use of the proceeds from this offering;

the accuracy of our estimates regarding expenses, clinical trial timelines, capital requirements and needs for additional financing; and

our ability to obtain and maintain intellectual property protection for our product candidates.

In addition, you should refer to the Risk Factors section of this prospectus for a discussion of other important factors, risks and uncertainties that may cause our actual results to differ materially from those expressed or implied by these forward-looking statements. Given these other important factors, risks and uncertainties, you should not place undue reliance on these forward-looking statements. Also, these forward-looking statements represent our estimates and assumptions only as of the date such forward-looking statements are made. You should carefully read this prospectus, together with the information incorporated herein by reference as described under the section entitled Incorporation of Certain Information by Reference, completely and with the understanding that our actual future results may be materially different from what we expect. We can give no assurances that any of the events anticipated by the forward-looking statements will occur or, if any of them do, what impact they will have on our business, results of operations and financial condition.

You should rely only on information contained or incorporated by reference in this prospectus and the registration statement of which this prospectus is a part, including the exhibits that we have filed with the registration statement and, if required, any post-effective amendment to the registration statement of which this prospectus is a part. You should understand that our actual future results may be materially different from what we expect. We qualify all of the forward-looking statements in the foregoing documents by these cautionary statements.

Except as required by law, we undertake no obligation to update or revise any forward-looking statements to reflect new information or future events or developments. You should not assume that our silence over time means that actual events are bearing out as expressed or implied in such forward-looking statements.

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USE OF PROCEEDS

We estimate that the net proceeds from the sale of the shares of Preferred Stock and accompanying warrants that we are offering will be approximately $18.0 million based on the assumed public offering price of $192 per share, excluding the proceeds, if any, from the exercise of the warrants, and after deducting the estimated placement agent s fees and estimated offering expenses payable by us. Each $25.00 increase (decrease) in the assumed public offering price of $192 per share would increase (decrease) the net proceeds to us from this offering by approximately $2.4 million, assuming the number of shares offered by us, as set forth on the cover page of this prospectus, remains the same. We may also increase or decrease the number of shares we are offering. Each increase (decrease) of 2,500 shares in the number of shares offered by us would increase (decrease) the net proceeds to us from this offering by approximately $440,000, assuming that the assumed public offering price remains the same, and after deducting the estimated placement agent s fees and estimated offering expenses payable by us.

We intend to use the net proceeds of the offering to fund the Phase 2b portion of the GENETIC-AF trial, working capital and general corporate purposes. If a warrant holder elects to exercise the warrants issued in this offering, we may also receive proceeds of up to $. We cannot predict when or if the warrants will be exercised. It is possible that the warrants may expire and may never be exercised. The warrants contain a net exercise provision therefore the warrant holder may elect to utilize this feature and in this case we would not receive any proceeds from their exercise. Pending their use as described above, we intend to invest the net proceeds in high quality, short-term, interest-bearing securities.

PRICE RANGE OF COMMON STOCK

Our common stock has been trading on The NASDAQ Capital Market under the symbol ABIO . The following table sets forth the high and low intraday sales prices of our common stock for the periods indicated as reported by The NASDAQ Capital Market:

	Price	
	High	Low
Year ended 2013		
First Quarter	$ 5.94	$ 2.15
Year ended 2012		
First Quarter	$ 6.90	$ 5.22
Second Quarter	$ 5.70	$ 2.22
Third Quarter	$ 3.66	$ 1.86
Fourth Quarter	$ 3.18	$ 1.44
Year ended 2011		
First Quarter	$ 20.04	$ 13.50
Second Quarter	$ 15.84	$ 8.46
Third Quarter	$ 10.08	$ 6.00
Fourth Quarter	$ 14.70	$ 5.70

The reported last sale price of our common stock on The NASDAQ Capital Market on March 28, 2013, the last trading day of the period, was $2.38 per share. As of March 31, 2013, there were 122 holders of record of our common stock.

DIVIDEND POLICY

We have never declared or paid any cash dividends on our capital stock. Regardless of the restrictions in terms of any potential future indebtedness, we anticipate that we will retain all available funds and any future earnings to support our operations and finance the growth and development of our business and, therefore, we do not expect to pay cash dividends in the foreseeable future. Any future determination related to our dividend policy will be made at the discretion of our board of directors and will depend on then-existing conditions, including our financial condition, operating results, contractual restrictions, capital requirements, business prospects and other factors our board of directors may deem relevant.

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CAPITALIZATION

The following table sets forth our cash, cash equivalents and short-term investments and our capitalization as of March 31, 2013:

- on an actual basis;
- on an as adjusted basis to give effect to the sale of the 104,167 shares of our Preferred Stock that we are offering at an assumed public offering price of $192 per share of Preferred Stock, assuming the conversion of all of the Preferred Stock into shares of common stock and after deducting the estimated placement agent s fees and estimated offering expenses payable by us.

You should read this table with our financial statements and related notes and Management s Discussion and Analysis of Financial Condition and Results of Operations incorporated by reference in this prospectus.

	As of March 31, 2013	
	Actual	As Adjusted (1)
	(in thousands, except share and per share data) (Unaudited)	
Cash, cash equivalents and short-term investments	$ 3,537	$ 21,570
Stockholders equity:		
Common stock, $0.001 par value: 100,000,000 shares authorized; 3,185,562 shares issued and outstanding, 13,602,262 issued as adjusted	3	$ 13
Series A Convertible Preferred Stock, $0.001 par value: 120,000 shares authorized (12,000,000 common shares on an as converted basis); no shares issued and outstanding		$
Additional paid-in capital	72,373	$ 90,396
Deficit accumulated during the development stage	(69,065)	$ (69,065)
Accumulated other comprehensive income		
Total stockholders equity	3,311	$ 21,344
Total capitalization	$ 3,311	$ 21,344

(1) Assuming the issuance of all Preferred Stock and accompanying warrants offered by us in this offering, each $25.00 increase (decrease) in the assumed public offering price of $192 per share would increase (decrease) each of cash, cash equivalents and short-term investments, additional paid-in capital, total stockholders equity and total capitalization by approximately $2.4 million, assuming that the number of shares offered by us, as set forth on the cover page of this prospectus, remains the same, and after deducting the estimated placement agent s fees and estimated offering expenses payable by us. We may also increase or decrease the number of shares we are offering. Each increase of 2,500 shares in the number of shares offered by us would increase each of cash, cash equivalents and short-term investments, additional paid-in capital, total stockholders equity and total capitalization by approximately $440,000, assuming that the assumed public offering price remains the same, and after deducting the estimated placement agent s fees and estimated offering expenses payable by us. Similarly, each decrease of 2,500 shares in the number of shares offered by us would decrease each of cash, cash equivalents and short-term investments, additional paid-in capital, total stockholders equity and total capitalization by approximately $440,000, assuming that the assumed public offering price remains the same, and after deducting the estimated placement agent s fees and estimated offering expenses payable by us. The as adjusted information discussed above is illustrative only and will be adjusted based on the actual public offering price and other terms of this offering determined at pricing.

The number of shares of common stock shown above is based on 3,185,562 shares of common stock outstanding as of March 31, 2013. This number excludes:

1,302,425 shares of common stock issuable upon the exercise of warrants outstanding as of March 31, 2013, at a weighted average exercise price of $7.25 per share;

137,760 shares of common stock issuable upon the exercise of options outstanding as of March 31, 2013, at a weighted average exercise price of $18.36 per share; and

85,445 additional shares of common stock reserved for future issuance under our Amended and Restated 2004 Equity Incentive Plan.

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DILUTION

If you invest in our Preferred Stock, you will experience immediate and substantial dilution to the extent of the difference between the public offering price of our Preferred Stock in this offering (assuming the conversion of the Preferred Stock) and the as adjusted net tangible book value per share of our common stock immediately after the offering.

Our historical net tangible book value per share is determined by dividing our total tangible assets, less total liabilities, by the actual number of outstanding shares of our common stock. The historical net tangible book value of our common stock as of March 31, 2013 was $3.3 million, or $1.04 per share. Dilution with respect to net tangible book value per share (assuming the conversion of all of the Preferred Stock into shares of common stock) represents the difference between the amount per share paid by purchasers of shares of our Preferred Stock and warrants in this public offering and the net tangible book value per share of our common stock immediately after this public offering. For the purpose of this calculation, the entire purchase price for the shares of Preferred Stock and accompanying warrants is being allocated to the shares of Preferred Stock, and the shares issuable upon exercise of the accompanying warrants have not been included.

After giving effect to the sale of 104,167 shares of our Preferred Stock and accompanying warrants offered by us at an assumed public offering price of $192.00 per share and accompanying warrant, assuming the conversion of 104,167 shares of our Preferred Stock into 10,416,700 shares of our common stock and after deducting the estimated placement agent s fees and estimated offering expenses payable by us, our net tangible book value as of March 31, 2013 would have been approximately $21.3 million, or $1.57 per share of common stock. This represents an immediate increase in net tangible book value of $0.53 per share to existing stockholders and an immediate dilution of $0.35 per share to new investors purchasing shares of Preferred Stock and accompanying warrants in this offering at the assumed public offering price. The following table illustrates this dilution on a per share basis (assuming the conversion of all of the Preferred Stock into shares of common stock):

Assumed public offering price per share		$ 1.92
Net tangible book value per share as of March 31, 2013	$ 1.04	
Increase per share attributable to investors purchasing our common stock in this offering	$ 0.53	
As adjusted net tangible book value per share after this offering		$ 1.57
Dilution per share to investors purchasing our common stock in this offering		$ 0.35

On an as-converted-to-common stock basis and assuming the issuance of all Preferred Stock and accompanying warrants offered by us in this offering, each $0.25 increase (decrease) in the assumed public offering price of $1.92 per share would increase (decrease) our as adjusted net tangible book value after this offering by approximately $2.4 million, or approximately $0.18 per share, and the dilution per share to new investors by approximately $0.07 per share, assuming that the number of shares offered by us, as set forth on the cover page of this prospectus, remains the same and after deducting the estimated placement agent s fees and estimated offering expenses payable by us. We may also increase or decrease the number of shares we are offering. An increase of 250,000 shares in the number of shares offered by us would increase our as adjusted net tangible book value after this offering by approximately $440,000, or less than $0.01 per share, and the dilution per share to new investors would be $0.35 per share, assuming that the assumed public offering price remains the same, and after deducting the estimated placement agent s fees and estimated offering expenses payable by us. Similarly, a decrease of 250,000 shares in the number of shares offered by us would decrease our as adjusted net tangible book value after this offering by approximately $440,000, or less than $0.01 per share, and the dilution per share to new investors would be $0.35 per share, assuming that the assumed public offering price remains the same, and after deducting the estimated placement agent s fees and estimated offering expenses payable by us. The information discussed above is illustrative only and will adjust based on the actual public offering price and other terms of this offering determined at pricing.

The above discussion and table are based on 3,185,562 shares of common stock outstanding as of March 31, 2013 and exclude:

- 1,302,425 shares of common stock issuable upon the exercise of warrants outstanding as of March 31, 2013, at a weighted average exercise price of $7.25 per share;

137,760 shares of common stock issuable upon the exercise of options outstanding as of March 31, 2013, at a weighted average exercise price of $18.36 per share; and

85,445 additional shares of common stock reserved for future issuance under our Amended and Restated 2004 Equity Incentive Plan.

To the extent that options or warrants outstanding as of March 31, 2013 have been or are exercised, or other shares are issued, investors purchasing shares in this offering could experience further dilution. In addition, we may choose to raise additional capital due to market conditions or strategic considerations even if we believe we have sufficient funds for our current or future operating plans. To the extent that additional capital is raised through the sale of equity or convertible debt securities, the issuance of these securities could result in further dilution to our stockholders.

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

We have included or incorporated by reference into this Management s Discussion and Analysis of Financial Condition and Results of Operations and elsewhere in this prospectus, and from time to time our management may make, statements that constitute forward-looking statements within the meaning of Section 27A of the Securities Act and Section 21E of the Exchange Act. Forward-looking statements may be identified by words including anticipate, plan, believe, intend, estimate, expect, should, may, potential and similar expressions. T involve known and unknown risks, uncertainties and other factors that may cause our actual results, levels of activity, performance or achievements to be materially different from the information expressed or implied by these forward-looking statements. While we believe that we have a reasonable basis for each forward-looking statement contained in this Annual Report, we caution you that these statements are based on a combination of facts and factors currently known by us and our projections of the future, about which we cannot be certain. We undertake no obligation to publicly update any forward-looking statements, whether as a result of new information, future events or otherwise. You are advised, however, to consult any further disclosures we make on related subjects in our Annual Report on Form 10-K, Quarterly Reports on Form 10-Q, Current Reports on Form 8-K, and our website.

Overview

We are a biopharmaceutical company whose principal focus is developing genetically-targeted therapies for cardiovascular diseases. Our lead product candidate is Gencaro (bucindolol hydrochloride), a pharmacologically unique beta-blocker and mild vasodilator that we plan to evaluate in a new clinical trial for the treatment of atrial fibrillation, or AF, in patients with heart failure and reduced left ventricular dysfunction (HFREF). We have identified common genetic variations in receptors in the cardiovascular system that we believe interact with Gencaro s pharmacology and may predict patient response to the drug.

We have been granted patents in the U.S., Europe, and other jurisdictions for methods of treating AF and HF patients with Gencaro based on genetic testing, which we believe will provide market exclusivity for these uses of Gencaro into at least 2026 in the U.S. and into 2025 in Europe. In addition, we believe that if Gencaro is approved, a Gencaro patent will be eligible for patent term extension based on our current clinical trial plans which, if granted, may provide market exclusivity for Gencaro into 2029 or 2030 in the U.S. and Europe.

We believe that Gencaro has potential efficacy in reducing or preventing AF, and this efficacy may be genetically regulated. We plan to test this hypothesis in a clinical trial of Gencaro, known as GENETIC-AF. GENETIC-AF is projected to be a Phase 2b/3 trial comparing Gencaro to metoprolol CR/XL for prevention of AF in patients with HFREF.

We have created an adaptive design for GENETIC-AF, under which the trial is intended to be initiated as a Phase 2b study in approximately 200 HFREF patients. Depending on the results of the Phase 2b portion, the trial may then be expanded to a Phase 3 study by enrolling an estimated additional 420 patients. We estimate that GENETIC-AF could begin approximately 6 months after we obtain sufficient funding, and we believe the Phase 2b study would take approximately two years to complete after initiation.

To support the continued development of Gencaro, including the planned GENETIC-AF clinical trial and our ongoing operations, we are pursuing a public equity offering within the next quarter to fund the Phase 2b portion of the GENETIC-AF trial and our general and administrative costs through its projected completion. We may also seek additional funding that could allow us to operate while we continue to pursue financing options, a strategic combination, partnering, and licensing opportunities. If we are delayed in obtaining funding or are unable to complete a strategic transaction, we may discontinue our development activities on Gencaro or discontinue our operations. We believe our cash and cash equivalents balance as of March 31, 2013 will be sufficient to fund our operations, at our current cost structure, through September 2013. We are unable to assert that our current cash and cash equivalents are sufficient to fund operations beyond that date, and as a result, there is substantial doubt about our ability to continue as a going concern beyond September 2013. Changing circumstances may cause us to consume capital significantly faster or slower than we currently anticipate. We have based these estimates on assumptions that may prove to be wrong, and we could exhaust our available financial resources sooner than we currently anticipate.

Results of Operations Three Months Ended March 31, 2013 and 2012

Research and Development Expenses

Research and development, or R&D, expense is comprised of research & development, regulatory and manufacturing process development activities and costs. Our R&D expense continues to be almost entirely generated by our activities relating to the development of Gencaro. Research and Development expense for the three months ended March 31, 2013 was $181,000 compared to $422,000 for the corresponding period of 2012, a decrease of approximately $241,000.

Research & development expense decreased $135,000 for the three months ended March 31, 2013 due to reduced personnel costs from staff furloughs implemented in the third quarter of 2012 and decreased consulting costs attributable to reductions in our clinical development activities compared to the corresponding period of 2012.

Regulatory and manufacturing process costs decreased $105,000 for the three months ended March 31, 2013 compared to the corresponding periods of 2012. The decrease for the three months ended March 31, 2013 compared to the corresponding period of 2012 is primarily due to reduced personnel costs from staff furloughs implemented in the third quarter of 2012.

Our R&D expenses are contingent upon our ability to raise substantial additional funding or complete a strategic transaction. Should we receive funds from one or a combination of these sources, R&D expense in future periods could be substantially higher as we initiate our planned GENETIC-AF clinical trial. Until substantial additional funding is obtained, R&D expenses for the remainder of 2013 are expected to be comparable to those incurred in the respective quarters of 2012.

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Selling, General and Administrative Expenses

Selling, general and administrative expenses, or SG&A, primarily consist of personnel costs, consulting and professional fees, insurance, facilities and depreciation expenses, and various other administrative costs.

SG&A expense was $889,000 for the three months ended March 31, 2013 as compared to $984,000 for the corresponding period in 2012, a decrease of $95,000. The decrease in the three months ended March 31, 2013 as compared to the corresponding period of 2012 is comprised of reduced personnel, travel and board of director costs of approximately $230,000 attributable to staff furloughs and other cost reduction efforts implemented in the third quarter of 2012. These decreases were partially offset by increased costs for accounting, legal, consulting, and outside support services of approximately $136,000, which increases are primarily attributable to the special proxy report and shareholder meeting held during the quarter to approve the 1 for 6 reverse split of the common stock.

SG&A expenses for the remainder of 2013 are expected to be comparable to 2012 levels but are contingent upon our ability to raise substantial additional funding or complete a strategic transaction. Should we receive funds from one or a combination of these sources, SG&A expense in future periods could be substantially higher as we increase our activities to support initiation of our GENETIC-AF clinical trial.

Interest and Other Income

Interest and other income was less than $1,000 in the three months ended March 31, 2013 and March 31, 2012 The amounts and related change between years are nominal to our overall operations. We expect interest income to continue to be nominal in 2013 due to low investment yields and declining cash and cash equivalent investment balances.

Interest and Other Expense

Interest and other expense was approximately $1,000 in the three months ended March 31, 2013 and March 31, 2012. Based on our current capital structure, interest expense for 2013 is expected to be minimal.

Liquidity and Capital Resources Three Months Ended March 31, 2013 and 2012

Cash and Cash Equivalents

	March 31, 2013	December 31, 2012
Cash and cash equivalents	$ 3,537	$ 2,920

As of March 31, 2013, we had total cash and cash equivalents of approximately $3.5 million, as compared to $2.9 million as of December 31, 2012. The net increase of $0.6 million in the three month period reflects the $1.4 million of net proceeds from our stock offerings completed during the quarter, less approximately $764,000 of cash used to fund operating activities for the three months ended March 31, 2013.

Cash Flows from Operating, Investing and Financing Activities

	Three Months Ended March 31,	
	2013	2012
Net cash (used in) provided by:		
Operating activities	$ (764)	$ (1,656)
Investing activities	(9)	
Financing activities	1,390	(60)
Net decrease in cash and cash equivalents	$ 617	$ (1,716)

Net cash used in operating activities for the three months ended March 31, 2013 decreased approximately $892,000 compared with the 2012 period primarily due to decreased R&D and SG&A expenses discussed above and due to increased trade payable and accrued liabilities.

Net cash used in investing activities for the three months ended March 31, 2013 was approximately $9,000 representing investment in capitalized equipment compared to $0 used in investing activities in the three months ended March 31, 2012.

Net cash provided by financing activities was $1.4 million for the three months ended March 31, 2013 representing the net proceeds from two equity financings completed during the quarter. Net cash used in financing activities of $60,000 for the three months ended March 31, 2012 were of costs incurred in 2012 for preparing and filing the registration statement required for our equity financing completed in December 2011.

Results of Operations Years Ended December 31, 2012 and 2011

Research and Development Expenses

Research and development, or R&D, expenses comprise research & development, regulatory, and manufacturing process development activities and costs. Our research and development expenses totaled $1.1 million for the year ended December 31, 2012 as compared to $2.3 million for 2011, a decrease of approximately $1.2 million. During 2012, our R&D efforts and costs were almost entirely for the development of Gencaro. The research and regulatory components of our R&D costs decreased approximately $883,000 due primarily to reduced personnel costs from staff furloughs implemented in the third quarter of 2012, and decreased consulting costs in association with our reduced clinical development activities compared to the prior year. Manufacturing process development costs decreased approximately $342,000 for the year. In 2011, we incurred milestone costs for ongoing, long-term drug stability studies of Gencaro and new costs for preliminary analysis and development of clinical trial materials for our planned GENETIC-AF clinical trial. During 2012 we did not have similar activities and the cost decrease reflects our lower utilization of outside support services in connection with our reduced level of operations.

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Our R&D expenses are highly contingent upon our ability to raise substantial additional funding or complete a strategic transaction. Should we receive funds from one or a combination of these sources, R&D expense in 2013 will be substantially higher than 2012 if we initiate our GENETIC-AF clinical trial. Until substantial additional funding is obtained, R&D expenses in 2013 are expected to be comparable to 2012 levels.

Selling, General and Administrative Expenses

Selling, general and administrative expenses, or SG&A, primarily consist of personnel costs, consulting and professional fees, insurance, facilities and depreciation expenses, and various other administrative costs.

SG&A expenses were $3.2 million for the year ended December 31, 2012, compared to $5.0 million for 2011, a decrease of approximately $1.8 million. Cost decreases of approximately $940,000 were comprised primarily of reduced personnel, consulting, board advisory, and legal expenses.

Approximately $772,000 of the total cost decrease was attributable to lower depreciation and occupancy expense, and the balance of the decrease is due to our reduced operations overall. During the fourth quarter of 2011 we relocated our corporate office to a smaller suite. The move necessitated additional depreciation of certain leasehold improvements, furniture and equipment that were not useable in the new office suite. The reductions in depreciation and occupancy related expenses in 2012 are the result of this office move.

SG&A expenses for 2013 are expected to be comparable to 2012 levels, but are contingent upon our ability to raise substantial additional funding or complete a strategic transaction. Should we receive funds from one or a combination of these sources, SG&A expense in 2013 could be substantially higher than 2012 as we increase activities to support initiating our GENETIC-AF clinical trial.

Gain on Assignment of Patent Rights

During the year ended December 31, 2011, we entered into an agreement in which we assigned certain patent rights to a large pharmaceutical company. In exchange for the patent rights we received a $2.0 million non-recourse payment during the second quarter of 2011. The gain was exclusive to 2011.

Interest and Other Income

Interest and other income was $2,000 for the year ended December 31, 2012, as compared to $2,000 for 2011, remaining essentially unchanged. Interest income was nominal in both years due to low investment yields and declining cash balances. We expect interest income to continue to be nominal in 2013.

Interest and Other Expense

Interest and other expense was $3,000 for the year ended December 31, 2012, as compared to $5,000 for 2011. The amounts and related change between years are nominal to our overall operations. Based on our current capital structure, interest expense for 2013 is expected to be comparable to 2012.

Liquidity and Capital Resources Years Ended December 31, 2012 and 2011

Cash and Cash Equivalents

	December 31, 2012	December 31, 2011
Cash and cash equivalents	$ 2,920	$ 5,943

Cash Flows from Operating, Investing and Financing Activities

	Year Ended December 31,	
	2012	2011
Net cash (used in) provided by:		
Operating activities	$ (4,078)	$ (6,959)
Investing activities		2,006
Financing activities	1,055	3,871
Net decrease in cash and cash equivalents	$ (3,023)	$ (1,082)

Net cash used in operating activities for the year ended December 31, 2012 decreased nearly $2.9 million compared with the 2011 period due to decreased R&D and SG&A expenses discussed above.

Net cash flows provided by investing activities for the year ended December 31, 2011 was primarily due to $2 million of cash received from the assignment of patent rights during 2011. There were no such transactions during 2012. Net cash provided by financing activities of approximately $1.1 million for the year ended December 31, 2012 is comprised of approximately $1.2 million of net proceeds from the sales of our common stock, less $134,000 in payments made on a vendor financing arrangement. For the year ended December 31, 2011, net cash provided by financing activities was $3.9 million of net proceeds from sales of our common stock, less $146,000 in payments made on a vendor financing arrangement.

Sources and Uses of Capital

Our primary sources of liquidity to date have been capital raised from issuances of shares of our common and preferred stock and funds provided by the Merger with Nuvelo. The primary uses of our capital resources to date have been to fund operating activities, including research, clinical development and drug manufacturing expenses, license payments, and spending on capital items.

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Considering the substantial additional time and costs associated with the development of Gencaro and our need to raise a significant amount of capital on acceptable terms to finance the planned GENETIC-AF clinical trial and our ongoing operations, we are evaluating strategic alternatives for funding our operations and development programs. We are pursuing a public equity offering to fund the Phase 2b portion of the GENETIC-AF trial and our general and administrative costs through its projected completion. We may also seek additional funding that could allow us to operate while we continue to pursue financing alternatives, a strategic combination, or partnership to support the continued clinical development of Gencaro, including the planned GENETIC-AF clinical trial.

On August 2, 2012, we sold approximately $953,000 of ARCA s common stock and warrants for common stock in a Registered Direct Offering under the Company s registration statement on Form S-3 (File No.333-172686) (the Registration Statement) in which we issued 406,099 shares of common stock and warrants to purchase 304,575 shares of common stock. The net proceeds, after deducting placement agent fees and other offering expenses payable by us, was approximately $741,000, and these proceeds are being used solely for general working capital purposes. Each unit, consisting of a share of common stock and a warrant to purchase 0.75 shares of common stock, was sold at a purchase price of $2.35 per unit, which was a 15 percent discount to the consolidated price of the stock and warrants, based on the closing bid price of $2.76 as reported on the Nasdaq Capital Market on August 2, 2012. The warrants become exercisable six months after issuance, expire 6 years thereafter, and have an exercise price of $2.76 per share, equal to 100% of the closing bid price of ARCA s common stock on the Nasdaq Capital Market on August 2, 1012. The Registered Direct Offering was effected as a takedown off the Registration Statement, which became effective on April 4, 2011, pursuant to a prospectus supplement filed with the Securities and Exchange Commission on August 3, 2012. The warrant agreements provide for settlement of the warrants in unregistered shares should an effective registration statement or current prospectus not be in place at the time a warrant is exercised.

On October 22, 2012, we sold approximately $325,000 of ARCA common stock and warrants for common stock in a private placement transaction. Certain Directors, Officers and Affiliates of ARCA were investors in the private placement. We issued to investors 137,530 shares of common stock together with warrants to purchase 103,148 shares of common stock. The net proceeds, after deducting offering expenses, were approximately $280,000, and these proceeds are being used solely for general working capital purposes. Each unit consisting of a share of common stock and a warrant to purchase 0.75 shares of common stock was sold at a purchase price of $2.36 per unit. The warrants were exercisable upon issuance, expire 5 years from the date of issuance, and have an exercise price of $1.80 per share, equal to 100% of the closing sales price of ARCA s common stock on the Nasdaq Capital Market on October 22, 2012.

On December 18, 2012, we sold approximately $250,000 of our common stock and warrants for common stock in a private placement transaction with our Chief Executive Officer, Dr. Michael Bristow. We issued 86,186 shares of common stock together with warrants to purchase 64,640 shares of common stock. The net proceeds, after deducting offering expenses were approximately $230,000, and these proceeds are being used solely for general working capital purposes. Each unit consisting of a share of common stock and a warrant to purchase 0.75 shares of common stock was sold at a purchase price of $2.90 per unit. The warrants were exercisable upon issuance, expire 5 years from the date of issuance, and have an exercise price of $2.34 per share, equal to 100% of the closing sales price of ARCA s common stock on the Nasdaq Capital Market on December 18, 2012.

On January 22, 2013, we sold approximately $1 million of our common stock and warrants for common stock in a private placement transaction with accredited investors and our Chief Executive Officer. We issued 356,430 shares of common stock together with warrants to purchase 249,501 shares of common stock. The net proceeds, after deducting placement agent fees and other offering expenses, were approximately $805,000, and these proceeds are being used solely for general working capital purposes. Each unit, consisting of a share of common stock and a warrant to purchase 0.70 shares of common stock, was sold at a purchase price of $2.81 per unit. The warrants were exercisable upon issuance, expire 7 years from the date of issuance, and have an exercise price of $2.28 per share, equal to 100% of the closing bid price of ARCA s common stock on the Nasdaq Capital Market on January 22, 2013.

Pursuant to the terms of the Registration Rights Agreements (the Rights Agreements) entered into as part of each of these Private Placement transactions, we granted to the investors certain registration rights related to the shares underlying the units sold in these private placements. We filed a registration statement, in accordance with the terms of the Rights Agreements, for the resale of the shares underlying the units sold in these private placements. That registration statement was declared effective by the Securities and Exchange Commission on February 14, 2013.

On January 31, 2013, we sold approximately $730,000 of ARCA s common stock and warrants for common stock in a Registered Direct Offering under the Company s registration statement on Form S-3 (File No.333-172686) (the Registration Statement) in which we issued 164,636 shares of common stock and warrants to purchase 65,855 shares of common stock. The net proceeds, after deducting placement agent fees and other offering expenses payable by us, was approximately $616,000, and these proceeds are being used solely for general working capital purposes. Each unit, consisting of a share of common stock and a warrant to purchase 0.40 shares of common stock, was sold at a purchase price of $4.43 per unit. The warrants were exercisable upon issuance, expire 5 years from the date of issuance, and have an exercise price of $4.13 per share, equal to 100% of the closing bid price of ARCA s common stock on the Nasdaq Capital Market on January 30, 2013. The Registered Direct Offering was effected as a takedown off the Registration Statement, which became effective on April 4, 2011, pursuant to a prospectus

supplement filed with the Securities and Exchange Commission on February 1, 2013. The warrant agreements provide for settlement of the warrants in unregistered shares should an effective registration statement or current prospectus not be in place at the time a warrant is exercised.

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We believe our cash and cash equivalents balance as of March 31, 2013 will be sufficient to fund our operations, at our current cost structure, through September 30, 2013. However, we are unable to assert that these funds are sufficient to fund operations beyond that date, and as a result, there is substantial doubt about our ability to continue as a going concern beyond September 30, 2013. The consolidated financial statements contained in this prospectus have been prepared with the assumption that we will continue as a going concern and will be able to realize our assets and discharge our liabilities in the normal course of business and do not include any adjustments to reflect the possible future effects on the recoverability and classification of assets or the amounts and classification of liabilities that may result from our inability to continue as a going concern. We may not be able to raise sufficient capital on acceptable terms or at all to continue development of Gencaro or to continue operations and may not be able to execute any strategic transaction.

Our liquidity, and ability to raise additional capital or complete any strategic transaction, depends on a number of factors, including, but not limited to, the following:

- the costs and timing for an additional clinical trial in order to gain possible FDA approval for Gencaro;
- the market price of our stock and the availability and cost of additional equity capital from existing and potential new investors;
- our ability to retain the listing of our common stock on the Nasdaq Capital Market;
- general economic and industry conditions affecting the availability and cost of capital;
- our ability to control costs associated with our operations;
- the costs of filing, prosecuting, defending and enforcing any patent claims and other intellectual property rights; and
- the terms and conditions of our existing collaborative and licensing agreements.

The sale of additional equity or convertible debt securities would likely result in substantial additional dilution to our stockholders. If we raise additional funds through the incurrence of indebtedness, the obligations related to such indebtedness would be senior to rights of holders of our capital stock and could contain covenants that would restrict our operations. We also cannot predict what consideration might be available, if any, to us or our stockholders, in connection with any strategic transaction. Should strategic alternatives or additional capital not be available to us in the near term, or not be available on acceptable terms, we may be unable to realize value from our assets and discharge our liabilities in the normal course of business which may, among other alternatives, cause us to further delay, substantially reduce or discontinue operational activities to conserve its cash resources.

Critical Accounting Policies and Estimates

A critical accounting policy is one that is both important to the portrayal of our financial condition and results of operation and requires management s most difficult, subjective or complex judgments, often as a result of the need to make estimates about the effect of matters that are inherently uncertain. While our significant accounting policies are described in Note 1 of Notes to Consolidated Financial Statements included within Note 1 of Notes to Consolidated Financial Statements included within our 2012 Annual Report on Form 10-K filed with the Securities and Exchange Commission on March 21, 2013, we believe the following critical accounting policy affected our most significant judgments, assumptions, and estimates used in the preparation of our consolidated financial statements and, therefore, is important in understanding our financial condition and results of operations.

Long-Lived Assets and Impairments

We review long-lived assets whenever events or changes in circumstances indicate that the carrying value of such assets may not be recoverable. As a development stage company, we have not generated positive cash flows from operations, and such cash flows may not materialize for a significant period in the future, if ever. Additionally, we may make changes to our business plan that would result in changes to expected cash flows from long-lived assets. It is reasonably possible that future evaluations of long-lived assets, including changes from our current expected use of long-lived assets, may result in impairments.

Accrued Expenses

As part of the process of preparing our financial statements, we are required to estimate accrued expenses. This process involves identifying services that third parties have performed on our behalf and estimating the level of service performed and the associated cost incurred for these services as of the balance sheet date. Examples of estimated accrued expenses include contract service fees, such as fees payable to contract manufacturers in connection with the production of materials related to our drug product, and professional service fees, such as attorneys, consultants, and clinical research organizations. We develop estimates of liabilities using our judgment based upon the facts and circumstances known at the time.

Off-Balance Sheet Arrangements

We have not participated in any transactions with unconsolidated entities, such as special purpose entities, which would have been established for the purpose of facilitating off-balance sheet arrangements.

Indemnifications

In the ordinary course of business, we enter into contractual arrangements under which we may agree to indemnify certain parties from any losses incurred relating to the services they perform on our behalf or for losses arising from certain events as defined within the particular contract. Such indemnification obligations may not be subject to maximum loss clauses. We have entered into indemnity agreements with each of our directors, officers and certain employees. Such indemnity agreements contain provisions, which are in some respects broader than the specific indemnification provisions contained in Delaware law. We also maintain an insurance policy for our directors and executive officers insuring against certain liabilities arising in their capacities as such.

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BUSINESS

Some of the statements under Business, Risk Factors, Management s Discussion and Analysis of Financial Condition and Results of Operations and elsewhere in this Prospectus constitute forward-looking statements. In some cases, you can identify forward-looking statements by the following words: may, will, could, would, should, expect, intend, plan, anticipate, believe, estimate, predict, project, potential, continue, ongoing or the negative of these terms or other comparable terminology, although not all forward-looking statements contain these words. Examples of these statements include, but are not limited to, statements regarding the following: the timing and results of any clinical trials, including the planned Gencaro trial for the prevention of atrial fibrillation-our ability to obtain additional funding or enter into a strategic or other transaction, the extent to which our issued and pending patents may protect our products and technology, the potential of such product candidates to lead to the development of safe or effective therapies, our ability to enter into collaborations, our ability to maintain listing of our common stock on a national exchange, our future operating expenses, our future losses, our future expenditures, and the sufficiency of our cash resources to maintain operations. These statements involve known and unknown risks, uncertainties and other factors that may cause our actual results, levels of activity, performance or achievements to be materially different from the information expressed or implied by these forward-looking statements. While we believe that we have a reasonable basis for each forward-looking statement contained in this Prospectus, we caution you that these statements are based on a combination of facts and factors currently known by us and our projections of the future, about which we cannot be certain.

In addition, you should refer to the Risk Factors section of this Prospectus for a discussion of other important factors that may cause our actual results to differ materially from those expressed or implied by our forward-looking statements. As a result of these factors, we cannot assure you that the forward-looking statements in this Prospectus will prove to be accurate. Furthermore, if our forward-looking statements prove to be inaccurate, the inaccuracy may be material. In light of the significant uncertainties in these forward-looking statements, you should not regard these statements as a representation or warranty by us or any other person that we will achieve our objectives and plans in any specified time frame, or at all.

We undertake no obligation to publicly update any forward-looking statements, whether as a result of new information, future events or otherwise. You are advised, however, to consult any further disclosures we make on related subjects in our Annual Report on Form 10-K for the year ended December 31, 2012, Quarterly Reports on Form 10-Q, Current Reports on Form 8-K, and our website.

Overview

We are a biopharmaceutical company whose principal focus is developing genetically-targeted therapies for cardiovascular diseases. Our lead product candidate is Gencaro (bucindolol hydrochloride), a pharmacologically unique beta-blocker and mild vasodilator that we plan to evaluate in a new clinical trial for the treatment of atrial fibrillation, or AF, in patients with heart failure and left ventricular dysfunction, or HFREF. We have identified common genetic variations in receptors in the cardiovascular system that we believe interact with Gencaro s pharmacology and may predict patient response to the drug.

We plan to test this hypothesis in a Phase 2b/3 clinical trial of Gencaro, known as GENETIC-AF. We plan to pursue this indication for Gencaro because data from the previously conducted Phase 3 HF trial of Gencaro in 2,708 HF patients, or the BEST trial, suggest that Gencaro may be successful in reducing or preventing AF.

AF is a disorder in which the normally regular and coordinated contraction pattern of the heart s two small upper chambers (the atria) becomes irregular and uncoordinated. The irregular contraction pattern associated with AF causes blood to pool in the atria, predisposing the formation of clots potentially resulting in stroke. AF is considered an epidemic cardiovascular disease with an estimated prevalence of at least 2.7 million Americans in 2010. The approved therapies for the treatment or prevention AF have certain disadvantages in HFREF patients, such as toxic or cardiovascular adverse effects, and most of the approved drugs for AF are contra indicated or have warnings in their prescribing information for such patients. We believe there is an unmet medical need for new AF treatments that have fewer side effects than currently available therapies and are more effective, particularly in HFREF patients.

The GENETIC-AF trial is designed to compare Gencaro to the beta-blocker metoprolol CR/XL in patients with the beta-1 389 arginine homozygous genotype, which we believe responds most favorably to Gencaro. We believe data from the BEST trial indicate that Gencaro may have a genetically regulated effect in reducing or preventing AF, whereas we believe the therapeutic benefit of metoprolol CR/XL does not appear to be enhanced in patients with this genotype. A retrospective analysis of data from the BEST trial shows that the entire cohort of patients in the BEST trial treated with Gencaro had a 41% reduction in the risk of new onset AF (time-to-event) compared to placebo ($p = 0.0004$). In the BEST DNA substudy, patients with the beta-1 389 arginine homozygous genotype experienced a 74% ($p = 0.0003$) reduction in risk of AF when receiving Gencaro, based on the same analysis. The beta-1 389 arginine homozygous genotype was present in about 47% of the patients in the BEST pharmacogenetic substudy, and we estimate it is present in about 50% of the US general population.

GENETIC-AF is planned as a multi-center, randomized, double-blind clinical trial designed to compare the safety and efficacy of Gencaro to an active comparator, metoprolol CR/X/L, in beta-1 389 arginine homozygous genotype HFREF patients recently diagnosed with persistent AF. The primary endpoint will be measured over a twenty-four week period after the patient s AF has been electrically cardioverted through the administration of a direct current shock to restore normal heart rhythm. We have created an adaptive design for GENETIC-AF, which we plan to initiate with a Phase 2b study in approximately 200 HFREF patients with recent onset, persistent AF who also have a genetic variant of the beta-1 adrenergic receptor which we believe responds most favorably to Gencaro. The secondary endpoint of the proposed Phase 2b portion of the trial will be AF burden, as defined as a patient s actual percentage of time in AF, regardless of symptoms. Under the proposed design, all 200 patients in the Phase 2b portion of the trial will have AF burden measured by continuous monitoring, either by previously implanted cardiac resynchronization or defibrillation

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devices, or newly or previously inserted loop recorders. At the end of enrollment of the first 200 patients, the primary endpoint of the combination of recurrent symptomatic AF or all-cause mortality, and the secondary endpoint of AF burden will be evaluated by the trial s Data and Safety Monitoring Board for evidence of an efficacy signal. If a sufficient efficacy signal is detected and acceptable safety is observed, the trial could then proceed to the Phase 3 portion of the trial. We estimate that GENETIC-AF could begin approximately six months after we obtain sufficient funding and we believe the Phase 2b study would take approximately two years to complete after initiation.

Medtronic, Inc., a leader in medical technologies to improve the treatment of chronic diseases, including cardiac rhythm disorders, has entered into a Clinical Trial Collaboration Agreement, dated April 18, 2013 (the Agreement), with us to collaborate on the Phase 2b portion of GENETIC-AF. Under the collaboration, we plan, with the support of Medtronic, to conduct a substudy that will include continuous monitoring of the cardiac rhythms of all 200 patients enrolled during the Phase 2b portion of GENETIC-AF. Each patient will have heart rhythm monitoring via a Medtronic device, either a previously implanted cardiac resynchronization or defibrillation device, or a previously or newly inserted Reveal loop recorder. The collaboration substudy will measure AF burden, defined as a patient s actual time in AF regardless of symptoms. In determining the presence of an efficacy signal in the Phase 2b portion of the trial, AF burden will be evaluated along with time to mortality or recurrent AF, which will also be the Phase 3 primary endpoint.

The collaboration will be administered by a joint ARCA-Medtronic committee. Medtronic will use its proprietary CareLink System to collect and analyze the cardiac rhythm data from the implanted Medtronic devices and provide the data to ARCA at the close of the Phase 2b portion of the trial. The parties will negotiate in good faith to agree on the substudy protocol, specifying the elements of the substudy and of the cardiac rhythm data collection and analysis to be provided for the substudy by Medtronic by August 15, 2013. Medtronic will support the reimbursement process for patients enrolled in the Phase 2b portion, and will provide financial support of unreimbursed costs for a certain number of patients in the Phase 2b portion up to a certain maximum amount per patient. If GENETIC-AF proceeds to Phase 3, ARCA will seek to enroll an additional 100 patients in the substudy, and Medtronic will provide the agreed-on CareLink System cardiac rhythm data collection and analysis for the Phase 3 portion of the substudy, and support the reimbursement process.

We have been granted patents in the U.S., Europe, and other jurisdictions for methods of treating AF and HF patients with Gencaro based on genetic testing, which we believe will provide market exclusivity for these uses of Gencaro into at least 2026 in the U.S. and into 2025 in Europe. In addition, we believe that if Gencaro is approved, a Gencaro patent will be eligible for patent term extension based on our current clinical trial plans which, if granted, may provide market exclusivity for Gencaro into 2029 or 2030 in the U.S. and Europe.

To support the continued development of Gencaro, including the planned GENETIC-AF clinical trial and our ongoing operations, we are pursuing a public equity offering to fund the Phase 2b portion of the GENETIC-AF trial and our general and administrative costs through its projected completion. We may also seek additional funding that could allow us to operate while we continue to pursue financing options, a strategic combination, partnering and licensing opportunities. If we are delayed in obtaining funding or are unable to complete a strategic transaction, we may discontinue our development activities on Gencaro or discontinue our operations. We believe our cash and cash equivalents balance as of March 31, 2013 will be sufficient to fund our operations, at our current cost structure, through September 2013. We are unable to assert that our current cash and cash equivalents are sufficient to fund operations beyond that date, and as a result, there is substantial doubt about our ability to continue as a going concern beyond September 2013. Changing circumstances may cause us to consume capital significantly faster or slower than we currently anticipate. We have based these estimates on assumptions that may prove to be wrong, and we could exhaust our available financial resources sooner than we currently anticipate.

On January 27, 2009, we completed a business combination (the Merger) with ARCA Colorado in accordance with the terms of that Agreement and Plan of Merger and Reorganization, dated September 24, 2008, and amended on October 28, 2008 (as amended, the Merger Agreement), in which a wholly-owned subsidiary of Nuvelo, Inc. merged with and into ARCA Colorado, with ARCA Colorado continuing after the Merger as the surviving corporation and a wholly-owned subsidiary of Nuvelo, Inc. Immediately following the Merger, we changed our name from Nuvelo, Inc. to ARCA biopharma, Inc., and our common stock began trading on the Nasdaq Global Market under the symbol ABIO on January 28, 2009. On March 7, 2011, the listing of our common stock was transferred from the Nasdaq Global Market to the Nasdaq Capital Market.

On February 25, 2013, we held a special meeting of our stockholders in order to approve a series of certificates of amendment to our Restated Certificate of Incorporation, as amended, to effect a reverse split of our outstanding common stock, pursuant to which any whole number of outstanding shares between, and including, three and twenty would be combined into one share of common stock and to authorize our board of directors to select and file one such certificate of amendment and abandon the other certificates of amendment, or to abandon all such certificates of amendment as permitted under Section 242(c) of the Delaware General Corporation Law, to be determined by the board of directors within one year of approval.

On March 4, 2013, we filed a Certificate of Amendment to our Amended and Restated Certificate of Incorporation, to implement a six-for-one reverse split of our common stock, as previously authorized and approved at our special meeting of stockholders on February 25, 2013. The

reverse split was effective as of 5:01 p.m. (Eastern Time) on March 4, 2013, and our common stock continued trading on The NASDAQ Capital Market on a post-split basis on March 5, 2013.

As a result of the reverse split, every six shares of issued and outstanding common stock were combined into one share of issued and outstanding common stock. In addition, the reverse split effected a proportionate adjustment to the per share exercise price and the number of shares issuable upon the exercise or settlement of all outstanding options and warrants to purchase shares of our common stock, and the number of shares reserved for issuance pursuant to our existing stock option plans were reduced proportionately. No

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fractional shares were issued as a result of the reverse split, and stockholders who otherwise would have been entitled to a fractional share received in lieu thereof, a cash payment based on the closing sale price of our common stock as reported on The NASDAQ Capital Market on March 4, 2013. The reverse split did not alter the par value of our common stock or modify any voting rights or other terms of the common stock.

Our Strategy

Our mission is to become a leading biopharmaceutical company developing cardiovascular therapies with an emphasis on genetically-targeted therapies. To achieve this goal, we are pursuing the following strategies:

Advance the development of Gencaro. We plan to focus our efforts on initiating and completing the GENETIC-AF Trial.

Raise substantial additional funding or complete a strategic transaction. To support the continued clinical development of Gencaro, including the planned GENETIC-AF clinical trial, we are seeking to raise substantial additional funding, through the sale of public or private equity securities or the completion of a strategic transaction.

Build a cardiovascular pipeline. Our management and employees, including our chief executive officer, have extensive experience in cardiovascular research, molecular genetics and clinical development of cardiovascular therapies. We are seeking to leverage this expertise to identify, acquire and develop other cardiovascular products or candidates, with an emphasis on pharmacogenetic applications.

Leverage our existing assets. We are pursuing opportunities to leverage certain of our development-stage product candidates. We are also pursuing licensing transactions for certain of our other compounds which are in early stages of development for various indications. For example, in 2011, we raised $2 million through the assignment of certain patent rights for one of these compounds to a large pharmaceutical company.

Atrial Fibrillation Market Background and Opportunity

AF is a disorder in which the normally regular and coordinated contraction pattern of the heart s two small upper chambers becomes irregular and uncoordinated. The irregular contraction pattern associated with AF causes blood to pool in the atria, predisposing to the formation of clots. These clots may travel from the heart and become lodged in the arteries leading to the brain and other organs, thereby blocking necessary blood flow and potentially resulting in stroke. In addition, we also believe that the development of AF in a HFREF patient can be associated with increased risk of death and other heart failure related adverse outcomes. AF is considered an epidemic cardiovascular disease with an estimated prevalence of at least 2.7 million Americans in 2010. Approximately 300,000-400,000 treated AF patients currently receive a form of beta-blocker as pharmaceutical intervention.

The goals of current medical therapy for AF are to maintain sinus rhythm or permanent AF control of the ventricular rate response, avoid the risk of complications including stroke and to minimize patient symptoms. Current treatments include pharmaceutical intervention and device intervention. There are several antiarrhythmic drugs approved by the FDA for the treatment and/or prevention of recurrent AF. However, these drugs have safety and/or administration concerns and all but one have contraindications or label warnings regarding their prescription in patients with HFREF.

Current device interventions for the treatment of AF include:

Electrical cardioversion which is used to restore normal heart rhythm with administration of a direct current shock;

Radiofrequency ablation which can be effective in patients for whom medications are ineffective; and,

Atrial pacemakers which are implanted under the skin and then intravenously into the heart to regulate heart rhythm.

Gencaro

Gencaro (bucindolol hydrochloride) is a pharmacologically unique beta-blocker and mild vasodilator being developed for the treatment of AF. Gencaro is considered part of the beta-blocker class of compounds because of its property of blocking both beta-1 and beta-2, receptors in the heart. The blocking of these receptors prevents binding with other molecules, primarily the neurotransmitter norepinephrine (NE), which activate these receptors. We believe that Gencaro is well-tolerated in cardiovascular patients because of its mild vasodilator effects. Originally developed by Bristol-Myers Squibb, or BMS, the active pharmaceutical ingredient, or API, in Gencaro, bucindolol hydrochloride, has been tested clinically in approximately 4,500 patients. Gencaro was the subject of a Phase 3 HF mortality trial of over 2,700 patients, mostly in the U.S., known as the BEST trial. The BEST trial included a DNA bank of over 1,000 patients, which was used to evaluate the effect of genetic variation on patients response to Gencaro.

At the time of the BEST trial, our founding scientists, Dr. Michael Bristow and Dr. Stephen Liggett, hypothesized that the unique pharmacologic properties of Gencaro would interact with common genetic variations of beta-1, beta-2 and alpha-2C, adrenergic receptors, which are important receptors that regulate cardiac or adrenergic (sympathetic) nerve function. They tested this hypothesis prospectively in a substudy conducted using data from the BEST DNA bank. On the basis of this study, Drs. Bristow and Liggett have determined that patients with certain variations in these receptors had substantially improved outcomes on primary and certain secondary clinical endpoints in the trial, such as mortality, HF progression, hospitalization and prevention of arrhythmias, relative to the counterpart genotype groups and the general patient population of the BEST trial. We believe that these genetically determined receptor variations, which are detectable using standard DNA testing technology, can serve as diagnostic markers for predicting enhanced therapeutic response to Gencaro, and potentially avoiding adverse events, in individual patients. We have patented our methods for treating AF and HF patients with Gencaro in the U.S. and Europe based on genetic testing.

Pharmacology and Pharmacogenetics

Gencaro s pharmacology appears to be different from other compounds in the beta-blocker class in two fundamental respects. First, the National Heart, Lung and Blood Institute of the National Institutes of Health (NHLBI) and the Cooperative Studies Program of the Department of Veterans Affairs sponsored studies conducted by Drs. Bristow and Liggett indicated that in human myocardial preparations, Gencaro leads to inactivation of constitutively active (i.e. functional in the absence of bound agonist) beta-1 receptors

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through a mechanism separate from beta-blockade, in addition to inhibiting the binding activity of the beta-1 receptor like a typical beta-blocker. Second, other studies, including BEST, indicated that Gencaro lowers the systemic levels of the neurotransmitter NE, released by cardiac and other adrenergic nerves. These two properties interact with common genetic variations in two cardiac receptors, the beta-1 and alpha-2C receptors, to produce the unique pharmacogenetic profile of Gencaro. We believe that these two properties, and their pharmacogenetic implications, are unique to Gencaro.

Gencaro has an important interaction with the beta-1 receptor found on muscle cells, or cardiac myocytes, of the heart. The general role of the beta-1 receptor and its downstream signaling cascades is to regulate the strength and rate of the heart s contractions. NE serves as an activator of the beta-1 receptor, causing the receptor to initiate signaling to the cardiac myocyte. Although this signaling may be beneficial to the failing heart in the short term, in chronic HFREF patients the beta-1 receptor also initiates harmful, or cardiomyopathic, signaling which, over time, exacerbates the heart s structural and functional decline. Beta-blockers counteract this destructive process by reducing beta-1 receptor signaling. They do this by binding to the receptor and blocking NE molecules from binding and activating the signaling activity and, in Gencaro s case, by also inactivating certain beta-1 receptors that are constitutively active (active in the absence of NE stimulation) as well as by lowering NE levels.

There are two common genetic variations of the beta-1 receptor, each of which we estimate is present in approximately 50% of the U.S. population. One of these variations is known as the beta-1 389 arginine receptor variant, exclusively present in the beta-1 389 arginine homozygous or, genotype. Laboratory studies indicate that this variation results in a higher functioning beta-1 receptor, which has a greater ability to mediate the stimulatory effects of NE than the counterpart beta-1 389 glycine or beta-1 389 Gly version of the beta-1 receptor. In addition, the beta-1 389 arginine variant is also more likely to be constitutively active and signal the cardiac myocyte to contract in the absence of NE. The beta-1 389 arginine receptor also has much higher affinity for NE as compared to the beta-1 389 glycine version, present in patients with either one or two copies of the beta-1 389 glycine gene allele (Gly carriers). Patients with the beta-1 389 glycine version, also present in approximately 50% of the U.S. population who are Gly carriers, results in a beta-1 receptor that is much lower functioning and, according to laboratory studies, has less probability of being in a constitutively active state and has lower NE affinity compared to the beta-1 389 arginine receptor.

We believe Gencaro has a powerful interaction with the higher-function beta-1 389 arginine variation of the beta-1 receptor. Laboratory studies show that constitutively active receptors will continue to signal in the presence of standard beta-blockade with neutral antagonists. Laboratory studies in isolated human heart preparations also show that Gencaro has the novel ability of being able to reduce the signaling of constitutively active receptors. We believe that this property contributes to the enhanced lowering of heart failure and arrhythmia event rates in HFREF patients who are beta-1 389 arginine homozygous genotype relative to individuals who are beta-1 389 Gly carriers or to the general population. In addition, we believe the unique NE lowering properties of Gencaro have a selectively beneficial effect in patients who have only beta-1 389 arginine receptors, because of the high affinity of these receptors for NE.

The efficacy of Gencaro also appears to be influenced by the alpha-2C receptor, located on the terminus of cardiac adrenergic nerves, at the neuromuscular junction with the cardiac myocyte. The role of this receptor is to modulate the release of NE at this junction, which in turn affects the activation of beta-1 receptors and the heart s activity. There are two important genetic variations of this receptor that appear to affect the effects of Gencaro; the alpha-2C -wild type , which is the normal functioning version of the receptor (approximately 87-90% of the U.S. general population), and the deletion variant , a version of the receptor that functions poorly (present in at least one copy in approximately 10 13% of the U.S. general population). The DNA substudy of patients from the BEST trial, conducted by Drs. Bristow and Liggett, indicated that these two variations of the alpha-2C receptor appear to affect Gencaro s heart failure and arrhythmia responses in HFREF patients only if the 389 Gly variant of the beta-1 receptor is also present; in patients with the beta-1 389 Gly variant, the wild type version of the alpha-2C receptor enhances clinical response, whereas the alpha-2C deletion variant reduces efficacy. When only the arginine version of the beta-1 receptor is present (beta-1 389 arginine homozygous genotype), the efficacy of Gencaro does not appear to depend on which version of the alpha-2C receptor is present.

The DNA substudy from the BEST HFREF trial indicated that the combinations of these receptor variations in individual patients appear to influence the response to Gencaro with respect to significant clinical endpoints. However, the beta-1 389 Arg/Arg variant appeared to have the most powerful beneficial effect on Gencaro heart failure and arrhythmia responses. While we believe that the beta-1 389 Gly carrier patients who also are alpha-2C wild type homozygotes may respond favorably to Gencaro, we believe that patients who possess only the beta-1 389 arginine variant (beta-1 389 arginine homozygous genotype) exhibit enhanced clinical responses to Gencaro, and should be the primary targeted population. The beta-1 389 arginine homozygous genotype constitutes an estimated 47-50% of the U.S. population.

The BEST trial

The NHLBI and Veterans Affairs Cooperative Studies funded BEST trial began in 1995. It was a double-blind, placebo-controlled, multi-center study of bucindolol s effect on reduction of mortality and morbidity in an advanced chronic HFREF population. The primary endpoint of the BEST trial was all cause mortality (ACM) and the pre-specified main secondary endpoint was progression of heart failure (HF), defined as death

from HF, cardiac transplant, HF hospitalization, or emergency room visit for the treatment of worsening HF not requiring hospitalization. The trial was planned to run four and one-half years, and enroll 2,800 patients. The trial enrolled a total of 2,708 chronic HF patients, who were mostly from the United States. Under the umbrella of the BEST trial substudies program, a DNA bank and substudy was created, and 1,040 of the BEST patients participated by providing blood for DNA analysis. The DNA bank provided data for the DNA substudy of BEST patients conducted by Drs. Bristow and Liggett.

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In 1999, the BEST trial was terminated prior to the completion of follow-up, in response to a recommendation of the BEST trial Data and Safety Monitoring Board. The primary reason for termination was loss of investigator equipoise; in other words, the fact that the BEST investigators were no longer uncertain regarding the comparative therapeutic merits of giving a placebo versus giving a beta-blocker to a HFREF patient. Positive mortality results from two other HF trials involving other beta-blockers had been reported, and a substantial number of BEST trial investigators concluded that it was unethical to continue to give placebo to BEST trial participants. As a result, some investigators began to prescribe these other beta-blockers to patients in the trial, which threatened to destroy the trial s integrity; therefore the trial was terminated early.

Clinical Results and the DNA Substudy

Following termination, the preliminary results of the study were analyzed and published. The preliminary determination and general perception were that the BEST trial had failed on the basis of not meeting its primary endpoint of ACM. The published values were a 10% risk reduction in mortality with a p-value of 0.10. Subsequently, we reanalyzed the results from BEST, in accordance with the FDA approved, pre-specified statistical analysis plans, which had not been performed by the sponsors of BEST when the trial was terminated. Our reanalysis appeared to show a 13% risk reduction on the primary endpoint of all-cause mortality in the BEST trial with a p-value of 0.053.

In 2003 and 2004, the results of the DNA substudy conducted by Drs. Bristow and Liggett began to be analyzed and released. The DNA substudy results indicated a significant enhancement of response on the major heart failure clinical endpoints from the BEST trial in patients with the beta-1 389 arginine homozygous genotype. The risk reduction on HF clinical efficacy endpoints such as mortality and hospitalization ranged from 34% to 48% in this genotype. In addition, in arrhythmia endpoints of atrial fibrillation or ventricular fibrillation/ventricular tachycardia, tracked by adverse events and surveillance ECGs, the risk reduction by bucindolol in the beta-1 389 arginine homozygous genotype appeared to be even greater, with hazard ratios of 74% for both endpoints.

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Shown below are certain of the primary and secondary endpoint data from the BEST HF DNA substudy results, by genotype:

BEST Trial Clinical Responses by Genotype Groups

Endpoint	{beta-1 389 Arg/ Arg + any alpha-2C} Very Favorable Patient Type (47%)		{beta-1 389 Gly carrier+ alpha-2C Wt/ Wt} Favorable Patient Type (40%)		{beta-1 389 Gly carrier + alpha-2C Del carrier} Unfavorable Patient Type (13%)	
All Cause Mortality (ACM), TTE	i	38%*	i	25%	h	4%
Cardiovascular Mortality (CVM), TTE	i	48%*	i	40%*	h	11%
ACM + transplantation	i	43%*	i	24%	h	4%
HF (HF) Progression	i	34%**	i	20%	i	1%
HF Hosp days/patient	i	48%**	i	17%	h	19%
AF prevention (from AE and ECG db)	i	74%**	i	6%	h	33%
VT/VF prevention (from AE db)	i	74%**	i	49%*	i	24%

1 Covariate adjusted, transplant censored analysis with 1 hazard ratio estimates presented
* p<0.05; **p £ 0.007; TTE: Time To Event; CRF: Case Report Form; Adj.: Adjudicated

Analysis of BEST trial for AF

Recently, the BEST study data were further analyzed focusing on AF prevention, rate control in patients with persistent AF, and on clinical outcomes of patients with AF. Although there was no pre-determined AF endpoint, including reduction in risk of AF, in the BEST trial, according to our analysis of adverse events and surveillance ECG s during the trial, 7.9% of patients developed new onset AF, with a greater incidence observed in the placebo group (9.7%) compared to the bucindolol group (6.2%). This corresponded to a 36% reduction in the incidence of new onset AF (based on crude event rates) for patients receiving bucindolol (p = 0.002). In a time to event analysis, the risk of new onset AF was reduced by 41% (p = 0.0004) with bucindolol treatment. Patients in the BEST study with the beta-1 389 Arg/Arg genotype who received Gencaro had a 74% reduction in the risk of developing new onset AF (p = 0.0003).

Further published analyses of the data from BEST suggest that Gencaro may also have potential efficacy for other clinical endpoints and outcomes related to AF. A published analysis of the BEST data revealed that of the 303 patients in the BEST trial with established AF, 67% of those who received Gencaro achieved ventricular response rate control, defined as a resting heart rate of less than or equal to 80 beats per minute without symptomatic bradycardia (p < 0.005). In AF patients who achieved ventricular response rate control, Gencaro produced a 39% reduction (p = 0.025) in cardiovascular mortality/cardiovascular hospitalizations. In addition, Gencaro also improved cardiovascular clinical endpoints for those AF patients possessing the beta-1 389 arginine genotype that ARCA believes is most favorable for Gencaro response. In a substudy of 1,040 patients in BEST in which patient genotypes were analyzed, Gencaro was associated with a 72% decrease (p = 0.039) in cardiovascular mortality/cardiovascular hospitalizations in those 52 AF patients in the substudy with the beta-1 389 arginine homozygous genotype.

Analysis of the BEST Study data also shows that Gencaro has potential efficacy against the serious arrhythmias of VT/VF, which also appears to be genetically regulated. A published report demonstrated that patients in the BEST Trial who received Gencaro experienced a 58% reduction in the incidence of VT/VF (p = 0.00006), adjusted for the competing risk of mortality. In addition, the authors of this report determined that Gencaro reduced the incidence of VT/VF by 74% (p = 0.00005) in patients with the beta-1 389 arginine homozygous genotype.

As with the overall study cohort, most patients (89%) in the 1,040 patient DNA substudy were free of AF (91% sinus rhythm, 9% other non-AF rhythms) at baseline. The proportion of patients free of AF at baseline was also similar in the two treatment groups for the overall DNA substudy cohort, as well as in the beta-1 389 genotype subgroups. In the BEST DNA substudy, the proportion of patients who developed new onset AF was similar compared to the overall study cohort for both the placebo group (11% and 10%, respectively) and the Gencaro group in the DNA substudy population compared to the overall study cohort (7% and 6%, respectively). Also, there was a similar reduction in new onset AF observed in the bucindolol group compared to placebo (43% and 41%, respectively, by time to event analysis). Therefore, the overall results from the genetic substudy population are consistent with the results from the overall study population.

In patients with all genotypes, the AF risk reduction of 41-43% by Gencaro in BEST is based on an analysis of adverse events and surveillance ECG s which was similar to AF risk reductions observed in a meta analysis of data regarding seven placebo-controlled beta-blocker trials in HFREF patients. In the meta-analysis, beta-blockers appeared to reduce the incidence of new onset AF in all but one trial, with an overall relative risk reduction of 27%. Despite what we believe to be potential evidence for the prevention of AF in HFREF trials, no beta-blocker has FDA approval for use in this indication. However, the evidence of modest efficacy by beta-blockers approved for other indications will require that any Phase 3 trials with Gencaro will have an active beta-blocker comparator instead of a comparison against placebo. The Phase 2b/3 trial GENETIC-AF trial will only enroll patients with the beta-1 389 arginine homozygous genotype. In the BEST trial, the post hoc analysis of patients with the beta-1 389 arginine homozygous genotype who received Gencaro had a 74% reduction in the risk of developing AF. In another trial, the active comparator we plan to use in GENETIC-AF, metoprolol CR/XL, reduced the risk of developing AF by 48% in all genotypes. Because these are not the same trials, the results should not be relied on as direct comparisons. However, we believe that these two data points indicate that Gencaro may have an advantage in preventing AF when compared to metoprolol in GENETIC-AF, in part due to our plan to only enroll beta-1 389 arginine homozygous genotype patients who appear to respond best to Gencaro.

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Clinical and Regulatory Strategy

The regulatory strategy for Gencaro is to conduct our adaptive design Phase 2b/3 clinical trial, GENETIC-AF, to obtain an AF approval in a genotype specific HFREF population. We will seek to enroll certain patients with the beta-1 389 arginine homozygous genotype in our AF clinical trial because our analysis of the BEST DNA substudy indicated this group had a 74% reduction in risk for new AF events.

We have created an adaptive design for GENETIC-AF, under which we plan to initiate a Phase 2b study in approximately 200 HFREF patients. Depending on the results of the Phase 2b portion, the trial could then be expanded to a Phase 3 study by enrolling an estimated additional 420 patients. The secondary endpoint of the proposed Phase 2b portion of the trial will be AF burden, defined as a patient s actual percentage of time in AF, regardless of symptoms. Under our proposed design, all 200 patients in the Phase 2b portion of the trial will have AF burden measured by continuous monitoring, either by previously implanted cardiac resynchronization or defibrillation devices, or newly or previously inserted implantable loop recorders. At the end of enrollment of the first 200 patients, the primary endpoint of recurrent symptomatic AF or all-cause mortality, and the secondary endpoint of AF burden will be evaluated by the trial s Data and Safety Monitoring Board for evidence of an efficacy signal. If a sufficient efficacy signal is detected and acceptable safety is observed, the trial would then proceed to the Phase 3 portion and full enrollment.

We have previously received guidance from the FDA regarding a Phase 3 clinical study comparing Gencaro to metoprolol for the prevention of AF in approximately 620 patients, with a design similar to GENETIC-AF, but without an adaptive feature. Based on this FDA guidance, we believe that a successful Phase 3 clinical study similar to GENETIC-AF, with a p-value of less than 0.01, could be sufficient evidence of efficacy upon which to base a New Drug Application (NDA) for the approval of Gencaro for an AF indication in HFREF patients. We plan to obtain further guidance from the FDA on the new trial design, which may affect the trial s design.

The Gencaro Test

If approved, we believe that Gencaro will be the first cardiovascular drug to be integrated with a companion diagnostic to predict enhanced efficacy. We believe the drug label being sought for Gencaro would identify the patient receptor genotypes that can expect enhanced efficacy, as well as those with a likelihood of a standard beta-blocker response and the small unfavorable subgroup with a low probability of benefit. The label being sought would recommend receptor genotype testing prior to initiation of therapy. Accordingly, we collaborated with LabCorp to develop a receptor genotype diagnostic, the Gencaro Test, and believe the test will be simple to administer and would be widely available. We currently intend to pursue a separate arrangement with LabCorp or another third party to provide the diagnostic services of the Gencaro Test needed to support our planned AF trial.

Through our existing agreement with LabCorp we have collaborated to develop and commercialize the Gencaro Test for the treatment of patients with HF. Under the terms of that collaboration, we licensed to LabCorp certain rights to commercialize a receptor genotype diagnostic for the beta-1 and alpha-2C polymorphisms. In return, LabCorp agreed to develop the Gencaro Test and obtain FDA clearance or approval of the Gencaro Test for HF.

Licensing and Royalty Obligations

We have licensed worldwide rights to Gencaro, including all preclinical and clinical data from Cardiovascular Pharmacology and Engineering Consultants, LLC, or CPEC, who has licensed rights in Gencaro from BMS. In addition, we have sublicensed CPEC s rights from BMS. CPEC is a licensing entity which holds the rights of the biotechnology companies that were the commercial sponsors of the BEST trial. If the FDA grants marketing approval for Gencaro, the license agreements require that we make a milestone payment of $8.0 million, which is due within six months after FDA approval. Under the license agreements, we are required to make milestone payments of up to $5.0 million in the aggregate upon regulatory marketing approval in Europe and Japan. Our royalty obligation under the licenses ranges from 12.5% to 25% of revenue from the related product based on achievement of specified product sales levels including a 5% royalty that CPEC is obligated to pay under its original license agreement for Gencaro. We have the right to buy down the royalties to a range of 12.5% to 17% by making a payment within six months of regulatory approval. We also have licensed worldwide rights to intellectual property covering the pharmacogenetic response of Gencaro based on the cardiac receptor polymorphisms, which is owned by the University of Colorado. We have no material future financial obligations under this license. We also have an option to license exclusive, worldwide rights to develop and commercialize diagnostics for these receptor polymorphisms, for the purpose of prescribing Gencaro, from the licensee of these rights, the University of Cincinnati.

Development Pipeline

Our development activities are substantially focused on our lead product candidate, Gencaro, for the treatment of AF. We also believe, based upon data from the BEST trial, that Gencaro may have additional potential for the treatment of AF rate control, VT/VF and prevention of heart

failure endpoints in HFREF patients. We do not expect to pursue development of Gencaro for disease indications beyond AF without entering into a strategic partnership or collaboration. We believe Gencaro has potential to address these additional indications, and that the clinical response of patients with these diseases may be genetically influenced, based on the same genetic markers we have identified for our proposed treatment of AF with Gencaro.

We also have exclusive pharmacogenetic and other patent rights to drug candidates that have potential indications in cardiovascular disease, oncology and other therapeutic areas, in both early and later stages of development. We may seek partners to assist us in the development of these candidates or who may license them.

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Competition

Current treatments include pharmaceutical intervention and device intervention. There are several antiarrhythmic drugs approved by the FDA for the treatment and/or prevention of recurrent AF. However, these drugs have safety and/or administration concerns and all but one have contraindications or label warnings regarding their prescription in patients with heart failure.

Current device interventions for the treatment of AF include:

Electrical cardioversion which is used to restore normal heart rhythm with administration of a direct current shock;

Radiofrequency ablation which can be effective in patients for whom medications are ineffective; and,

Atrial pacemakers which are implanted under the skin and then intravenously into the heart to regulate heart rhythm.

Considering that most of the approved drugs and device interventions for the treatment or prevention AF have notable risks or adverse side effects, we believe there is an unmet medical need for new AF treatments that have fewer side effects than currently available therapies and are more effective, particularly in patients with HF where the approved drugs are contra-indicated or have warnings regarding their prescribing information. We believe that Gencaro s prevention of AF in HF patients would provide this patient population a safer treatment option than other treatments currently approved by the FDA.

The pharmaceutical industry is highly competitive. We face significant competition from pharmaceutical companies and biotechnology companies that are researching and selling products designed to treat cardiovascular conditions. Most of these companies have significantly greater financial, product development, manufacturing, and commercial resources than we have.

In addition, our proposed prescribing information for Gencaro includes a recommendation for genetic testing, which will add additional cost and procedures to the process of prescribing Gencaro, and which could make it more difficult for us to compete against existing therapies.

Manufacturing and Product Supply

Gencaro is a small molecule drug with an established manufacturing history. Multiple manufacturers of both the API and drug product have successfully produced Gencaro for use in clinical trials over the course of its clinical development. We outsource all manufacturing and analytical testing of the Gencaro API and drug product. We have selected third party contract manufacturing organizations on the basis of their technical and regulatory expertise. Our approach with our contract manufacturing partners has been to replicate the manufacturing processes that were used to support the prior pivotal clinical trial with Gencaro, and to minimize any changes from these baseline processes, thereby reducing technical and regulatory risk. We contracted with Groupe Novasep to complete the drug substance registration batches required for the Gencaro NDA. These batches were successful, and the resulting drug substance was used to supply the drug product registration campaign. Remaining inventory was placed in current Good Manufacturing Practice, or cGMP, storage to provide a backup supply for the planned GENETIC-AF trial, and for use as an initial source of drug substance to support eventual product launch, if approved.

For drug product production, we have contracted with Patheon, Inc. to manufacture the Gencaro tablets. Gencaro is produced in a tablet form, utilizing standard solid oral dosage processing techniques. Six separate dosage strengths are manufactured, with the maximum recommended dose of 50mg twice daily for patient weighing 75kg or less and 100mg twice daily for patients weighing more than 75kg. Registration batches were successfully completed by Patheon, Inc. and tablets from these runs have been placed in cGMP storage to supply the planned GENETIC-AF trial.

If sufficient funding is obtained, our manufacturing focus for 2013 will continue to be to prepare the blinded clinical trial supplies for Gencaro and the comparator compound, and to establish the appropriate packaging and clinical distribution channels necessary for the successful execution of the planned GENETIC-AF trial.

Research and Development Expenses

Our research and development expenses totaled $1.1 million for the year ended December 31, 2012 as compared to $2.3 million for 2011, a decrease of approximately $1.2 million. Our research and development expense for the three months ended March 31, 2013 was $181,000 compared to $422,000 for the corresponding period of 2012, a decrease of approximately $241,000. Our future R&D expenses are highly contingent upon our ability to raise substantial additional funding or complete a strategic transaction. Should we receive funds from one or a combination of these sources, R&D expense in future periods could be substantially higher as we initiate our planned GENETIC-AF clinical trial. Until substantial additional funding is obtained, R&D expenses for the remainder of 2013 are expected to be comparable to 2012 levels.

Government Regulation

Governmental authorities in the U.S. at the federal, state, and local levels and foreign countries extensively regulate, among other things, the research, development, testing, manufacture, labeling, promotion, advertising, marketing, distribution, sampling, and import and export of pharmaceutical and medical device products. In the U.S., the Food and Drug Administration (FDA) regulates these activities at the federal level pursuant to the Federal Food Drug and Cosmetic Act (FDCA) and the regulations promulgated thereunder.

Premarket Approval of Drugs

FDA approval is required before any new drug, dosage form, indication, or strength can be marketed in the U.S. We anticipate that all of our products will require regulatory approval by governmental agencies prior to commercialization. The process of obtaining approval and the subsequent process of maintaining compliance with appropriate federal, state, local and foreign statutes and regulations require the expenditure of substantial time and financial resources. In addition, these statutes, rules, regulations and policies may change and our products may be subject to new legislation or regulations. There are numerous FDA and other federal and state sanctions for non-compliance.

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The steps required before new human therapeutic drug products are marketed in the U.S. and foreign countries include rigorous preclinical and clinical testing and other approval requirements by regulatory agencies, such as the FDA and comparable agencies in foreign countries. There is no guarantee that products will be approved in a specific timeframe or at all.

Preclinical Phase. Preclinical studies are generally conducted in the laboratory to identify potential drug candidates and to evaluate their potential efficacy and safety. These studies include laboratory evaluation of product chemistry, formulation and stability, as well as studies to evaluate short and long-term toxicity in animals. Preclinical studies are governed by numerous regulations, including but not limited to FDA s Good Laboratory Practices.

Clinical Phase. Before human clinical trials can commence, an Investigational New Drug, or IND, application, submitted to FDA must become effective. For an IND to become effective, the applicant must submit, among other things, information on design of the proposed investigation, reports necessary to assess the safety of the drug for use in clinical investigation, and information on the chemistry and manufacturing of the drug, controls available for the drug, and primary data tabulations from animal or human studies. The clinical phase of development involves the performance of human studies, including adequate and well-controlled human clinical trials to establish the safety and efficacy of the product candidate for each proposed indication. Typically, clinical evaluation involves three sequential phases, which may overlap. During Phase 1, clinical trials are conducted with a relatively small number of subjects or patients to determine the early safety profile of a product candidate, as well as dose tolerance, absorption, and the pattern of drug distribution and drug metabolism. Phase 2 trials are conducted with groups of patients afflicted by a specific target disease to determine preliminary efficacy, optimal dosages and dosage tolerance and to identify possible adverse effects and safety risks. In Phase 3, larger-scale, multi- center trials are conducted with patients afflicted with a specific target disease to provide data for the statistical proof of efficacy and safety as required by regulatory agencies. The conduct of clinical trials is subject to extensive regulation. FDA may delay or suspend clinical trials through clinical holds.

NDA Submission. In the U.S., the results of preclinical and clinical testing along with chemistry, manufacturing and controls information, are submitted to the FDA in the form of an NDA. Under the Prescription Drug User Fee Act, or PDUFA, after submission of an NDA and payment, or waiver, of the required fee, the FDA s goal is to review most standard NDAs within 10 months from sponsor submission of the application by which time, the FDA must issue a complete response, or approve the NDA. While FDA s goal is to issue a complete response within 10 months, the process may take longer than 10 months, particularly if multiple review cycles are required.

In responding to an NDA, the FDA may grant marketing approval or deny the application if the FDA determines that the application does not satisfy the statutory and regulatory approval criteria. A denial may include a request for additional information, including additional clinical data and/or an additional Phase 3 clinical trial. Data from clinical trials are not always conclusive and FDA may interpret data differently than we interpret data. Under the Food and Drug Modernization Act of 1997, the FDA is authorized to approve a drug based on a single adequate and well-controlled study if such study and other confirmatory data are sufficient to establish the drug s effectiveness. However, it has long been the FDA s general position that the standard of proof of a drug s effectiveness generally requires at least two well-controlled and adequate Phase 3 clinical studies demonstrating statistically significant results as compared to a placebo or active control (with p-values of less than 0.05) with respect to the primary endpoint or endpoints of the trial.

In addition, in accordance with current FDA law and regulations, the FDA may refer a drug to an advisory committee for review prior to approval. Most new compounds are referred to an FDA advisory committee, which could add additional time to the review process. There is no guarantee that the advisory committee will recommend approval of a drug candidate. In some cases, FDA may require completion, within a specified time period, of additional clinical studies after approval, referred to as Phase 4 clinical studies, to monitor the effect of a new product and may prevent or limit future marketing of the product based on the results of these post-marketing programs. Furthermore, prior to granting approval, the FDA generally conducts an inspection of the facilities, including outsourced facilities that will be involved in the manufacture, production, packaging, testing and control of the drug substance and finished drug product for compliance with current Good Manufacturing Practice, or cGMP, requirements.

If the FDA approves the NDA, the sponsor is authorized to begin commercialization of the drug in accordance with the approval. Even if the FDA approves the NDA, the FDA may decide later to suspend or withdraw product approval if compliance with regulatory standards is not maintained or if safety problems are recognized after the product reaches the market. In addition, the FDA requires surveillance programs to monitor approved products that have been commercialized, and the agency has the power to require additional clinical studies, to require changes in labeling or to prevent further marketing of a product based on the results of these post-marketing programs. The FDA also has authority to request implementation of a risk evaluation and mitigation strategy, or REMS, that could restrict distribution of Gencaro or require us to provide additional risk information to prescribers. Whether or not FDA approval has been obtained, approval of a product candidate by comparable foreign regulatory authorities is necessary prior to the commencement of marketing of a product candidate in those countries. The approval procedures vary among countries and can involve additional testing. The time required to obtain approval may differ from that required for FDA approval.

Post-approval Compliance. If regulatory approval for a drug or medical device is obtained, the product and the facilities manufacturing the product are subject to periodic inspection and continued regulation by regulatory authorities, including compliance with cGMP, as well as labeling, advertising, promotion, recordkeeping, and reporting requirements, including the reporting of adverse events. In addition, the FDA closely regulates the post-approval marketing and promotion of drugs, including standards and regulations for labeling, promotion to health care professionals, direct-to-consumer advertising, off-label promotion, industry-sponsored scientific and educational activities and promotional activities involving the Internet. Drugs may be marketed only for the approved indications and in accordance with the provisions of the approved labeling. Companies are responsible for

compliance with such requirements and would be responsible to ensure that all contract manufacturing organizations who perform work for them also comply with such requirements. Similarly, if a drug manufacturer hires contract sales representatives or consultants to promote its products, such organizations or individuals must comply with all of the same requirements applicable to the drug manufacturer. Failure to comply with these requirements can result in adverse publicity, warning letters, corrective advertising and potential civil and criminal penalties.

Drug Price Competition and Patent Term Restoration Act of 1984. Under the Drug Price Competition and Patent Term Restoration Act of 1984, also known as the Hatch-Waxman Act, Congress created an abbreviated FDA review process for generic versions of pioneer (brand name) drug products. The Hatch-Waxman Act also provides for patent term restoration and the award, in certain circumstances, of non-patent marketing exclusivities.

Generic Drug Approval. The Hatch-Waxman Act established an abbreviated FDA review process for drugs that are shown to be equivalent to approved pioneer drugs. Approval for a generic drug is obtained by filing an abbreviated NDA, or ANDA. Generic drug applications are abbreviated because they generally do not include clinical data to demonstrate safety and effectiveness. Instead, an ANDA applicant must establish that its product is bioequivalent to an approved drug and that it is the same as the approved drug with respect to active ingredient(s), route of administration, dosage form, strength and recommended conditions of use (labeling). The FDA will approve the generic as suitable for an ANDA if it finds that the generic does not raise questions of safety and effectiveness as compared to the pioneer drug. A drug is not eligible for ANDA approval if the FDA determines that it is not equivalent to the pioneer drug or if it is intended for a different use. Any applicant who files an ANDA seeking approval of a generic version of an approved drug listed in FDA s Approved Drug Products with Therapeutic Equivalence Evaluations, or the Orange Book, before expiration of the patent(s) listed in the Orange Book for that approved drug, must certify to the FDA for each patent that (i) no patent information on the drug has been submitted to the FDA; (ii) that such patent has expired; (iii) the date on which such patent expires; or (iv) that such patent is invalid, unenforceable or will not be infringed by the manufacture, use or sale of the generic drug. If the ANDA applicant makes a certification pursuant to (iv) above, or a Paragraph IV certification, and the NDA holder files an infringement suit against the ANDA applicant within 45 days of receiving the Paragraph IV notification, the NDA owner is entitled to an automatic 30-month stay of FDA s ability to approve the ANDA. This 30-month stay will end early upon any decision by a court that the patent is invalid, unenforceable or not infringed by the generic drug.

Patent Term Restoration. The Hatch-Waxman Act provides for the restoration of a portion of the patent term lost during product development and FDA review of an application. However, the maximum period of restoration cannot exceed five years, or restore the total remaining term of the patent to greater than 14 years from the date of FDA approval of the product.

Patent Term Extension. While the term of a U.S. patent is 20 years from the earliest priority date of a patent application (excluding a provisional patent application) , a U.S. patent that covers subject matter requiring regulatory approval to market is eligible for an extension of that patent term. Patent Term Extension, or PTE, extends the term of an issued patent for generally 1) the length of the FDA approval process and 2) half of the time spent in clinical trials. However, there are certain limitations to PTE, including the limitation that the term cannot be extended more than 14 years after approval has been obtained.

Under 35 U.S.C. § 156(a), a patent covering a method of using a product is eligible for PTE if the following conditions are met:

(1) the patent has not yet expired;

(2) the patent was not previously extended;

(3) the patent owner submits an application for PTE that includes all necessary supporting information within 60 days of FDA approval;

(4) the product was subject to regulatory review before its commercial marketing or use; and

(5) the drug application is for the first permitted commercial marketing of the product.

We have obtained three U.S. patents (U.S. Patent Nos. 7,678,824; 8,080,578; 8,093,286), and have one pending U.S. patent application that generally concern methods for treating patients with Gencaro based on the presence of certain polymorphisms in the beta-1 and/or alpha-2C

adrenergic receptors. We believe that, if approved by the FDA, one of the U.S. patents may be eligible for PTE, which could provide approximately 3 years or more of additional patent life based on our current clinical trial plans.

Patent Term Extension, known as a Supplementary Protection Certificate, or SPC, is a form of patent term extension that is available for pharmaceutical products approved for marketing in the European Union. We obtained a patent in Europe on methods for using Gencaro that is similar to the 824 patent (EP 1802775); this patent is in force in certain countries in Europe, including the United Kingdom, France, Germany, Italy and Spain. We believe that this patent may be eligible for an SPC, if Gencaro is approved for marketing in any European country in which the patent is in force, which could provide up to five years of additional patent life.

Non-Patent Marketing Exclusivities. Separate and apart from patent protection, the Hatch-Waxman Act entitles approved drugs to various periods of non-patent statutory protection, known as marketing exclusivity. The Hatch-Waxman Act provides five years of new chemical entity marketing exclusivity to the first applicant to gain approval of an NDA for a product that contains an active moiety not found in any other approved product. This exclusivity means that another manufacturer cannot submit an ANDA or 505(b)(2) NDA until the marketing exclusivity period ends. This exclusivity protects the entire new chemical entity franchise, including all products containing the active ingredient for any use and in any strength or dosage form, but will not prevent the submission or approval of stand-alone NDAs where the applicants have conducted their own clinical studies to demonstrate safety and effectiveness. There is an exception, however, for a competitor that seeks to challenge a patent with a Paragraph IV certification. Four years into the five-year exclusivity period, a manufacturer who alleges that one or more of the patents listed with the NDA is invalid, unenforceable or not infringed may submit an ANDA or 505(b)(2) NDA for a generic or modified version of the product.

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The Hatch-Waxman Act also provides three years of new use marketing exclusivity for the approval of NDAs, and supplements, where those applications contain the results of new clinical investigations (other than bioavailability studies) essential to the FDA s approval of the applications. Such applications may be submitted for new indications, dosage forms, strengths, or new conditions of use of approved products. So long as the studies are essential to the FDA s approval or were conducted by or for the applicant, this three-year exclusivity prohibits the final approval of ANDAs or 505(b)(2) NDAs for products with the specific changes associated with those studies. It does not prohibit the FDA from approving ANDAs or 505(b)(2) NDAs for other products containing the same active ingredient, without those changes.

FDA Premarket Review of Medical Devices

Unless an exemption applies, each medical device that a company wishes to market in the U.S. requires either approval of a premarket approval PMA application or clearance of a premarket notification, commonly known as a 510(k) from the FDA. The FDA classifies medical devices into one of three classes. Devices deemed to pose lower risks are placed in either class I or II, which may require the manufacturer to submit to the FDA a 510(k) requesting permission to commercially distribute the device. Clearance of a 510(k) usually requires between three months and one year from the time of submission of the 510(k), although the process may take longer. The FDA s 510(k) clearance procedure is less rigorous than the PMA approval procedure, but is available only to companies who can establish that their device is substantially equivalent to a legally-marketed predicate device that was (i) on the market prior to the enactment of the Medical Device Amendments of 1976, (ii) reclassified from Class III to Class II, or (iii) has been cleared through the 510(k) procedure. 510(k)s must typically be supported by performance data, including preclinical data, bench testing, and in some cases, clinical data. Some low risk devices are exempted from this requirement. Devices deemed by the FDA to pose the greatest risks, or for which there is no predicate, are placed in class III, requiring approval of a PMA.

PMA Pathway. Generally, a PMA must be supported by extensive data including, but not limited to, technical, preclinical, clinical trials, manufacturing and labeling to demonstrate to the FDA s satisfaction a reasonable assurance of the safety and effectiveness of the device for its intended use. After a PMA is sufficiently complete, the FDA will accept the application and begin an in-depth review of the submitted information and will generally conduct a pre-approval inspection of the manufacturing facility or facilities to ensure compliance with FDA s Quality System Regulations (QSR). By statute, the FDA has 180 days to review the accepted application , although, generally, review of the application can take between one and three years, and it may take significantly longer. The PMA application process can be expensive, and there is a substantial user fee that must be paid to FDA in connection with the submission of a PMA application. If the FDA s evaluation of the PMA application or the manufacturing facility is not favorable, the FDA may deny approval of the PMA application or issue a not approvable letter. The FDA may also require additional clinical trials, which can delay the PMA approval process by several years. After the PMA is approved, if significant changes are made to a device, its manufacturing or labeling, a PMA supplement containing additional information must be filed for prior FDA approval. PMA supplements often must be approved by FDA before the modification to the device, the labeling, or the manufacturing process may be implemented.

Clinical Trials. Clinical trials are generally required to support a PMA application and are sometimes required for 510(k) clearance.

In Vitro Diagnostic Companion Diagnostic Devices. FDA has described IVD companion diagnostic devices as in vitro diagnostic devices that provide information that is essential for the safe and effective use of a corresponding therapeutic product. The use of an IVD companion diagnostic device with a particular therapeutic product is stipulated in the instructions for use in the labeling of both the diagnostic device and the corresponding therapeutic product, as well as in the labeling of any generic equivalents of the therapeutic product. An IVD companion diagnostic device could be used to (i) identify patients who are most likely to benefit from a particular therapeutic product; (ii) identify patients likely to be at increased risk for serious adverse reactions as a result of treatment with a particular therapeutic product; or (iii) monitor response to treatment for the purpose of adjusting treatment (e.g., schedule, dose, discontinuation) to achieve improved safety or effectiveness. Although FDA s regulation of IVD Companion Diagnostic Devices is evolving and implemented on a case-by-case basis, FDA s stated policy is that a therapeutic product and its corresponding IVD companion diagnostic device would be developed contemporaneously, with the clinical performance and clinical significance of the IVD companion diagnostic device established using data from the clinical development program of the corresponding therapeutic product. FDA s policy is that an IVD companion diagnostic device should be developed and approved or cleared contemporaneously to support the therapeutic product s safe and effective use. With respect to the Gencaro Test, there is no assurance that we will be able to develop and obtain approval or clearance contemporaneously with Gencaro. Failure to develop the Gencaro Test or obtain clearance or approval could delay approval of Gencaro, if FDA regards the Gencaro Test as an IVD companion diagnostic test that is essential to the safe and effective use of Gencaro.

Continuing Regulation. After a device is placed on the market, numerous regulatory requirements apply to the manufacturer, or holder of a PMA approval. With respect to the Gencaro Test, we intend to seek a new or amended collaborative arrangement with a diagnostic company in which we could license them certain rights to perform the diagnostic test for patients with AF. As part of such arrangement, we will seek to have the diagnostic company take responsibility for compliance with the FDA s device approval and on-going regulatory requirements.

International Marketing Approvals. International sales of medical devices are subject to foreign government regulations, which vary substantially from country to country and are subject to change. The time required to obtain approval by a foreign country may be longer or shorter than that required for FDA clearance or approval, and the requirements may differ.

Other Regulatory Requirements. We are also subject to various federal, state and local laws, regulations and recommendations relating to safe working conditions, laboratory and manufacturing practices, the experimental use of animals and the use and disposal of hazardous or potentially hazardous substances, including radioactive compounds and infectious disease agents, used in connection with our work. The extent and character of governmental regulation that might result from future legislation or administrative action cannot be accurately predicted.

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Intellectual Property

The future success of our business will partly depend on our ability to maintain market exclusivity in the United States and important international markets for Gencaro, and for other products or product candidates that we may acquire or develop. We will rely on statutory protection, patent protection, trade secrets, know-how, and in-licensing of technology rights to maintain protection for our products.

We believe that both patent protection and data exclusivity statutes will give Gencaro market exclusivity in the U.S. and in major international markets. If approved by the FDA or international regulatory agencies, Gencaro will qualify as a New Chemical Entity, or NCE, as it has never received regulatory approval in any jurisdiction. As an NCE, Gencaro will enjoy market exclusivity in the United States and most international markets under data exclusivity statutes. These laws provide for an exclusivity period beginning from regulatory approval, during which any generic competitor is barred from submitting an application that relies on the data that has been submitted in connection with the approval of the NCE. In the U.S., the Hatch-Waxman Act provides for an initial period of four or five years from approval of the NCE, during which a generic application attempting to rely on the data submitted for the NCE cannot be filed with the FDA. This period can be extended under certain circumstances, and we believe that the maximum period of exclusivity under these provisions is seven and one-half years from FDA approval, as discussed below.

Many international markets have data exclusivity statutes that are analogous to Hatch-Waxman and often more protective. The analogous statute in the European Medicines Evaluation Agency will, in general, provide Gencaro with a minimum of ten years of protection before such a generic application may be approved. Protection under Hatch-Waxman and other data exclusivity statutes is sometimes considered superior to patent protection, as the generic cannot be marketed during the period of exclusivity, thus eliminating the need to initiate patent infringement litigation with its accompanying risks and costs.

In addition to protection under data exclusivity statutes, we believe that Gencaro s patent portfolio provide alternative protection of market exclusivity. We have been granted patents in the United States and Europe that claim the use of Gencaro with the genetic polymorphisms of the beta-1 and alpha-2C receptors that predict Gencaro response. We believe that this patent strategy may effectively serve to exclude generic competition because of the threat of patent litigation. Consequently, if our patent strategy is successful, we believe that the possibility of generic competition with Gencaro will be significantly reduced or eliminated until at least the expiration of these patents, which would be no earlier than 2026 in the U.S and into 2025 in Europe. In addition, we believe that if Gencaro is approved, a Gencaro patent will be eligible for patent term extension based on our current clinical trial plans which, if granted may provide market exclusivity for Gencaro into 2029 or 2030 in the U.S. and Europe. We also believe that the initial period of statutory exclusivity for Gencaro in the U.S. may be extended to seven and one-half years from approval, under a special Hatch-Waxman provision that permits an automatic 30-month extension of the exclusivity period by pursuing litigation against any company attempting to enter the market with a generic for a drug that is covered by a composition of matter or method of use patent.

We also own or have rights in a number of patents and patent applications relating to a number of pre-clinical and clinical candidate molecules, including rNAPc2. We estimate that patents for rNAPc2 covering use as a treatment for hemorrhagic fever viruses will expire no earlier than 2023.

In some cases, certain of the U.S. patents may be entitled to an extension of their term and certain European patents may be entitled to supplemental protection in one or more countries in Europe. The length of any such extension, if an extension is granted, will vary by country. We cannot predict whether any such extensions will be granted.

Employees

As of March 31, 2013, we had 8 active employees, of which 6 were full-time employees. All of these employees operate out of the Broomfield, Colorado location. None of our employees are represented by any collective bargaining unit. We believe that we maintain good relations with our employees.

Description of Property

We do not own any real property. On February 8, 2008, the Company entered into a lease agreement for approximately 15,000 square feet of newly constructed office facilities in Broomfield, Colorado. The Company relocated to the new facility upon its completion in July 2008. The lease has a term of 5 years with rights to extend the term for two additional three year periods. On June 14, 2011, the Company entered into a first amendment (the Amendment) to the lease agreement. Under the terms of the Amendment, the Company and its landlord mutually agreed for the Company to relocate from its office suite of approximately 15,000 square feet, to another suite within the same building, comprising approximately 4,500 square feet. The office location serves as the Company s primary business office. The Amendment also modified the annual

per square foot rate of rent and allows the Company to terminate with three months notice. As part of the agreement, the Company made a one-time payment to the landlord of $200,000, which the landlord agreed to use for the landlord s improvements in the new leased premises. The original five year term of the Lease remains unchanged. Per the lease agreement, base rent is subject to annual increases of approximately three percent per year. The rent expense for the lease is being recognized on a straight-line basis over the lease term.

Under the original lease, the Company received tenant improvement reimbursements from the landlord totaling $593,000 which were recorded as deferred rent and were amortized as reductions to rent expense. The $200,000 payment made to the landlord in conjunction with the Amendment was recorded against the existing deferred rent. The net deferred rent balance is being amortized as reductions to rent expense over the remaining term of the lease. The unamortized deferred rent balance as of March 31, 2013 was $8,000.

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Rent expense under this lease for the three months ended March 31, 2013 and 2012 was $12,000 and was $527,000 from Inception through March 31, 2013.

The Company s facility lease in Broomfield, Colorado expires in June 2013. The remaining minimum lease payments committed under the lease through June 2013 are $20,000. The lease has an option to renew for an additional three year term under comparable terms, and the Company is in negotiations with the landlord regarding potential renewal of the lease.

Corporate Information

On January 27, 2009, we completed a business combination (the Merger) with ARCA Colorado in accordance with the terms of that Agreement and Plan of Merger and Reorganization, dated September 24, 2008, and amended on October 28, 2008 in which a wholly-owned subsidiary of Nuvelo, Inc. merged with and into ARCA Colorado, with ARCA Colorado continuing after the Merger as the surviving corporation and a wholly-owned subsidiary of Nuvelo, Inc. Immediately following the Merger, we changed our name from Nuvelo, Inc. to ARCA biopharma, Inc. Nuvelo was originally incorporated as Hyseq, Inc. in Illinois in 1992 and reincorporated in Nevada in 1993. On January 31, 2003, Nuvelo merged with Variagenics, Inc., a publicly traded Delaware corporation based in Massachusetts, and, in connection with the merger, changed its name to Nuvelo, Inc. On March 25, 2004, Nuvelo was reincorporated from Nevada to Delaware. On January 27, 2009, in connection with the Merger with ARCA Colorado described above, Nuvelo changed its name to ARCA biopharma, Inc. Our principal offices are located in Broomfield, Colorado.

We file our annual reports on Form 10-K, quarterly reports on Form 10-Q and current reports on Form 8-K pursuant to Section 13(a) or 15(d) of the Securities Exchange Act of 1934 electronically with the SEC. The public may read or copy any materials that have been filed with the SEC at the SEC s Public Reference Rooms at 100 F Street, N.E., Washington, D.C. 20549 on official business days during the hours of 10:00 a.m. and 3:00 p.m. The public may obtain information on the operation of the Public Reference Room by calling the SEC at 1-800-SEC-0330. The SEC maintains an Internet site that contains reports, proxy and information statements, and other information regarding issuers that file electronically with the SEC. The address of that site is http://www.sec.gov.

You may obtain a free copy of our annual reports on Form 10-K, quarterly reports on Form 10-Q, current reports on Form 8-K and amendments to those reports on our website at http://www.arcabiopharma.com on the earliest practicable date following the filing with the SEC or by contacting the Investor Relations Department at our corporate office by calling (720) 940-2200. Information found on our website is not incorporated by reference into this report.

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EXECUTIVE COMPENSATION

The following table shows for the fiscal years ended December 31, 2012 and December 31, 2011, compensation awarded to, paid to, or earned by the Company s principal executive officers and its other named executive officers as of December 31, 2012, collectively, the Named Executive Officers:

SUMMARY COMPENSATION TABLE FOR FISCAL 2012 AND 2011

Name and Principal Position	Year	Salary ($)(2)	Option Awards ($)(1)	Bonus ($)	All Other Compensation ($)	Total ($)
Michael R. Bristow, President and Chief Executive Officer	2012	246,705		13,304	9,868	269,877
	2011	272,950	54,756		10,912	338,618
Patrick M. Wheeler, Chief Financial Officer	2012	200,157			8,006	208,163
	2011	221,450	36,504		8,853	266,807
Christopher D. Ozeroff, Senior Vice President and General Counsel	2012	241,119			4,606	245,725
	2011	266,770	36,504		4,509	307,783

(1) The amounts reported under Option Awards in the above table reflect the grant date fair value of these awards as determined in accordance with Financial Accounting Standards Board Accounting Standards Codification Topic 718, Compensation Stock Compensation, excluding the effects of estimated forfeitures. The value of stock option awards was estimated using the Black-Scholes option-pricing model. The valuation assumptions used in the valuation of option awards may be found in Note 9 to the Company s consolidated financial statements included in our annual report on Form 10-K for the year ended December 31, 2012 and filed with the SEC on March 21, 2013.

(2) The amounts reported under Salary in the above table represent the actual amounts paid during the calendar year. Because the Company s actual pay dates do not always coincide with the calendar year, these amounts may differ from the base salary amounts authorized by the Company s Board of Directors and described in the narrative that follows.

Narrative Disclosure to Summary Compensation Table

Employment Agreements or Arrangements

Michael R. Bristow, M.D., Ph.D. Dr. Bristow serves as the Company s President and Chief Executive Officer under an Employment and Retention Agreement that was amended and restated as of June 4, 2008 and further amended pursuant to a Waiver and Amendment Agreement executed as of March 30, 2012. Pursuant to such employment agreement, Dr. Bristow is permitted to continue his academic work for the University of Colorado Health Sciences Center and for the Cardiovascular Institute, so long as it does not interfere with his duties as President and Chief Executive Officer of ARCA.

The Company s Board of Directors approved a 2011 base salary for Dr. Bristow of $272,950 and a 2012 base salary of $245,655 as a measure to preserve the Company s available capital. Dr. Bristow s salary is subject to annual increases if approved by the Company s Board of Directors or Compensation Committee and he is eligible to receive an annual bonus as determined by the Board of Directors or Compensation Committee in its sole discretion.

On March 26, 2012, the Compensation Committee approved a 2011 cash bonus for Dr. Bristow in the amount of $60,049 for partial achievement of the Company s 2011 performance goals. Specifically, the Board determined that the Company had achieved certain of its 2011 performance goals during the fiscal year 2011 by maintaining Nasdaq listing requirements, meeting Company budget goals and by achieving certain product development goals, and had engaged in substantial efforts towards achieving the goal to advance the Company s Gencaro atrial fibrillation regulatory approval process. However, due to the Company s limited financial resources, the Board concluded that the Company would pay cash bonuses for partial achievement of the 2011 performance goals during the 2012 fiscal year upon the Company s completing a transaction providing financing for the Company s planned atrial fibrillation clinical trial (the AF Milestone). Because the AF Milestone was not achieved in 2012, Dr. Bristow s deferred 2011 cash bonus was not paid and will not be rolled over. Dr. Bristow received a bonus of $13,304 in 2012 to reimburse him for certain health benefit costs. Other than such reimbursement, no bonuses were paid to any Company employees in 2012 as a measure to preserve the Company s available capital.

If the Company terminates Dr. Bristow s employment without cause, or if Dr. Bristow terminates his employment with good reason (as these terms are defined in his employment agreement), the Company has agreed to pay Dr. Bristow a severance payment equivalent to (i) 12 months of his base salary (if such termination occurs on the same day as or within thirteen months after a change of control of the Company), (ii) a pro rata portion of any bonus compensation under any employee bonus plan that has been approved by the Board of Directors payable to him for the fiscal year in which his employment terminated to be paid at the same time that such incentive bonus would have been paid had the termination not occurred, and (iii) reimbursement to cover out-of-pocket costs to continue group health insurance benefits under COBRA for 12 months, whether he elects or is eligible to receive COBRA (provided, that even if he does not elect or is not eligible to receive COBRA, he will receive the equivalent of such out-of-pocket expenses paid by him not to exceed the costs that the benefits would equal under COBRA if he were so eligible). In addition, ARCA may elect in its

sole discretion, to pay additional severance equal to up to 12 months of base salary, which additional payment would extend the covenants and obligations under Dr. Bristow s Employee Intellectual Property, Confidentiality and Non-Compete Agreement for such additional period. The severance payment is conditioned on the execution by Dr. Bristow of a legal release in a form acceptable to the Company. A termination for cause includes willful misconduct, gross negligence, theft, fraud, or other illegal or dishonest conduct, any of which are considered to be materially harmful to the Company; refusal, unwillingness, failure, or inability to perform material job duties or habitual absenteeism; or violation of fiduciary duty, violation of any duty of loyalty, or material breach of any material term of the employment agreement or the Employee Intellectual Property, Confidentiality and Non-Compete Agreement, or any other agreement, with the Company. Good reason includes a relocation of normal work location greater than 30 miles; a decrease in current base salary by more than 15%, with certain exceptions; and the Company s unilateral decision to significantly and detrimentally reduce Dr. Bristow s job responsibilities.

Patrick M. Wheeler. Mr. Wheeler serves as the Company s Chief Financial Officer under an Employment Agreement dated February 11, 2009, as amended pursuant to a Waiver and Amendment Agreement executed as of March 30, 2012. Under his employment agreement, Mr. Wheeler is entitled to receive an annual base salary of $215,000, subject to annual increases if approved by the Company s Board of Directors or Compensation Committee and is eligible to receive an annual bonus as determined by the Board of Directors or Compensation Committee in its sole discretion. The Company s Board of Directors approved a 2011 base salary for Mr. Wheeler of $221,450 and a 2012 base salary of $199,305 as a measure to preserve the Company s available capital.

On March 26, 2012, the Compensation Committee approved a 2011 cash bonus for Mr. Wheeler in the amount of $29,231 for partial achievement of the Company s 2011 performance goals. Specifically, the Board determined that the Company had achieved certain of its 2011 performance goals during the fiscal year 2011 by maintaining Nasdaq listing requirements, meeting Company budget goals and by achieving certain product development goals, and had engaged in substantial efforts towards achieving the goal to advance the Company s Gencaro atrial fibrillation regulatory approval process. However, due to the Company s limited financial resources, the Board concluded that the Company would pay cash bonuses for partial achievement of the 2011 performance goals during the 2012 fiscal year upon the achievement of the AF Milestone. Because the AF Milestone was not achieved in 2012, Dr. Wheeler s deferred 2011 cash bonus was not paid and will not be rolled over. No bonuses were paid to Mr. Wheeler in 2012 as a measure to preserve the Company s available capital.

If the Company terminates Mr. Wheeler s employment without cause, or if Mr. Wheeler terminates his employment with good reason (as these terms are defined in his employment agreement), the Company has agreed to pay Mr. Wheeler severance benefits that include (i) a payment equal to, as applicable, (A) 12 months of his base salary, if such termination occurs on the same day as or within thirteen months after a change of control of the Company, or (B) four months of his base salary, if a change of control of the Company has not occurred as of or within thirteen months of such termination, (ii) a payment equal to a pro rata portion of any bonus compensation under any employee bonus plan that has been approved by the board of directors payable to him for the fiscal year in which his employment terminated, to be paid at the same time that such incentive bonus would have been paid had the termination not occurred, and (iii) reimbursement of out-of-pocket costs to continue group health insurance benefits (and dependent coverage, if applicable) under COBRA for a period equivalent to that set forth in clause (i) above, whether he elects or is eligible to receive COBRA (provided, that even if he does not elect or is not eligible to receive COBRA, he will receive the equivalent of such out-of-pocket expenses paid by him not to exceed the costs that the benefits would equal under COBRA if he were so eligible). In addition the Company may elect in its sole discretion to pay additional severance equal to up to 12 months of his base salary, which additional payment would extend certain of the covenants and obligations under Mr. Wheeler s Employee Intellectual Property, Confidentiality and Non-Compete Agreement for such additional period. The severance benefits are conditioned on the execution by Mr. Wheeler of a legal release in a form acceptable to the Company. A termination for cause includes willful misconduct, gross negligence, theft, fraud or other illegal or dishonest conduct, any of which are considered to be materially harmful to the Company; refusal, unwillingness, failure or inability to perform material job duties or habitual absenteeism; or violation of fiduciary duty, violation of any duty of loyalty or material breach of any material term of the employment agreement or the Employee Intellectual Property, Confidentiality and Non-Compete Agreement, or any other agreement, with the Company. Good reason includes a relocation of normal work location greater than 30 miles; a decrease in current base salary by more than 15%, other than any such decrease resulting from a general reduction by the Company in the base salary of all Company executive officers; and the Company s unilateral decision to significantly and detrimentally reduce Mr. Wheeler s job responsibilities.

Christopher D. Ozeroff. Mr. Ozeroff serves as the Company s Senior Vice President and General Counsel under an Employment and Retention Agreement that was amended and restated as of June 12, 2008 and further amended pursuant to a Waiver and Amendment Agreement executed as of March 30, 2012.

Under his employment agreement, Mr. Ozeroff is entitled to receive an annual base salary of $259,000, subject to annual increases if approved by the Company s Board of Directors or Compensation Committee and is eligible to receive an annual bonus as determined by the Board of Directors or Compensation Committee in its sole discretion. The Board of Directors approved a 2011 base salary for Mr. Ozeroff of $266,770 and a 2012 base salary of $240,093 as a measure to preserve the Company s available capital.

On March 26, 2012, the Compensation Committee approved a 2011 cash bonus for Mr. Ozeroff in the amount of $35,214 for partial achievement of the Company s 2011 performance goals. Specifically, the Board determined that the Company had achieved certain of its 2011 performance goals during the fiscal year 2011 by maintaining Nasdaq listing requirements, meeting Company budget goals and by achieving certain product development goals, and had engaged in substantial efforts towards achieving the goal to advance the Company s Gencaro atrial fibrillation regulatory approval process. However, due to the Company s limited financial resources, the Board concluded that the Company would pay cash bonuses for partial achievement of the 2011 performance goals during the 2012 fiscal year upon the achievement of the AF Milestone. Upon achievement of the AF Milestone, Mr. Ozeroff s deferred 2011 cash bonus will be paid. No bonuses were paid to Mr. Ozeroff in 2012 as a measure to preserve the Company s available capital.

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If the Company terminates Mr. Ozeroff s employment without cause, or if Mr. Ozeroff terminates his employment with good reason (as these terms are defined in his employment agreement), the Company has agreed to pay Mr. Ozeroff a severance payment equivalent to (i) 12 months of his base salary (if such termination occurs on the same day as or within thirteen months after a change of control of the Company), (ii) a pro rata portion of any bonus compensation under any employee bonus plan that has been approved by the Board of Directors payable to him for the fiscal year in which his employment terminated to be paid at the same time that such incentive bonus would have been paid had the termination not occurred, and (iii) reimbursement to cover out-of-pocket costs to continue group health insurance benefits under COBRA for 12 months, whether he elects or is eligible to receive COBRA (provided, that even if he does not elect or is not eligible to receive COBRA, he will receive the equivalent of such out-of-pocket expenses paid by him not to exceed the costs that the benefits would equal under COBRA if he were so eligible). In addition, ARCA may elect in its sole discretion, to pay additional severance equal to up to 12 months of base salary, which additional payment would extend the covenants and obligations under Mr. Ozeroff s Employee Intellectual Property, Confidentiality and Non-Compete Agreement for such additional period. The severance payment is conditioned on the execution by Mr. Ozeroff of a legal release in a form acceptable to the Company. A termination for cause includes willful misconduct, gross negligence, theft, fraud, or other illegal or dishonest conduct, any of which are considered to be materially harmful to the Company; refusal, unwillingness, failure, or inability to perform material job duties or habitual absenteeism; or violation of fiduciary duty, violation of any duty of loyalty, or material breach of any material term of the employment agreement or the Employee Intellectual Property, Confidentiality and Non-Compete Agreement, or any other agreement, with the Company. Good reason includes a relocation of normal work location greater than 30 miles; a decrease in current base salary by more than 15%, with certain exceptions; and the Company s unilateral decision to significantly and detrimentally reduce Mr. Ozeroff s job responsibilities.

Non-Equity Incentive Plan Compensation

In February 2007, the Compensation Committee and the Board of Directors of ARCA established a bonus structure for its entire executive team. The philosophy employed was to create incentives for the executive officers to achieve key corporate goals. The Compensation Committee retained discretion to change the bonus structure and the bonus payment amounts as it considered appropriate.

For incentive bonuses tied to 2012 performance, the Compensation Committee and Board of Directors approved a similar bonus structure as they approved for 2011. For 2012 performance, the Compensation Committee of the Board of Directors set a potential bonus target of 50% of base salary for Dr. Bristow and 30% of base salary for Mr. Wheeler and Mr. Ozeroff. For incentive bonuses tied to ARCA s 2012 performance, the Compensation Committee approved a set of weighted goals, which the Board of Directors of ARCA believed were attainable with a very high level of executive performance and would be challenging to achieve. These goals included:

- obtaining funding for the atrial fibrillation clinical trial;
- completing the planning and regulatory process for the atrial fibrillation clinical trial;
- obtaining government or partner support for another clinical study;
- complying with securities laws and stock exchange listing requirements applicable to public companies;
- developing additional product candidates;

The Compensation Committee and Board of Directors reviewed the 2012 corporate goals described above and determined that they had not sufficiently been achieved and therefore no bonuses were paid.

The Compensation Committee and Board of Directors have not approved a bonus structure or goals for 2013.

Equity Incentive Compensation

The option awards reported in the table above were granted to the Executives in 2011. Each of the option awards were priced at $2.24, the market closing price on the date of grant. These awards vest in monthly installments through May 20, 2014 and have an acceleration provision in

the event of a Change of Control of the Company. Upon a Change in Control of the Company, the vesting of these option grants accelerates as follows:

a) Fifty percent (50%) of the unvested option shares become fully vested and exercisable upon the closing date of such Change in Control and any remaining unvested option shares continue to vest according to the original vesting schedule, and

b) Upon the one year anniversary of the closing of the Change of Control, or the Executive s involuntary termination, whichever occurs first, the remaining unvested option shares shall become fully vested and exercisable.

Other Elements of Executive Compensation Program

The remaining elements of the Company s executive compensation program, like its broader employee compensation programs, are intended to make the Company s overall compensation program competitive with those of its peer companies, keeping in mind the constraints imposed by the Company s reliance on capital markets as a primary source of cash. The remaining elements of the Company s executive compensation program, (401(k) Plan, Medical, Dental, and Vision Plans, Life and Disability Insurance) are available to all Company employees.

OUTSTANDING EQUITY AWARDS AT FISCAL YEAR END

The following table shows for the fiscal year ended December 31, 2012, certain information regarding outstanding equity awards at fiscal year end for the Named Executive Officers.

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OUTSTANDING EQUITY AWARDS AT DECEMBER 31, 2012

A description of the equity incentive plans we maintain is set forth in Note 9 to the Company s consolidated financial statements included in our annual report on Form 10-K for the year ended December 31, 2012 and filed with the SEC on March 21, 2013.

	Number of Securities Underlying Unexercised options (#) Exercisable	Number of Securities Underlying Unexercised options (#) Unexercisable	Option Exercise Price ($)	Option Expiration Date
Michael Bristow, President and Chief Executive Officer	4,087	87(1)	33.42	1/23/2019
	2,518	148(6)	17.82	2/18/2020
	2,638	2,362(7)	13.44	5/20/2021
Patrick Wheeler, Chief Financial Officer	835	(5)	5.40	8/3/2016
	278	(4)	10.80	5/3/2017
	4,035	(3)	11.16	2/12/2018
	2,916	417(2)	17.40	6/25/2019
	953	21(1)	33.42	1/23/2019
	1,007	59(6)	17.82	2/18/2020
	1,759	1,574(7)	13.44	5/20/2021
Christopher Ozeroff, Senior Vice President and General Counsel	1,007	59(6)	17.82	2/18/2020
	1,759	1,574(7)	13.44	5/20/2021

(1) Options vest in monthly installments through January 23, 2013
(2) Options vest in monthly installments through June 25, 2013
(3) Options vest in quarterly installments through February 12, 2012
(4) Options vest in quarterly installments through May 3, 2011
(5) Options vest in quarterly installments through July 31, 2010
(6) Options vest in monthly installments through February 18, 2013
(7) Options vest in monthly installments through May 20, 2014

DIRECTOR COMPENSATION

The following table shows for the fiscal year ended December 31, 2012 certain information with respect to the compensation of all non-employee directors of the Company:

DIRECTOR COMPENSATION FOR FISCAL 2012 (1)

	Fees Earned or Paid in Cash ($)	Stock Awards($)	Non-Equity Incentive Plan Compensation ($)	Nonqualified Deferred Compensation Earnings ($)	All Other Compensation ($)	Option Awards ($)	Total ($)
Jean-Francois Formela, M.D. (2)	17,500					5,457	22,957
Lind Grais, M.D. (3)	30,000					5,457	35,457
Burton E. Sobel, M.D. (4)(7)	22,500					5,457	27,957
John L. Zabriskie, Ph.D (5)	26,250					5,457	31,707
Richard B. Brewer (6)	22,500					5,457	27,957

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(1) See Summary Compensation Table for disclosure related to Dr. Michael Bristow
(2) The aggregate number of options awards outstanding at December 31, 2012 for Dr. Formela was 3,027
(3) The aggregate number of options awards outstanding at December 31, 2012 for Dr. Grais was 3,000
(4) The aggregate number of options awards outstanding at December 31, 2012 for Dr. Sobel was 3,479
(5) The aggregate number of options awards outstanding at December 31, 2012 for Dr. Zabriskie was 6,285
(6) On August 15, 2012 Richard Brewer passed away. The aggregate number of options awards outstanding at December 31, 2012 for Mr. Brewer was 32,767 and his estate has until August 15, 2013 to exercise the options
(7) On May 2, 2013 Burton Sobel passed away. The aggregate number of options awards outstanding at December 31, 2012 for Dr. Sobel was 3,479 and his estate has until May 2, 2014 to exercise the options

In 2012, nonemployee directors were compensated for their service on the Company s Board, as follows:

Each non-employee director is entitled to an annual retainer fee of $30,000;

As additional compensation for their services, each non-employee director, upon joining the Board, is entitled to an initial grant of options to purchase 1,250 shares of the Company s common stock under the ARCA biopharma, Inc. 2004 Equity Incentive Plan (the Option Plan) and an annual grant of an additional 583 shares of the Company s common stock under the Option Plan;

The Audit Committee chair is entitled to receive an additional $15,000 for service as the Audit Committee chair;

If a non-employee director serves as the chair of any other Committee, that director is entitled to receive an additional $10,000 per chair and the Chairman of the Board is entitled to receive an additional $15,000;

Each of the members of the Audit Committee, other than the chair, is entitled to receive an additional $5,000 for his or her service on the Audit Committee;

For membership on any other Committee, except for the chair of such Committee, a non-employee director is entitled to receive an additional $5,000; and

The director designated as the Lead Independent Director is entitled to an annual fee of $10,000.

At the June 21, 2012 meeting of the Board of Directors, the Board agreed to forgo future Board payments for an indeterminate time as a measure to preserve the Company s available capital.

On February 10, 2012, Mr. Brewer, Dr. Formela, Dr. Sobel, Dr. Zabriskie and Dr. Grais each were granted options to purchase 1,166 shares of the Company s common stock under the Option Plan, 583 of which were compensation for service on the Board in 2011 and 583 of which were compensation for service rendered and to be rendered on the Board in 2012. The purchase price for these options was $6.00, which was equal to the closing price of the Company s common stock on the date of the grant on the Nasdaq Global Market (Nasdaq).

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PRINCIPAL STOCKHOLDERS

The following table sets forth certain information regarding the ownership of the Company s Common Stock as of March 31, 2013 by: (i) each director; (ii) each of our named executive officers; (iii) all executive officers and directors of the Company as a group; and (iv) all those known by the Company to be beneficial owners of more than five percent of its Common Stock. Unless otherwise noted below, the address of each beneficial owner listed on the table is c/o ARCA biopharma, Inc., 8001 Arista Place, Suite 430, Broomfield, CO 80021.

We have determined beneficial ownership in accordance with the rules of the Securities and Exchange Commission, or the SEC. Except as indicated by the footnotes below, we believe, based on the information furnished to us, that the persons and entities named in the table below have sole voting and investment power with respect to all shares of common stock that they beneficially own, subject to applicable community property laws. The table is based upon information supplied by officers, directors and principal stockholders and Schedules 13G or 13D filed with the SEC. For purposes of this table, certain of our outstanding warrants that may be exercisable for fractional shares have been rounded down to the nearest whole number.

In computing the number of shares of common stock beneficially owned by a person and the percentage ownership of that person, we deemed outstanding shares of common stock subject to options or warrants held by that person that are currently exercisable or exercisable within 60 days of March 31, 2013. We did not deem these shares outstanding, however, for the purpose of computing the percentage ownership of any other person.

The percentages below prior to the offering assume the issuance of all Preferred Stock and accompanying warrants offered by us in this offering and are based on 3,185,562 shares of our common stock outstanding as of March 31, 2013. The percentages below after the offering are based on 13,602,262 shares of our common stock to be outstanding immediately after the completion of this offering (assuming the conversion of 104,167 shares of Preferred Stock into 10,416,700 shares of common stock), which gives effect to the issuance of 104,167 shares of Preferred Stock in this offering.

Beneficial Owner	Shares Beneficially Owned	Percentage of Shares Beneficially Owned Before the Offering	Percentage of Shares Beneficially Owned After the Offering
Directors and Named Executive Officers			
Michael R. Bristow, M.D., Ph.D. (1) (2)	603,210	17.61%	4.36%
Patrick M. Wheeler (3)	13,229	*	*
Christopher D. Ozeroff (4)	28,759	*	*
Jean-Francois Formela, M.D. (5)	318,529	9.83%	2.33%
Linda Grais, M.D. (6)	2,999	*	*
Burton Sobel, M.D. (7)	3,477	*	*
John L. Zabriskie, Ph.D. (8)	48,171	1.50%	*
All current directors and executive officers as a group (7 persons) (10)	1,018,374	28.83%	7.30%
5% Stockholders			
Michael R. Bristow, M.D., Ph.D. (1)	603,210	17.61%	4.36%
Investocor Trust (2)	243,393	7.40%	1.78%
Atlas Venture Fund VII, L.P. (9)	315,503	9.74%	2.31%

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

(1) Includes the following owned by (i) Investocor Trust: (a) 139,082 shares and (b) 104,311 shares issuable upon the exercise of warrants, which warrants are immediately exercisable. Dr. Bristow is the sole trustee of Investocor Trust; (ii) NFS as Custodian for Michael Bristow s IRA: (a) 178,215 shares and (b) 124,750 shares issuable upon the exercise of warrants, which warrants are immediately exercisable; and (iii) options to purchase 10,173 shares that are exercisable within 60 days of March 31, 2013.

(2) Includes (a) 139,082 shares and (b) 104,311 shares issuable upon the exercise of warrants, which warrants are immediately exercisable. Dr. Bristow is the sole trustee of Investocor Trust.

(3) Includes options to purchase 12,673 shares that are exercisable within 60 days of March 31, 2013.

(4)

Includes (a) options to purchase 3,288 shares that are exercisable within 60 days of March 31, 2013, and (b) 7,934 shares issuable upon the exercise of warrants, which warrants are immediately exercisable.

(5) Includes the following owned directly by Atlas Venture Fund VII, L.P. (AV VII): (a) 263,256 shares and (b) 52,247 shares issuable upon exercise of warrants, which warrants are immediately exercisable. Atlas Venture Associates VII, L.P. (AVA VII LP) is the general partner of AV VII. Atlas Venture Associates VII, Inc (AVA VII Inc.) is the general partner of AVA VII LP. Each AVA VII LP and AVA VII Inc., may also be deemed to beneficially own these shares. Dr. Formela, a director at AV VII Inc., and one of the Company s directors may be deemed to beneficially own these shares. Dr. Formela disclaims beneficial ownership of these shares except to the extent of his pecuniary interest therein. Each of AV VII, AVA VII LP and AVA VII Inc. disclaims beneficial ownership of the shares except to the extent of its pecuniary interest therein. Also includes options to

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purchase 3,026 shares that are exercisable within 60 days of March 31, 2013. These options were granted to Dr. Formela and the proceeds of any sale of the Company s Common Stock issued to Dr. Formela upon the exercise of this option will be transferred to Atlas Venture Advisors, Inc. (Atlas Advisors) and therefore Dr. Formela disclaims beneficial ownership of such shares which belong to Atlas Advisors. The address for Dr. Formela is 25 First Street, Suite 303, Cambridge, MA 02141.

(6) Includes options to purchase 2,999 shares that are exercisable within 60 days of March 31, 2013.

(7) Includes options to purchase 3,477 shares that are exercisable within 60 days of March 31, 2013.

(8) Consists of (a) options to purchase 6,282 shares that are exercisable within 60 days of March 31, 2013 granted to Dr. Zabriskie, and (b) 26,021 shares and 15,868 shares issuable upon the exercise of warrants, which warrants are immediately exercisable, owned directly by Lansing Brown Investments, LLC. Dr. Zabriskie, one of the Company s directors, is the President of Lansing Brown Investments, LLC. Dr. Zabriskie has shared voting and dispositive powers over the shares held by Lansing Brown Investments, LLC. He disclaims beneficial ownership of these shares, except to the extent of his pecuniary interest in them.

(9) Consists of the following owned directly by Atlas Venture Fund VII, L.P., or AV VII, (a) 263,256 shares and (b) 52,247 shares issuable upon exercise of warrants, which warrants are immediately exercisable. AVA VII LP is the general partner of AVA VII. AV VII Inc. is the general partner of AVA VII LP. Each of AV VII, AVA VII LP, and AVA VII Inc. disclaims beneficial ownership of the shares except to the extent of its pecuniary interest therein. The address for Atlas Venture Fund VII, L.P. is 25 First Street, Suite 303, Cambridge, MA 02141.

(10) See Notes (1) through (8) above.

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DESCRIPTION OF SECURITIES

As of the date of this prospectus, our authorized capital stock consists of 100,000,000 shares of common stock, par value $0.001 per share, and 5,000,000 shares of preferred stock, par value $0.001 per share. As of March 31, 2013, 3,185,562 shares of our common stock were outstanding and no shares of our preferred stock were outstanding.

The following summary description of our capital stock is based on the provisions of our amended and restated certificate of incorporation and amended and restated bylaws and the applicable provisions of the Delaware General Corporation Law. This information may not be complete in all respects and is qualified entirely by reference to the provisions of our amended and restated certificate of incorporation, amended and restated bylaws and the Delaware General Corporation Law. For information on how to obtain copies of our amended and restated certificate of incorporation and amended and restated bylaws, which are exhibits to the registration statement of which this prospectus is a part, see Where You Can Find Additional Information.

Common Stock

Voting Rights. Each holder of our common stock is entitled to one vote for each share on all matters submitted to a vote of the stockholders, including the election of directors; provided, however, holders of our common stock may not, unless otherwise required by law, vote on any amendment to our amended and restated certificate of incorporation that relates solely to the terms of one or more series of preferred stock that we may issue if the holders of such preferred stock are entitled to vote on such amendment. In all such matters other than the election of directors, the affirmative vote of the majority of shares present in person, by remote communication, or represented by proxy at a meeting of the stockholders and entitled to vote generally on the subject matter shall be the act of the stockholders. Directors shall be elected by a plurality of the votes of the shares present in person, by remote communication, or represented by proxy at a meeting of the stockholders and entitled to vote generally on the election of directors. Our stockholders do not have cumulative voting rights in the election of directors. Accordingly, holders of a majority of the voting shares are able to elect all of the directors to be elected at any particular time.

Dividends. Subject to preferences that may be applicable to any then outstanding preferred stock, holders of our common stock are entitled to receive dividends, if any, as may be declared from time to time by our board of directors out of legally available funds.

Liquidation. In the event of our liquidation, dissolution or winding up, holders of our common stock will be entitled to share ratably in the net assets legally available for distribution to stockholders after the payment of all of our debts and other liabilities and the satisfaction of any liquidation preference granted to the holders of any then outstanding shares of preferred stock.

Rights and Preferences. Holders of our common stock have no preemptive, conversion, subscription or other rights, and there are no redemption provisions applicable to our common stock. The rights, preferences and privileges of the holders of our common stock are subject to and may be adversely affected by the rights of the holders of shares of any series of our preferred stock that we may designate in the future.

Fully Paid and Nonassessable. All of our outstanding shares of common stock are, and the shares of common stock to be issued in this offering will be, fully paid and nonassessable.

Warrants

As of the date of this prospectus, we had outstanding warrants to purchase an aggregate of 1,302,425 shares of our common stock, with a weighted average exercise price of $7.25 per share.

Preferred Stock

Our board of directors is authorized, subject to limitations prescribed by Delaware law, to issue preferred stock in one or more series, to establish from time to time the number of shares to be included in each series and to fix the designation, powers, preferences and rights of the shares of each series and any of its qualifications, limitations or restrictions. Our board of directors can also increase or decrease the number of shares of any series, but not below the number of shares of that series then outstanding, without any further vote or action by our stockholders. Our board of directors may authorize the issuance of additional preferred stock with voting or conversion rights that could adversely affect the voting power or other rights of the holders of the common stock or the Preferred Stock being offered in this offering. The issuance of additional preferred stock, while providing flexibility in connection with financings, possible acquisitions and other corporate purposes, could, among other things, have the effect of delaying, deferring, discouraging or preventing a change in control of our company, may adversely affect the market price of our common stock and the voting and other rights of the holders of common stock and Preferred Stock offered in this offering, and may reduce the likelihood that common stockholders or Preferred stockholders will receive dividend payments and payments upon liquidation.

Registration Rights

On October 22, 2012, ARCA sold approximately $325,000 of our common stock and warrants for common stock in a private placement transaction. ARCA issued to investors 137,530 shares of common stock together with warrants to purchase 103,148 shares of common stock. The net proceeds, after deducting offering expenses, were approximately $280,000, and these proceeds are being used solely for general working capital purposes. Each unit consisting of a share of common stock and a warrant to purchase 0.75 shares of common stock was sold at a purchase price of approximately $2.36 per unit.

The warrants were exercisable upon issuance, expire 5 years from the date of issuance, and have an exercise price of approximately $1.80 per share, equal to 100% of the closing sales price of ARCA s common stock on the Nasdaq Capital Market on October 22, 2012.

ARCA Director and Chief Executive Officer Dr. Michael Bristow, ARCA Director John Zabriskie, and ARCA Senior Vice President and General Counsel Chris Ozeroff were investors in the private placement. Atlas Venture, a current investor in the Company affiliated with ARCA Director Dr. Jean-Francois Formela, was also an investor in the private placement.

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On December 18, 2012, ARCA sold approximately $250,000 of our common stock and warrants for common stock in a private placement transaction with its Chief Executive Officer, Dr. Michael Bristow. ARCA issued 86,186 shares of common stock together with warrants to purchase 64,640 shares of common stock. The net proceeds, after deducting offering expenses were approximately $230,000, and these proceeds are being used solely for general working capital purposes. Each unit consisting of a share of common stock and a warrant to purchase 0.75 shares of common stock was sold at a purchase price of approximately $2.90 per unit.

The warrants were exercisable upon issuance, expire 5 years from the date of issuance, and have an exercise price of approximately $2.34 per share, equal to 100% of the closing sales price of ARCA s common stock on the Nasdaq Capital Market on December 18, 2012.

On January 22, 2013, ARCA sold approximately $1 million of its common stock and warrants for common stock in a private placement transaction with accredited investors and its Chief Executive Officer. ARCA issued 356,430 shares of common stock together with warrants to purchase 249,501 shares of common stock. The net proceeds, after deducting a placement agent fee and other offering expenses, were approximately $805,000, and these proceeds are being used solely for general working capital purposes. Each unit consisting of a share of common stock and a warrant to purchase 0.70 shares of common stock was sold at a purchase price of approximately $2.81 per unit.

The warrants were exercisable upon issuance, expire 7 years from the date of issuance, and have an exercise price of approximately $2.28 per share, equal to 100% of the closing bid price of ARCA s common stock on the Nasdaq Capital Market on January 22, 2013.

Pursuant to the terms of the Registration Rights Agreements (the Rights Agreements) entered into as part of each of these transactions, ARCA granted to the investors certain registration rights related to the shares underlying the units sold in these private placements. ARCA filed a registration statement, in accordance with the terms of the Rights Agreements, for the resale of the shares underlying the units sold in these private placements. That registration statement was declared effective by the Securities and Exchange Commission on February 14, 2013.

The foregoing is only a brief description of the material terms of the private placements and the associated Purchase Agreements, the Rights Agreements and the Warrants and does not purport to be a complete description of the rights and obligations of the parties hereunder. The foregoing is qualified in its entirety by reference to the forms of Purchase agreements the forms of Rights Agreements and forms of Warrants, which were filed as Exhibits to our reports on Forms 8K filed October 23, 2012, December 19, 2012 and January 23, 2013, respectively.

Anti-takeover effects of provisions of our certificate of incorporation and bylaws and Delaware law

Certificate of incorporation and bylaws. Our amended and restated certificate of incorporation and amended and restated bylaws include a number of provisions that may deter or impede hostile takeovers or changes of control or management. These provisions include:

Issuance of undesignated preferred stock. Under our amended and restated certificate of incorporation, our board of directors has the authority, without further action by the stockholders, to issue up to 5,000,000 shares of undesignated preferred stock with rights and preferences, including voting rights, designated from time to time by the board of directors. The existence of authorized but unissued shares of preferred stock enables our board of directors to make it more difficult or to discourage an attempt to obtain control of us by means of a merger, tender offer, proxy contest or otherwise. The Preferred Stock being offered by us in this offering is being designated out of the 5,000,000 shares of previously undesignated preferred stock and therefore approximately 4.9 million shares of such undesignated preferred stock remains available for future issuance.

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Classified board. Our amended and restated certificate of incorporation provides for a classified board of directors consisting of three classes of directors, with staggered three-year terms. Only one class of directors will be elected at each annual meeting of our stockholders, with the other classes continuing for the remainder of their respective three-year terms. This provision may have the effect of delaying a change in control of the board.

Board of directors vacancies. Our amended and restated certificate of incorporation and amended and restated bylaws authorize only our board of directors to fill vacant directorships, unless our board of directors determines by resolution that the stockholders shall fill such vacant directorships. In addition, the number of directors constituting our board of directors may be set only by resolution adopted by a majority vote of our entire board of directors. These provisions prevent a stockholder from increasing the size of our board of directors and gaining control of our board of directors by filling the resulting vacancies with its own nominees.

Stockholder action; special meetings of stockholders. Our amended and restated certificate of incorporation provides that our stockholders may not take action by written consent, but may only take action at annual or special meetings of our stockholders. Stockholders will not be permitted to cumulate their votes for the election of directors. Our amended and restated bylaws further provide that special meetings of the stockholders may be called by the chief executive officer, president, the board of directors, or by holders of common stock who hold, in the aggregate, not less than fifty percent (50%) of the outstanding shares of Common Stock for the purpose or purposes stated in the call of the meeting. These provisions may prevent stockholders from corporate actions as stockholders at times when they otherwise would like to do so.

Advance notice requirements for stockholder proposals and director nominations. Our amended and restated bylaws provide advance notice procedures for stockholders seeking to bring business before our annual meeting of stockholders, or to nominate candidates for election as directors at our annual meeting of stockholders. Our bylaws also specify certain requirements as to the form and content of a stockholder s notice. These provisions may make it more difficult for our stockholders to bring matters before our annual meeting of stockholders or to nominate directors at our annual meeting of stockholders.

These provisions are intended to enhance the likelihood of continued stability in the composition of our board of directors and its policies and to discourage certain types of transactions that may involve an actual or threatened acquisition of us. These provisions are designed to reduce our vulnerability to an unsolicited acquisition proposal. The provisions also are intended to discourage certain tactics that may be used in proxy fights. However, these provisions could have the effect of discouraging others from making tender offers for our shares and, as a consequence, they may also reduce fluctuations in the market price of our shares that could result from actual or rumored takeover attempts.

Section 203 of the Delaware General Corporation Law

We are subject to Section 203 of the Delaware General Corporation Law. Section 203 generally prohibits certain Delaware corporations from engaging, under certain circumstances, in a business combination with any interested stockholder for a period of three years following the time that such stockholder became an interested stockholder, unless:

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

Section 203 defines a business combination to include:

any merger or consolidation involving the corporation and the interested stockholder;

any sale, lease, exchange, mortgage, pledge, transfer or other disposition (in one transaction or a series of transactions) involving the interested stockholder of 10% or more of the assets of the corporation (or its majority-owned subsidiary);

subject to exceptions, any transaction that results in the issuance or transfer by the corporation of any stock of the corporation to the interested stockholder;

subject to exceptions, any transaction involving the corporation that has the effect, directly or indirectly, of increasing the proportionate share of the stock or any class or series of the corporation beneficially owned by the interested stockholder; and

the receipt by the interested stockholder of the benefit, directly or indirectly (except proportionately as a stockholder of such corporation), of any loans, advances, guarantees, pledges or other financial benefits, other than certain benefits set forth in Section 203, provided by or through the corporation.

In general, Section 203 defines an interested stockholder as any entity or person beneficially owning 15% or more of the outstanding voting stock of the corporation and any entity or person that is an affiliate or associate of such entity or person.

A Delaware corporation may opt out of these provisions with an express provision in its original certificate of incorporation or an express provision in its certificate or incorporation or bylaws resulting from a stockholders amendment approved by a majority of the outstanding voting shares. We have not opted out of these provisions and do not plan to do so. The statute could prohibit or delay mergers or other takeover or change in control attempts and, accordingly, may discourage attempts to acquire us.

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PREFERRED STOCK BEING ISSUED IN THIS OFFERING

The following summary of certain terms and provisions of the Preferred Stock offered in this offering is subject to, and qualified in its entirety by reference to, the terms and provisions set forth in our certificate of designation of preferences, rights and limitations of the Preferred Stock, which has been filed as an exhibit to the registration statement of which this prospectus is a part.

Subject to the limitations prescribed by our certificate of incorporation, our board of directors is authorized to establish the number of shares constituting each series of preferred stock and to fix the designations, powers, preferences and rights of the shares of each of those series and the qualifications, limitations and restrictions of each of those series, all without any further vote or action by our stockholders. Our board of directors has designated 120,000 of the 5,000,000 authorized shares of preferred stock as Series A Convertible Preferred Stock. When issued, the shares of Preferred Stock will be validly issued, fully paid and non-assessable.

The Preferred Stock will rank:

- senior to all of our common stock;
- senior to any class or series of our capital stock specifically ranking by its terms junior to the Preferred Stock;
- on parity with any class or series of our capital stock specifically ranking by its terms on parity with the Preferred Stock; and
- junior to any class or series of our capital stock specifically ranking by its terms senior to the Preferred Stock;

in each case, as to distributions of assets upon our liquidation, dissolution or winding up whether voluntarily or involuntarily.

Each share of our Preferred Stock is convertible into 100 shares of our common stock (subject to adjustment as provided in the related certificate of designation of preferences) at any time at the option of the holder, provided that the holder will be prohibited from converting Preferred Stock into shares of our common stock if, as a result of such conversion, the holder, together with its affiliates, would beneficially own more than 9.99% of the total number of shares of our common stock then issued and outstanding.

In the event of our liquidation, dissolution, or winding up, holders of our Preferred Stock will receive a payment equal to $0.001 per share of Preferred Stock before any proceeds are distributed to the holders of our common stock. In addition, each share of Preferred Stock will be entitled to receive, on an as-if-converted basis, pari passu with each share of our common stock, any distributions of our assets or surplus funds which we make upon shares of our common stock.

Shares of Preferred Stock will have no voting rights, except as required by law.

Except for stock dividends or certain other distributions set forth in the certificate of designation, shares of Preferred Stock will be entitled to receive dividends (on an as-converted basis) in the same form as dividends actually paid on shares of our common stock when and if declared by our board of directors.

We are not obligated to redeem or repurchase any shares of Preferred Stock. Shares of Preferred Stock are not otherwise entitled to any redemption rights, or mandatory sinking fund or analogous fund provisions.

We do not plan on making an application to list the Preferred Stock on The NASDAQ Capital Market, any national securities exchange or other nationally recognized trading system. We expect the common stock issuable upon conversion of the Preferred Stock will be listed on The NASDAQ Capital Market.

Shares of Preferred Stock will be issued in book-entry form under a transfer agency and service agreement between Computershare Trust Company, N.A., as transfer agent, and us, and shall initially be represented by one or more book-entry certificates deposited with The Depository Trust Company, or DTC, and registered in the name of Cede & Co., a nominee of DTC, or as otherwise directed by DTC.

You should review a copy of the certificate of designation of the Preferred Stock, which has been filed as an exhibit to the registration statement of which this prospectus is a part, for a complete description of the terms and conditions of the Preferred Stock.

WARRANTS BEING ISSUED IN THIS OFFERING

The following summary of certain terms and provisions of the warrants offered in this offering is subject to, and qualified in its entirety by reference to, the terms and provisions set forth in the warrants.

We are offering warrants to purchase up to 5,208,350 shares of our common stock to purchasers in this offering and these warrants specify an exercise price of $ per share. The warrants are exercisable immediately upon issuance and have an exercise term equal to 5 years. The exercise of the warrants is subject to certain exercise limitations, such that the holder may not exercise the warrants if such exercise results in the holder (or any of its affiliates) becoming the beneficial owner of more than 9.99% of the number of shares of common stock outstanding immediately after giving effect to such exercise.

The warrants provide for the adjustment of the exercise price and number of shares issuable upon exercise of the warrants in connection with stock dividends and splits, such that the number of shares issuable upon exercise of the warrant is adjusted in proportion to the change in the number of the number of shares outstanding and the aggregate exercise price of the warrant remains unchanged. In addition, if we distribute to all holders of common stock (and not the holder of the warrant) evidences of our indebtedness or assets (including cash and cash dividends) or rights or warrants to purchase any security (other than with respect to stock dividends and splits), the exercise price of the warrant will be adjusted downward in proportion to the fair market value of such distributions and the number of shares issuable upon exercise of the warrant will be adjusted such that the aggregate exercise price of the warrant remains unchanged. Other than as described above, the warrants do not contain anti-dilution provisions.

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If we merge or consolidate with or into another entity, sell or otherwise dispose of substantially all of our assets, consummate any stock purchase offer, tender offer or exchange offer pursuant to which the holders of our common stock are permitted to sell, tender or exchange their shares for other securities, cash or property and which has been accepted by at least 50% of our outstanding common stock, or if we effect any reclassification, reorganization or recapitalization of our common stock, or upon the consummation of a stock purchase agreement whereby more than 50% of the outstanding shares of our common stock are acquired by another person or entity, then, upon any subsequent exercise of a warrant, the holder of such warrant will have the right to receive, for each share of common stock underlying such warrant that would have been issuable upon such exercise immediately prior to the transaction, the number of shares of the common stock of our successor or acquirer, and any additional consideration receivable as a result of such transaction by a holder of the number of shares of common stock for which the warrant is exercisable immediately prior to such transaction.

If the holders of common stock are given any choice as to the securities, cash or property to be received in such a fundamental transaction, the holders of the warrants shall be given the same choice as to any alternate consideration they are to receive upon any exercise of the warrants following such fundamental transaction. The terms of any agreement pursuant to which a fundamental transaction of the type described above is to be effected must include terms requiring any successor or surviving entity to comply with the provisions summarized above such that the warrants will be similarly adjusted upon any subsequent transaction analogous to a fundamental transaction of the types described above. The warrants provide for settlement of the warrants in unregistered shares should an effective registration statement not be in place at the time a warrant is exercised.

In addition, we have agreed to issue to the placement agent warrants to purchase up to an aggregate of 5% of the aggregate number of shares of common stock issuable upon conversion of the Preferred Stock sold in this offering. The placement agent warrants shall have the same terms as the warrants issued to the purchasers in the offering, except that the exercise price shall be 125% of the public offering price per common share and warrant combination and the expiration date shall be five years from the effective date of the registration statement of which this prospectus forms a part. The placement agent warrants do not have antidilution protections and the warrants and underlying warrant shares are not transferable for 180 days from the date of the commencement of sales of the offering except as allowed by FINRA Rule 5110(g). The warrants and the shares underlying the warrants issuable to the placement agent in the offering are not being registered under the registration statement of which this prospectus forms a part.

The warrants will be issued in book-entry form under a warrant agency agreement between Computershare Trust Company, N.A., as warrant agent, and us, and shall initially be represented by one or more book-entry certificates deposited with The Depository Trust Company, or DTC, and registered in the name of Cede & Co., a nominee of DTC, or as otherwise directed by DTC.

You should review a copy of the warrant agency agreement and the form of warrant, each of which has been filed as an exhibit to the registration statement of which this prospectus is a part, for a complete description of the terms and conditions of the warrants and the warrant agency agreement.

Transfer Agent, Warrant Agent and Registrar

The transfer agent and registrar for our common stock and Preferred Stock being offered in this offering, and the warrant agent for the warrants being offered in this offering, is Computershare Trust Company, N.A. Its address is 250 Royall Street, Canton, MA 02021.

Listing on The NASDAQ Capital Market

Our common stock is listed on The NASDAQ Capital Market under the symbol ABIO .

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CERTAIN RELATIONSHIPS AND RELATED PARTY TRANSACTIONS

Certain Transactions With or Involving Related Persons

The following is a summary of transactions since January 1, 2012 to which we have been a party in which the amount involved exceeded the lesser of $120,000 or one percent of the average of our total assets at fiscal years ended 2011 and 2012, and in which any of our executive officers, directors or holders of more than 5% of our capital stock, or any member of the immediate family of any of the foregoing persons, had or will have a direct or indirect material interest, other than compensation arrangements previously reported in our Annual Report on Form 10-K for the year ended December 31, 2012, as amended on April 18, 2013, which is incorporated by reference in this prospectus.

The Private Placements

The following tables summarize private placement purchases of our common stock and warrants by our executive officers, directors or holders of more than 5% of our capital stock, or any member of the immediate family of any of the foregoing persons and their affiliated entities.

October 2012 PIPES Offering	Name of Purchaser	Dollars Invested	Post-Split Shares	Post-Split Warrant Shares
5% shareholder and Affiliate	Atlas Venture Fund VII, L.P. Jean Francios Formela, Director	$ 125,000.00	52,896	39,672
5% shareholder and Affiliate	Investocor Trust Dr. Michael Bristow, M.D., Ph.D., CEO and Director	$ 125,000.00	52,896	39,672
Affiliate	Lansing Brown Investments, LLC John L. Zabriskie, Ph.D. Director	$ 50,000.00	21,159	15,868
Affiliate	Christopher D. Ozeroff	$ 25,000.00	10,579	7,934

On October 22, 2012, we entered into a subscription agreement with certain investors named in the table above pursuant to which we agreed to sell 137,530 units, with each unit consisting of one share of our common stock and a warrant to purchase 0.75 shares of our common stock. The warrants have an exercise price of approximately $1.80, became exercisable on October 25, 2012 and expire five years after becoming exercisable, unless earlier terminated. On October 25, 2012, we closed the private placement and received gross proceeds of approximately $325,000, before deduction of offering expenses. In connection with the closing of the private placement on October 25, 2012, we also entered into a registration rights agreement with the investors, pursuant to which we agreed to file a registration statement with the Securities Exchange Commission to register for resale the shares issued in the private placement and the shares issuable upon exercise of the warrants issued in the private placement. We filed such registration statement on Form S-3 (File No.333-186584) (the PIPE Registration Statement) which became effective on February 14, 2013.

December 2012 PIPES Offering	Name of Purchaser	Dollars Invested	Post-Split Shares	Post-Split Warrant Shares
5% shareholder and Affiliate	Investocor Trust Dr. Michael Bristow, M.D., Ph.D., CEO and Director	$ 250,000.00	86,186	64,639

On December 18, 2012, we entered into a subscription agreement with an investor named in the table above pursuant to which we agreed to sell 86,186 units, with each unit consisting of one share of our common stock and a warrant to purchase 0.75 shares of our common stock. The warrants have an exercise price of approximately $2.34, became exercisable on December 20, 2012 and expire five years after becoming exercisable, unless earlier terminated. On December 20, 2012, we closed the private placement and received gross proceeds of approximately $250,000, before deduction of offering expenses. In connection with the closing of the private placement, on December 20, 2012, we also entered into a registration rights agreement with the investor, pursuant to which we agreed to file a registration statement with the Securities Exchange Commission to register for resale the shares issued in the private placement and the shares issuable upon exercise of the warrants

issued in the private placement. We filed such registration statement, the PIPE Registration Statement, which became effective on February 14, 2013.

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Registered Direct Offerings

The following tables summarize registered direct offering purchases of our common stock and warrants by our executive officers, directors or holders of more than 5% of our capital stock, or any member of the immediate family of any of the foregoing persons and their affiliated entities.

August 2012 Registered

Direct Offering	Name of Purchaser	Dollars Invested	Post-Split Shares	Post-Split Warrant Shares
5% shareholder	Sabby Healthcare Volatility Master Fund, Ltd.	$ 333,333.76	142,086	106,564
5% shareholder	Sabby Volatility Warrant Master Fund, Ltd.	$ 166,666.10	71,042	53,282

On August 2, 2012, we sold approximately $953,000 of ARCA s common stock and warrants for common stock in a Registered Direct Offering under the Company s registration statement on Form S-3 (File No.333-172686) (the Registration Statement) in which we issued 406,099 shares of common stock and warrants to purchase 304,575 shares of common stock. The net proceeds, after deducting placement agent fees and other offering expenses payable by us, was approximately $741,000, and these proceeds are being used solely for general working capital purposes. Each unit, consisting of a share of common stock and a warrant to purchase 0.75 shares of common stock, was sold at a purchase price of $2.35 per unit, which was a 15 percent discount to the consolidated price of the stock and warrants, based on the closing bid price of $2.76 as reported on the NSADAQ Capital Market on August 2, 2012. The warrants become exercisable six months after issuance, expire 6 years thereafter, and have an exercise price of $2.76 per share, equal to 100% of the closing bid price of ARCA s common stock on the Nasdaq Capital Market on August 2, 2012. The Registered Direct Offering was effected as a takedown off the Registration Statement, which became effective on April 4, 2011, pursuant to a prospectus supplement filed with the Securities and Exchange Commission on August 3, 2012.

Policies and Procedures for Related Party Transactions

In January 2009, in conjunction with our merger with Nuvelo, Inc., our board of directors adopted an audit committee charter that provides that the audit committee will review and approve all related party transactions. Accordingly, all related party transactions are reviewed and approved by our audit committee, including the private placements described above. This review covers any material transaction, arrangement or relationship, or any series of similar transactions, arrangements or relationships, in which we were or are to be a participant, and a related party had or will have a direct or indirect material interest, including, purchases of goods or services by or from the related party or entities in which the related party has a material interest, indebtedness, guarantees of indebtedness and employment by us of a related party.

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PLAN OF DISTRIBUTION

We are offering up to 104,167 shares of our Preferred Stock and warrants to purchase up to 5,208,350 shares of our common stock (and the common stock issuable from time to time upon conversion of the Preferred Stock and upon exercise of each of the warrants) to purchasers in this offering. The Preferred Stock and warrants are immediately separable and will be issued separately. However, there is no minimum offering amount required as a condition to closing and we may sell significantly fewer shares of Preferred Stock and warrants in the offering. The offering will terminate on , 2013, unless the offering is fully subscribed before that date or we decide to terminate the offering prior to that date.

The Subscription Agreement entered into with investors in the January 2013 Private Placement, which has previously been filed by us as an exhibit to the Form 8-K on January 23, 2013, grants to each of those investors, until the earlier of the twelve month anniversary of the Subscription Agreement or the date whereby we generate aggregate gross proceeds in excess of $10 million in new funding from the issuance of equity or equity-linked securities, the right to participate in any financing by us through an issuance of our common stock for cash, indebtedness or a combination thereof, up to an amount equal to 50% of such financing and on the same pricing and other terms and conditions as such financing. As a result, each of the investors in the January 2013 Private Placement may choose to acquire up to 50% of the securities issued in the offering. Following the effectiveness of this registration statement, the investors in the January 2013 Private Placement will be offered the right to acquire such portion of the securities offered by us in this offering.

In determining the offering price of the Preferred Stock and the exercise price of the warrants, we will consider a number of factors including, but not limited to, the current market price of our common stock, trading prices of our common stock over time, the illiquidity and volatility of our common stock, our current financial condition and the prospects for our future cash flows and earnings, and market and economic conditions at the time of the offering. Once the offering price is determined, the offering price for the Preferred Stock and the exercise price of the warrants will remain fixed for the duration of the offering.

Dawson James Securities, Inc., referred to as the placement agent or Dawson, has entered into a placement agent agreement with us in which it has agreed to act as lead placement agent in connection with the offering. The Placement Agent may retain other brokers or dealers to act as sub-agents or selected-dealers on its behalf in connection with the offering. The placement agent is not purchasing or selling the securities offered by us, and is not required to sell any specific number or dollar amount of securities, but will assist us in this offering on a reasonable best efforts basis. Subject to the terms and conditions contained in the placement agent agreement, the placement agent is using its reasonable best efforts to introduce us to investors which will purchase the securities. The placement agent agreement terminates upon the closing of the offering and further provides that the agreement may be terminated by the placement agent or us at any time upon ten days prior written notice.

We have agreed to pay Dawson a placement fee equal to 6.0% of the aggregate gross proceeds to us from the sale of the securities in the offering and, subject to compliance with FINRA Rule 5110(f)(2)(D), a non-accountable expense allowance equal to 1.75% of the aggregate gross proceeds to us from the sale of the securities in the offering and an accountable legal expense allowance in the amount of $30,000. In addition, we have agreed to issue to the placement agent, warrants to purchase up to an aggregate of 5% of the aggregate number of shares of common stock issuable upon conversion of the Preferred Stock sold in this offering. We estimate total expenses of this offering, excluding the placement agent fees, will be approximately $767,000. The following table shows the per share and total fees we will pay to the placement agent assuming the sale of all of the shares and warrants offered pursuant to this prospectus.

Per share	$
Total	$

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In addition to the cash fees set forth above, we have agreed to issue to the placement agent, or its designees as permitted by FINRA Rule 5110(g), warrants to purchase up to an aggregate of 5.0% of the aggregate number of shares of common stock issuable upon conversion of the Preferred Stock sold in this offering (excluding any shares of common stock issuable upon exercise of the warrants). The placement agent warrants shall have substantially the same terms as the warrants offered by this prospectus, except that the exercise price shall be 125% of the public offering price per common share and warrant combination, or $ per share and warrant combination, and the expiration date shall be five years from the effective date of the registration statement of which this prospectus forms a part. Pursuant to FINRA Rule 5110(f)(2)(H)(vi), the placement agent warrants will not have anti-dilution protections. Pursuant to FINRA Rule 5110(g)(1), neither the placement agent warrants nor any shares of common stock issued upon exercise of the placement agent warrants may be sold, transferred, assigned, pledged, or hypothecated, or be subject to any hedging, short sale, derivative, put, or call transaction that would result in the effective economic disposition of such securities by any person for a period of 180 days immediately following the date of effectiveness or commencement of sales of this offering, except the transfer of any security: (i) by operation of law or by reason of reorganization, (ii) to any FINRA member firm participating in the offering and the officers and partners thereof, if all securities so transferred remain subject to the lock-up restriction described above for the remainder of the time period, (iii) if the aggregate amount of our securities held by the placement agent or related person does not exceed 1% of the securities being offered, (iv) that is beneficially owned on a pro-rata basis by all equity owners of an investment fund, provided that no participating member manages or otherwise directs investments by the fund, and participating members in the aggregate do not own more than 10% of the equity in the fund, or (v) the exercise or conversion of any security, if all securities received remain subject to the lock-up restriction set forth above for the remainder of the time period. The warrants and the shares underlying the warrants issuable to the placement agent in the offering are not being registered under the registration statement of which this prospectus forms a part. Because there is no minimum offering amount required as a condition to closing, the actual total proceeds received by us and total offering commissions and warrants issuable to the placement agent, if any, are not presently determinable and may be substantially less than the maximum amount set forth above.

We have agreed to indemnify the placement agent against certain liabilities under the Securities Act of 1933, as amended. The placement agent may be deemed to be an underwriter within the meaning of Section 2(a)(11) of the Securities Act, and any commissions received by it and any profit realized on the resale of the securities sold by it while acting as principal might be deemed to be underwriting discounts or commissions under the Securities Act.

As an underwriter, the placement agent would be required to comply with the Securities Act and the Securities Exchange Act of 1934, as amended, including without limitation, Rule 10b-5 and Regulation M under the Exchange Act. These rules and regulations may limit the timing of purchases and sales of shares of common stock and warrants by the placement agent acting as principal. Under these rules and regulations, the placement agent:

- may not engage in any stabilization activity in connection with our securities; and
- may not bid for or purchase any of our securities or attempt to induce any person to purchase any of our securities, other than as permitted under the Exchange Act, until it has completed its participation in the distribution.

For more information on our arrangement with Dawson, you should review a copy of the placement agent agreement we have entered into with Dawson, which has been filed as an exhibit to the registration statement of which this prospectus is a part.

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LEGAL MATTERS

The validity of the Preferred Stock and warrants offered by this prospectus will be passed upon for us by Cooley LLP, Broomfield, Colorado. Ellenoff Grossman & Schole LLP, New York, New York is counsel to the placement agent in connection with this offering.

EXPERTS

The consolidated financial statements of ARCA biopharma, Inc. (a development stage enterprise) and subsidiaries (the Company) as of December 31, 2012 and 2011, and for each of the years in the two year period ended December 31, 2012, and for the period from Inception (December 17, 2001) through December 31, 2012, have been incorporated by reference herein and in the registration statement in reliance upon the report of KPMG LLP, independent registered public accounting firm, incorporated by reference herein, and upon the authority of said firm as experts in accounting and auditing.

The audit report covering the December 31, 2012, consolidated financial statements contains an explanatory paragraph that states that the Company s recurring losses from operations and its dependence upon raising additional funds from strategic transactions, sales of equity, and/or issuance of debt raise substantial doubt about the entity s ability to continue as a going concern. The consolidated financial statements do not include any adjustments that might result from the outcome of that uncertainty.

WHERE YOU CAN FIND ADDITIONAL INFORMATION

Any person to whom this prospectus is delivered may request copies of this prospectus and any related amendments or supplements, without charge, by written or telephonic request directed to Corporate Secretary, 8001 Arista Place, Suite 430, Broomfield, Colorado; telephone: (720) 940-2200.

We have filed with the SEC a registration statement on Form S-1 under the Securities Act with respect to the shares of our common stock offered under this prospectus. This prospectus does not contain all of the information set forth in the registration statement and the accompanying exhibits. Some items included in the registration statement are omitted from this prospectus in accordance with the rules and regulations of the SEC. For further information with respect to us and the common stock offered in this prospectus, we refer you to the registration statement and the accompanying exhibits. Statements contained or incorporated by reference in this prospectus as to the contents of any contract, agreement or any other document are summaries of the material terms of these contract, agreement or other document. With respect to each of these contracts, agreements or other documents filed as an exhibit to the registration statement, reference is made to such exhibit for a more complete description of the matter involved. A copy of the registration statement, and the accompanying exhibits, may be inspected without charge and copied 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 operation of the Public Reference Room. The SEC maintains a web site that contains reports, proxy and information statements and other information regarding registrants that file electronically with the SEC. The address of the SEC s website is http://www.sec.gov.

In addition, all of the documents incorporated by reference into this registration statement may be accessed via the Internet at our website: http://www.arcabiopharma.com. Our website, and the information contained on the website, is not incorporated into and are not part of this prospectus. You may access our annual reports on Form 10-K, quarterly reports on Form 10-Q, current reports on Form 8-K and amendments to those reports filed or furnished pursuant to Section 13(a) or 15(d) of the Exchange Act with the SEC free of charge at our website as soon as reasonably practicable after such material is electronically filed with, or furnished to, the SEC.

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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.000-22873):

- our annual report on Form 10-K for the year ended December 31, 2012, filed with the SEC on March 21, 2013, as amended on April 18, 2013;
- our quarterly report on Form 10-Q for the quarterly period ended March 31, 2013, filed with the SEC on May 13, 2013; and
- our current reports on Form 8-K filed with the SEC on January 3, 2013, January 23, 2013, January 30, 2013, February 1, 2013, February 6, 2013, February 28, 2013, March 5, 2013, March 25, 2013, April 22, 2013 and April 23, 2013.

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 Patrick Wheeler, Chief Financial Officer, ARCA biopharma, Inc., 8001 Arista Place, Suite 430, Broomfield, CO 80021; telephone: (720) 940-2200.

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

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104,167 Shares of Series A Convertible Preferred Stock

10,416,700 Shares of Common Stock Underlying the Preferred Stock

Warrants to Purchase up to 5,208,350 Shares of Common Stock and

5,208,350 Shares of Common Stock Underlying the Warrants

PRELIMINARY PROSPECTUS

, 2013

Dawson James Securities, Inc.

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PART II

INFORMATION NOT REQUIRED IN PROSPECTUS

Item 13. Other Expenses of Issuance and Distribution

The following table sets forth the fees and expenses, other than estimated placement agent s fees, payable in connection with the registration of the Preferred Stock hereunder. All amounts are estimates except the SEC registration fee and the FINRA filing fee.

	Amount Paid or to be Paid
SEC registration fee	$ 4,774
FINRA filing fee	3,500
NASDAQ Stock Market listing fee	104,167
Printing expenses	20,000
Legal fees and expenses	210,000
Accounting fees and expenses	26,000
Transfer agent and registrar fees	5,000
Placement Agent non-accountable expense allowance	350,000
Miscellaneous expenses	43,605
Total	$ 767,000

Item 14. Indemnification of Directors and Officers

Section 145 of the Delaware General Corporation Law permits a corporation to include in its charter documents, and in agreements between the corporation and its directors and officers, provisions expanding the scope of indemnification beyond that specifically provided by the current law.

The Registrant s amended and restated certificate of incorporation provides for the indemnification of directors to the fullest extent permissible under Delaware law.

The Registrant s amended and restated bylaws provide for the indemnification of officers, directors and third parties acting on the Registrant s behalf if such persons act in good faith and in a manner reasonably believed to be in and not opposed to the Registrant s best interest, and, with respect to any criminal action or proceeding, such indemnified party had no reason to believe his or her conduct was unlawful.

The Registrant has entered into indemnification agreements with each of its directors and executive officers, in addition to the indemnification provisions provided for in its charter documents, and the Registrant intends to enter into indemnification agreements with any new directors and executive officers in the future.

The Registrant maintains insurance on behalf of any person who is or was a director or officer against any loss arising from any claim asserted against him or her and incurred by him or her in that capacity, subject to certain exclusions and limits of the amount of coverage.

Item 15. Recent Sales of Unregistered Securities

Since January 1, 2012, the Registrant has issued and sold the following unregistered securities (share amounts and per share amounts have been retroactively adjusted to give effect to a 1-for-6 reverse stock split that became effective on March 4, 2013):

(a) Issuances of Capital Stock and Warrants

1. On October 22, 2012, ARCA sold approximately $325,000 of our common stock and warrants for common stock in a private placement transaction. ARCA issued to investors 137,530 shares of common stock together with warrants to purchase 103,148 shares of common stock. The net proceeds, after deducting offering expenses, were approximately $280,000, and these proceeds are being used solely for general working capital purposes. Each unit consisting of a share of common stock and a warrant to purchase 0.75 shares of common stock was sold at a purchase price of approximately $2.36 per unit.

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The warrants were exercisable upon issuance, expire 5 years from the date of issuance, and have an exercise price of approximately $1.80 per share, equal to 100% of the closing sales price of ARCA s common stock on the Nasdaq Capital Market on October 22, 2012. ARCA Director and Chief Executive Officer Dr. Michael Bristow, ARCA Director John Zabriskie, and ARCA Senior Vice President and General Counsel Chris Ozeroff were investors in the private placement. Atlas Venture, a current investor in the Company affiliated with ARCA Director Dr. Jean-Francois Formela, was also an investor in the private placement.

2. On December 18, 2012, ARCA sold approximately $250,000 of our common stock and warrants for common stock in a private placement transaction with its Chief Executive Officer, Dr. Michael Bristow. ARCA issued 86,186 shares of common stock together with warrants to purchase 64,640 shares of common stock. The net proceeds, after deducting offering expenses were approximately $230,000, and these proceeds are being used solely for general working capital purposes. Each unit consisting of a share of common stock and a warrant to purchase 0.75 shares of common stock was sold at a purchase price of approximately $2.90 per unit.

The warrants were exercisable upon issuance, expire 5 years from the date of issuance, and have an exercise price of approximately $2.34 per share, equal to 100% of the closing sales price of ARCA s common stock on the Nasdaq Capital Market on December 18, 2012.

3. On January 22, 2013, the ARCA sold approximately $1 million of its common stock and warrants for common stock in a private placement transaction with accredited investors and our Chief Executive Officer. ARCA issued 356,430 shares of common stock together with warrants to purchase 249,501 shares of common stock. The net proceeds, after deducting a placement agent fee and other offering expenses, were approximately $805,000, and these proceeds are being used solely for general working capital purposes. Each unit consisting of a share of common stock and a warrant to purchase 0.70 shares of common stock was sold at a purchase price of approximately $2.81 per unit.

The warrants were exercisable upon issuance, expire 7 years from the date of issuance, and have an exercise price of approximately $2.28 per share, equal to 100% of the closing bid price of ARCA s common stock on the Nasdaq Capital Market on January 22, 2013. Pursuant to the terms of the Registration Rights Agreements (the Rights Agreements) entered into as part of each of these transactions, ARCA granted to the investors certain registration rights related to the shares underlying the units sold in these private placements. ARCA filed a registration statement, in accordance with the terms of the Rights Agreements, for the resale of the shares underlying the units sold in these private placements. That registration statement was declared effective by the Securities and Exchange Commission on January 26, 2012.

The issuances of securities described above in paragraphs 1 through 3 were exempt from registration under the Securities Act of 1933, as amended, or the Securities Act, in reliance on Section 4(2) of the Securities Act, and Regulation D promulgated thereunder, as transactions by an issuer not involving any public offering. The purchasers of the securities in these transactions represented that they were accredited investors and that they were acquiring the securities for investment only and not with a view toward the public sale or distribution hereof. Such purchasers received written disclosures that the securities had not been registered under the Securities Act, and that any resale must be made pursuant to a registration statement or an available exemption from registration. All purchasers either received adequate financial statement or non-financial statement information about the Registrant or had adequate access, through their relationship with the Registrant, to financial statement or non-financial statement information about the Registrant. The sale of these securities was made without general solicitation or advertising.

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Item 16. Exhibits

Exhibit Number	Description
1.1*	Letter agreement by and between ARCA biopharma, Inc. and Dawson James Securities, Inc., dated April 11, 2013.
2.1	Agreement and Plan of Merger and Reorganization, dated September 24, 2008, among Nuvelo, Inc., Dawn Acquisition Sub, Inc. and ARCA biopharma, Inc.(5)
2.2	Amendment No. 1 to Agreement and Plan of Merger and Reorganization, dated October 28, 2008, by and among Nuvelo, Inc., Dawn Acquisition Sub, Inc. and ARCA biopharma, Inc.(6)
3.1	Amended and Restated Certificate of Incorporation of the Registrant, as amended.(8)
3.1(a)	Certificate of Amendment to Restated Certificate of Incorporation.(34)
3.1(b)*	Form of Certificate of Designation of Preferences, Rights and Limitations of Series A Convertible Preferred Stock of the Registrant.
3.2	Second Amended and Restated Bylaws of the Registrant, as amended.(9)
4.1#	Form of Warrant Agency Agreement by and between ARCA biopharma, Inc. and Computershare Trust Company, N.A.
4.2	Reference is made to Exhibits 3.1, 3.1(a) and 3.2.
4.3*	Form of Common Stock Purchase Warrant
5.1*	Opinion of Cooley LLP.
10.1§	Amended and Restated Collaboration and License Agreement, dated July 31, 2006, by and between Nuvelo, Inc. and Archemix Corp.(2)
10.2§	Second Amended and Restated Collaboration and License Agreement, dated April 20, 2010, by and between ARCA biopharma, Inc. and Archemix Corp.(17)
10.3	Lease, dated February 8, 2008, by and between ARCA Discovery, Inc. and Arista Place, LLC.(8)
10.4	Loan and Security Agreement, dated July 17, 2007, by and between ARCA Discovery, Inc. and Silicon Valley Bank.(8)
10.5	First Amendment to Loan and Security Agreement, dated January 21, 2009, by and between ARCA biopharma, Inc. and Silicon Valley Bank.(8)
10.6	Second Amendment to Loan and Security Agreement, dated March 23, 2009, by and between ARCA biopharma Colorado, Inc. and Silicon Valley Bank.(8)
10.7	Third Amendment to Loan and Security Agreement, dated April 6, 2009, by and between ARCA biopharma Colorado, Inc. and Silicon Valley Bank.(14)
10.8	Fourth Amendment to Assumption of Loan and Security Agreement, dated April 10, 2009, by and between ARCA biopharma, Inc., ARCA biopharma Colorado, Inc. and Silicon Valley Bank.(14)
10.9§	License and Sublicense Agreement, dated October 28, 2003, by and between ARCA Discovery, Inc. and CPEC, L.L.C.(12)
10.10§	Amendment to License and Sublicense Agreement, dated February 22, 2006, by and between ARCA Discovery, Inc. and CPEC L.L.C.(13)
10.11§	Exclusive License Agreement, dated October 14, 2005, by and between ARCA Discovery, Inc. and the University of Colorado s License Equity Holdings, Inc.(12)
10.12§	First Amendment to Exclusive License Agreement, dated June 23, 2006, by and between ARCA Discovery, Inc. and the University of Colorado s License Equity Holdings, Inc.(12)
10.13§	Second Amendment to Exclusive License Agreement, dated July 20, 2006, by and between ARCA Discovery, Inc. and the University of Colorado s License Equity Holdings, Inc.(12)
10.14	Third Amendment to Exclusive License Agreement, dated July 19, 2007, by and between ARCA Discovery, Inc. and the University of Colorado s License Equity Holdings, Inc.(12)

10.15§	Fourth Amendment to Exclusive License Agreement, dated August 22, 2007, by and between ARCA Discovery, Inc. and the University of Colorado s License Equity Holdings, Inc.(12)

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10.18§	Manufacturing Agreement, dated September 11, 2006, by and between ARCA Discovery, Inc. and Patheon, Inc.(12)
10.19§	Development, Commercialization and Licensing Agreement, dated February 1, 2007, by and between ARCA Discovery, Inc. and Laboratory Corporation of America Holdings, Inc.(13)
10.20	Amendment No. 1 to Development, Commercialization and Licensing Agreement, dated May 14, 2007, by and between ARCA Discovery, Inc. and Laboratory Corporation of America Holdings, Inc.(12)
10.21§	Amendment No. 2 to Development, Commercialization and Licensing Agreement, dated June 10, 2008, by and between ARCA Discovery, Inc. and Laboratory Corporation of America Holdings, Inc.(12)
10.22	Materials Transfer Agreement, dated October 14, 2005, by and between ARCA Discovery, Inc. and the University of Colorado.(12)
10.23	Lease Surrender and Termination Agreement, dated August 5, 2009, by and between ARCA biopharma, Inc. and The Irvine Company LLC.(9)
10.24	Lease Termination and Warrant Purchase Agreement, dated September 18, 2009, by and between ARCA biopharma, Inc., BMR-201 Industrial Road LLC and BioMed Realty, L.P.(10)
10.25§	Exclusive Option Agreement, dated December 2, 2009, by and between ARCA biopharma, Inc. and the University of Cincinnati. (16)
10.26	Agreement Term Extension Letter dated December 8, 2010, of the Exclusive Option Agreement by and between ARCA biopharma, Inc. and the University of Cincinnati.(19)
10.27	Agreement Term Extension Letter dated December 21, 2010, of the Exclusive Option Agreement by and between ARCA biopharma, Inc. and the University of Cincinnati.(20)
10.28	Agreement Term Extension Letter dated January 21, 2011, of the Exclusive Option Agreement by and between ARCA biopharma, Inc. and the University of Cincinnati.(21)
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10.30	Amendment No. 1 to the ARCA Discovery, Inc. 2004 Stock Incentive Plan.(7)
10.31	Amendment No. 2 to the ARCA Discovery, Inc. 2004 Stock Incentive Plan.(7)
10.32	Amendment No. 3 to the ARCA Discovery, Inc. 2004 Stock Incentive Plan.(7)
10.33	Amendment No. 4 to the ARCA Discovery, Inc. 2004 Stock Incentive Plan.(7)
10.34	Amendment No. 5 to the ARCA Discovery, Inc. 2004 Stock Incentive Plan.(7)
10.35	Amendment No. 6 to the ARCA Discovery, Inc. 2004 Stock Incentive Plan.(7)
10.36	ARCA biopharma, Inc. 2004 Stock Incentive Plan, Form of Executive Incentive Stock Option Agreement.(7)
10.37	ARCA biopharma, Inc. 2004 Stock Incentive Plan, Form of Non-Executive Incentive Stock Option Agreement.(7)
10.38	ARCA biopharma, Inc. 2004 Stock Incentive Plan, Form of Nonqualified Stock Option Agreement.(7)
10.39	ARCA biopharma, Inc. 2004 Equity Incentive Plan (f/k/a Nuvelo, Inc. 2004 Equity Incentive Plan), Form of Partial Acceleration Stock Option Agreement.(8)
10.40	ARCA biopharma, Inc. 2004 Equity Incentive Plan (f/k/a Nuvelo, Inc. 2004 Equity Incentive Plan), Form of No Acceleration Stock Option Agreement.(8)
10.41	ARCA biopharma, Inc. 2004 Equity Incentive Plan (f/k/a Nuvelo, Inc. 2004 Equity Incentive Plan), Form of Director Stock Option Agreement.(8)

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Exhibit Number	Description
10.42	ARCA biopharma, Inc. 2004 Equity Incentive Plan (f/k/a Nuvelo, Inc. 2004 Equity Incentive Plan), Form of Notice of Grant of Stock Option.(8)
10.43	ARCA biopharma, Inc. 2004 Equity Incentive Plan (f/k/a Nuvelo, Inc. 2004 Equity Incentive Plan), Form of Notice of Director Grant of Stock Option.(8)
10.44	Form of Indemnification Agreement between Nuvelo, Inc. and its directors and officers.(1)
10.45	Nuvelo, Inc. Amended Executive Change in Control and Severance Benefit Plan.(4)
10.46	Amended and Restated Employment and Retention Agreement, dated June 4, 2008, by and between ARCA biopharma, Inc. and Michael R. Bristow.(8)
10.47	Assignment and Assumption Agreement, dated January 26, 2009, by and between ARCA biopharma, Inc. and ARCA biopharma Colorado, Inc.(8)
10.48	Amended and Restated Employment Agreement, dated June 12, 2008, by and between ARCA biopharma, Inc. and Christopher D. Ozeroff.(8)
10.49	Assignment and Assumption Agreement, dated January 26, 2009, by and between ARCA biopharma, Inc. and ARCA biopharma Colorado, Inc.(8)
10.50	Amended and Restated ARCA biopharma, Inc. 2004 Equity Incentive Plan.(11)
10.51	ARCA biopharma, Inc. Employee Severance Benefit Plan.(18)
10.52	ARCA biopharma, Inc. 2009 Reduction in Force Severance Benefit Plan.(18)
10.53	Form of Option Amendment pursuant to ARCA biopharma, Inc. 2004 Equity Incentive Plan and ARCA biopharma, Inc. 2004 Stock Option Plan (change of control).(18)
10.54	Form of Option Agreement and Grant Notice pursuant to ARCA biopharma, Inc. 2004 Equity Incentive Plan (NDA/change of control acceleration).(18)
10.55	Employment Agreement, dated February 11, 2009, by and between ARCA biopharma, Inc. and Patrick Wheeler. (16)
10.56	Form of Indemnification Agreement between ARCA biopharma, Inc. and its directors and officers.(8)
10.57	Agreement Term Extension Letter dated March 31, 2011, of the Exclusive Option Agreement by and between ARCA biopharma, Inc. and the University of Cincinnati.(22)
10.58	Form of Subscription Agreement.(23)
10.59§	License Agreement, dated April 15, 2011, by and between ARCA biopharma and the University of Cincinnati.(24)
10.60	First Amendment to Lease Agreement, dated June 14, 2011, by and between Arista Place, LLC and ARCA biopharma Inc., (f/k/a ARCA Discovery, Inc.).(25)
10.61§	Amended and Restated Exclusive License Agreement, dated August 12, 2011, by and between the Regents of the University of Colorado and ARCA biopharma, Inc.(26)
10.62	Form of Subscription Agreement.(27)
10.63	Form of Registration Rights Agreement.(27)
10.64	Waiver and Amendment Agreement, dated March 30, 2012, by and between ARCA biopharma, Inc. and Michael Bristow. (28)
10.65	Waiver and Amendment Agreement, dated March 30, 2012, by and between ARCA biopharma, Inc. and Patrick Wheeler. (28)
10.66	Waiver and Amendment Agreement, dated March 30, 2012, by and between ARCA biopharma, Inc. and Christopher Ozeroff. (28)
10.67	Form of Subscription Agreement. (29)
10.68	Form of Subscription Agreement by and among the Company and the purchasers identified therein, dated October 22, 2012. (30)
10.69	Form of Registration Rights Agreement. (30)

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Exhibit Number	Description
10.70	Form of Subscription Agreement by and among the Company and the purchasers identified therein, dated December 18, 2012. (31)
10.71	Form of Registration Rights Agreement. (31)
10.72	Form of Amendment to the Registration Rights Agreement, dated December 18, 2012. (31)
10.73	Form of Subscription Agreement by and among the Company and the purchasers identified therein, dated January 22, 2013. (32)
10.74	Form of Registration Rights Agreement. (32)
10.75	Subscription Agreement. (33)
10.76	Form of Common Stock Certificate.(7)
10.77	Certificate of Designations of Series A Junior Participating Preferred Stock. (included as part of Exhibit 3.1)
10.78	Warrant to Purchase Stock Agreement, dated July 17, 2007, by and between ARCA Discovery, Inc. and Silicon Valley Bank.(8)
10.79	Amendment No. 1 to Warrant to Purchase Stock Agreement, dated February 19, 2009, by and between ARCA biopharma, Inc. and SVB Financial Group.(8)
10.80	Warrant to Purchase Stock Agreement, dated August 19, 2008, by and between ARCA biopharma, Inc. and Silicon Valley Bank.(8)
10.81	Amendment No. 1 to Warrant to Purchase Stock Agreement, dated February 19, 2009, by and between ARCA biopharma, Inc. and SVB Financial Group.(8)
10.82	Warrant to Purchase Stock Agreement, dated October 10, 2008, by and between ARCA biopharma, Inc. and Boulder Ventures IV, L.P.(8)
10.83	Amendment No. 1 to Warrant to Purchase Stock Agreement, dated February 19, 2009, by and between ARCA biopharma, Inc. and Boulder Ventures IV, L.P.(8)
10.84	Warrant to Purchase Stock Agreement, dated October 10, 2008, by and between ARCA biopharma, Inc. and Boulder Ventures IV (Annex), L.P.(8)
10.85	Amendment No. 1 to Warrant to Purchase Stock Agreement, dated February 19, 2009, by and between ARCA biopharma, Inc. and Boulder Ventures IV (Annex), L.P.(8)
10.86	Warrant to Purchase Stock Agreement, dated October 10, 2008, by and between ARCA biopharma, Inc. and InterWest Partners IX, LP.(8)
10.87	Amendment No. 1 to Warrant to Purchase Stock Agreement, dated February 19, 2009, by and between ARCA biopharma, Inc. and InterWest Partners IX, LP.(8)
10.88	Warrant to Purchase Stock Agreement, dated October 10, 2008, by and between ARCA biopharma, Inc. and Atlas Venture Fund VII, L.P.(8)
10.89	Amendment No. 1 to Warrant to Purchase Stock Agreement, dated February 19, 2009, by and between ARCA biopharma, Inc. and Atlas Venture Fund VII, L.P.(8)
10.90	Warrant to Purchase Stock Agreement, dated October 10, 2008, by and between ARCA biopharma, Inc. and The Peierls Foundation, Inc.(8)
10.91	Amendment No. 1 to Warrant to Purchase Stock Agreement, dated February 19, 2009, by and between ARCA biopharma, Inc. and The Peierls Foundation, Inc.(8)
10.92	Warrant to Purchase Stock Agreement, dated October 10, 2008, by and between ARCA biopharma, Inc. and Skyline Venture Partners Qualified Purchaser Fund IV, L.P.(8)
10.93	Amendment No. 1 to Warrant to Purchase Stock Agreement, dated February 19, 2009, by and between ARCA biopharma, Inc. and Skyline Venture Partners Qualified Purchaser Fund IV, L.P.(8)
10.94	Warrant to Purchase Stock Agreement, dated October 18, 2009, by and between ARCA biopharma, Inc. and BioMed Realty, L.P.(16)
10.95	Form of Common Stock Purchase Warrant.(23)

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Exhibit Number	Description
10.96	Form of Warrant to Purchase Common Stock.(27)
10.97	Form of Common Stock Purchase Warrant. (29)
10.98	Form of Warrants to Purchase Shares of Common Stock, dated October 22, 2012. (30)
10.99	Form of Warrants to Purchase Shares of Common Stock, dated December 20, 2012. (31)
10.100	Form of Warrants to Purchase Shares of Common Stock. (32)
10.101	Form of Common Stock Purchase Warrant. (33)
10.102§	Clinical Trial Collaboration Agreement between ARCA biopharma, Inc. and Medtronic, Inc. dated as of April 18, 2013.(35)
10.103	Placement Agency Agreement by and between ARCA biopharma, Inc. and Dawson James Securities, Inc., dated January 31, 2013.(33)
14.1	Code of Business Conduct and Ethics.(9)
16.1	Letter from Ernst & Young LLP to the Securities and Exchange Commission, dated March 30, 2009.(15)
23.1*	Consent of KPMG LLP, Independent Registered Public Accounting Firm.
24.1#	Power of Attorney (see page II-7 to the original filing of this registration statement on Form S-1).

* Filed herewith

\# Previously filed.

Compensatory plan or agreement.

§ Confidential treatment has been requested for portions of this document, which are omitted and filed separately with the SEC.

XBRL (Extensible Business Reporting Language) information is furnished and not filed or a part of a registration statement or prospectus for purposes of sections 11 or 12 of the Securities Act of 1933, as amended, is deemed not filed for purposes of section 18 of the Securities Exchange Act of 1934, as amended, and otherwise is not subject to liability under these sections.

(1) Previously filed with the SEC as an Exhibit to and incorporated herein by reference from Hyseq, Inc. s Form S-1, filed on June 12, 1997, as amended, File No. 333-29091.

(2) Previously filed with the SEC as an Exhibit to and incorporated herein by reference from Nuvelo, Inc. s Form 10-Q, filed on November 8, 2006, File No. 000-22873.

(3) Previously filed with the SEC as an Appendix to and incorporated herein by reference from Nuvelo, Inc. s Proxy Statement on Schedule 14A, filed on April 18, 2007, File No. 000-22873.

(4) Previously filed with the SEC as an Exhibit to and incorporated herein by reference from Nuvelo, Inc. s Form 10-Q, filed on November 7, 2007, File No. 000-22873.

(5) Previously filed with the SEC as an Exhibit to and incorporated herein by reference from Nuvelo, Inc. s Form 8-K, filed on September 25, 2008, File No. 000-22873.

(6) Previously filed with the SEC as an Exhibit to and incorporated herein by reference from Nuvelo, Inc. s Form 8-K, filed on October 29, 2008, File No. 000-22873.

(7) Previously filed with the SEC as an Exhibit to and incorporated herein by reference from ARCA biopharma, Inc. s Form 8-K, filed on January 28, 2009, File No. 000-22873.

(8) Previously filed with the SEC as an Exhibit to and incorporated herein by reference from ARCA biopharma, Inc. s Form 10-K, filed on March 27, 2009, File No. 000-22873.

(9) Previously filed with the SEC as an Exhibit to and incorporated herein by reference from ARCA biopharma, Inc. s Form 10-Q, filed on November 16, 2009, File No. 000-22873.

(10) Previously filed with the SEC as an Exhibit to and incorporated herein by reference from ARCA biopharma, Inc. s Form 8-K, filed on September 24, 2009, File No. 000-22873.

(11) Previously filed with the SEC as an Exhibit to and incorporated herein by reference from ARCA biopharma, Inc. s Form 10-Q/A, filed on August 21, 2009, File No. 000-22873.

(12) Previously filed with the SEC as an Exhibit to and incorporated herein by reference from ARCA biopharma, Inc. s Form 10-Q, filed on May 15, 2009, File No. 000-22873.

(13) Previously filed with the SEC as an Exhibit to and incorporated herein by reference from ARCA biopharma, Inc. s Form 10-Q/A, filed on November 6, 2009, File No. 000-22873.

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(14) Previously filed with the SEC as an Exhibit to and incorporated herein by reference from ARCA biopharma, Inc. s Form 8-K, filed on April 10, 2009, File No. 000-22873.
(15) Previously filed with the SEC as an Exhibit to and incorporated herein by reference from ARCA biopharma, Inc. s Form 8-K, filed on March 30, 2009, File No. 000-22873.
(16) Previously filed with the SEC as an Exhibit to and incorporated herein by reference from ARCA biopharma, Inc. s Form 10-K, filed on March 4, 2010, File No. 000-22873.
(17) Previously filed with the SEC as an Exhibit to and incorporated herein by reference from ARCA biopharma, Inc. s Form 10-Q, filed on August 10, 2010, File No. 000-22873.
(18) Previously filed with the SEC as an Exhibit to and incorporated herein by reference from ARCA biopharma, Inc. s Form 10-Q, filed on August 10, 2009, File No. 000-22873.
(19) Previously filed with the SEC as an Exhibit to and incorporated herein by reference from ARCA biopharma, Inc. s Form 8-K, filed on December 14, 2010, File No. 000-22873.
(20) Previously filed with the SEC as an Exhibit to and incorporated herein by reference from ARCA biopharma, Inc. s Form 8-K, filed on December 22, 2010, File No. 000-22873.
(21) Previously filed with the SEC as an Exhibit to and incorporated herein by reference from ARCA biopharma, Inc. s Form 8-K, filed on January 26, 2011, File No. 000-22873.
(22) Previously filed with the SEC as an Exhibit to and incorporated herein by reference from ARCA biopharma, Inc. s Form 8-K, filed on April 5, 2011, File No. 000-22873.
(23) Previously filed with the SEC as an Exhibit to and incorporated herein by reference from ARCA biopharma, Inc. s Form 8-K filed on April 18, 2011, File No. 000-22873.
(24) Previously filed with the SEC as an Exhibit to and incorporated herein by reference from ARCA biopharma, Inc. s Form 10-Q, filed on May 16, 2011, File No. 000-22873.
(25) Previously filed with the SEC as an Exhibit to and incorporated herein by reference from ARCA biopharma, Inc. s Form 8-K filed on June 20, 2011, File No. 000-22873.
(26) Previously filed with the SEC as an Exhibit to and incorporated herein by reference from ARCA biopharma, Inc. s Form 10-Q, filed on August 15, 2011, File No. 000-22873.
(27) Previously filed with the SEC as an Exhibit to and incorporated herein by reference from ARCA biopharma, Inc. s Form 8-K filed on December 22, 2011, File No. 000-22873.
(28) Previously filed with the SEC as an Exhibit to and incorporated herein by reference from ARCA biopharma, Inc. s Form 10-Q, filed on May 14, 2012, File No. 000-22873.
(29) Previously filed with the SEC as an exhibit and incorporated herein by reference from ARCA biopharma, Inc s Form 8-K, filed on August 3, 2012, File No. 000-22873.
(30) Previously filed with the SEC as an exhibit and incorporated herein by reference from ARCA biopharma, Inc s Form 8-K, filed on October 23, 2012, File No. 000-22873.
(31) Previously filed with the SEC as an exhibit and incorporated herein by reference from ARCA biopharma, Inc s Form 8-K, filed on December 19, 2012, File No. 000-22873.
(32) Previously filed with the SEC as an exhibit and incorporated herein by reference from ARCA biopharma, Inc s Form 8-K, filed on January 23, 2013, File No. 000-22873.
(33) Previously filed with the SEC as an exhibit and incorporated herein by reference from ARCA biopharma, Inc s Form 8-K, filed on February 1, 2013, File No. 000-22873.
(34) Previously filed with the SEC as an exhibit and incorporated herein by reference from ARCA biopharma, Inc s Form 8-K, filed on March 5, 2013, File No. 000-22873.
(35) Previously filed with the SEC as an Exhibit to and incorporated herein by reference from ARCA biopharma, Inc s Form 8-K, filed April 22, 2013, File No. 000-22873.

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Item 17. Undertakings

The Registrant hereby undertakes to:

(a) To file, during any period in which offers or sales are being made, a post-effective amendment to this registration statement:

i. To include any prospectus required by section 10(a)(3) of the Securities Act of 1933;

ii. To reflect in the prospectus any facts or events arising after the effective date of the registration statement (or the most recent posteffective amendment thereof) which, individually or in the aggregate, represent a fundamental change in the information set forth in the registration statement. Notwithstanding the foregoing, any increase or decrease in volume of securities offered (if the total dollar value of securities offered would not exceed that which was registered) and any deviation from the low or high end of the estimated maximum offering range may be reflected in the form of prospectus filed with the SEC pursuant to Rule 424(b) if, in the aggregate, the changes in volume and price represent no more than 20% change in the maximum aggregate offering price set forth in the Calculation of Registration Fee table in the effective registration statement.

iii. To include any material information with respect to the plan of distribution not previously disclosed in the registration statement or any material change to such information in the registration statement;

(b) That, for the purpose of determining any liability under the Securities Act of 1933, each such post-effective amendment shall be deemed to be a new registration statement relating to the securities offered therein, and the offering of such securities at that time shall be deemed to be the initial bona fide offering thereof.

(c) To remove from registration by means of a post-effective amendment any of the securities being registered which remain unsold at the termination of the offering.

(d) Insofar as indemnification for liabilities arising under the Securities Act of 1933 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 Act and is, therefore, unenforceable. In the event that a claim for indemnification against such liabilities (other than the payment by the registrant of expenses incurred or paid by a director, officer or controlling person of the registrant in the successful defense of any action, suit or proceeding) is asserted by such director, officer or controlling person in connection with the securities being registered, the registrant will, unless in the opinion of its counsel the matter has been settled by controlling precedent, submit to a court of appropriate jurisdiction the question whether such indemnification by it is against public policy as expressed in the Act and will be governed by the final adjudication of such issue.

(e) For purposes of determining any liability under the Securities Act of 1933, the information omitted from the form of prospectus filed as part of this registration statement in reliance upon Rule 430A and contained in a form of prospectus filed by the registrant pursuant to Rule 424(b) (1) or (4) or 497(h) under the Securities Act shall be deemed to be part of this registration statement as of the time it was declared effective.

(f) For the purpose of determining any liability under the Securities Act of 1933, each post-effective amendment that contains a form of prospectus shall be deemed to be a new registration statement relating to the securities offered therein, and the offering of such securities at that time shall be deemed to be the initial bona fide offering thereof.

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SIGNATURES

Pursuant to the requirements of the Securities Act of 1933, the registrant has duly caused this Amendment No. 3 to the Registration Statement to be signed on its behalf by the undersigned, thereunto duly authorized, in the City of Broomfield, State of Colorado, on the 23rd day of May 2013.

ARCA BIOPHARMA, INC.

By: /s/ Michael R. Bristow
Michael R. Bristow
President and Chief Executive Officer

Pursuant to the requirements of the Securities Act of 1933, as amended, this Amendment No. 3 to the Registration Statement has been signed by the following persons in the capacities indicated.

Signature	Title	Date
/s/ Michael R. Bristow **Michael R. Bristow**	President and Chief Executive Officer and Director *(Principal Executive Officer)*	May 23, 2013
/s/ Patrick M. Wheeler **Patrick M. Wheeler**	Chief Financial Officer *(Principal Financial Officer and Principal Accounting Officer)*	May 23, 2013
* **Jean-Francois Formela**	Director	May 23, 2013
* **Linda Grais**	Director	May 23, 2013
Burton E. Sobel	Director	May 23, 2013
* **John L. Zabriskie**	Director	May 23, 2013

By: /s/ Michael R. Bristow
Michael R. Bristow
Attorney-in-Fact

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EXHIBIT INDEX

Exhibit Number	Description
1.1*	Letter agreement by and between ARCA biopharma, Inc. and Dawson James Securities, Inc., dated April 11, 2013.
2.1	Agreement and Plan of Merger and Reorganization, dated September 24, 2008, among Nuvelo, Inc., Dawn Acquisition Sub, Inc. and ARCA biopharma, Inc.(5)
2.2	Amendment No. 1 to Agreement and Plan of Merger and Reorganization, dated October 28, 2008, by and among Nuvelo, Inc., Dawn Acquisition Sub, Inc. and ARCA biopharma, Inc.(6)
3.1	Amended and Restated Certificate of Incorporation of the Registrant, as amended.(8)
3.1(a)	Certificate of Amendment to Restated Certificate of Incorporation.(34)
3.1(b)*	Form of Certificate of Designation of Preferences, Rights and Limitations of Series A Convertible Preferred Stock of the Registrant.
3.2	Second Amended and Restated Bylaws of the Registrant, as amended.(9)
4.1#	Form of Warrant Agency Agreement by and between ARCA biopharma, Inc. and Computershare Trust Company, N.A.
4.2	Reference is made to Exhibits 3.1, 3.1(a) and 3.2.
4.3*	Form of Common Stock Purchase Warrant
5.1*	Opinion of Cooley LLP.
10.1§	Amended and Restated Collaboration and License Agreement, dated July 31, 2006, by and between Nuvelo, Inc. and Archemix Corp.(2)
10.2§	Second Amended and Restated Collaboration and License Agreement, dated April 20, 2010, by and between ARCA biopharma, Inc. and Archemix Corp.(17)
10.3	Lease, dated February 8, 2008, by and between ARCA Discovery, Inc. and Arista Place, LLC.(8)
10.4	Loan and Security Agreement, dated July 17, 2007, by and between ARCA Discovery, Inc. and Silicon Valley Bank.(8)
10.5	First Amendment to Loan and Security Agreement, dated January 21, 2009, by and between ARCA biopharma, Inc. and Silicon Valley Bank.(8)
10.6	Second Amendment to Loan and Security Agreement, dated March 23, 2009, by and between ARCA biopharma Colorado, Inc. and Silicon Valley Bank.(8)
10.7	Third Amendment to Loan and Security Agreement, dated April 6, 2009, by and between ARCA biopharma Colorado, Inc. and Silicon Valley Bank.(14)
10.8	Fourth Amendment to Assumption of Loan and Security Agreement, dated April 10, 2009, by and between ARCA biopharma, Inc., ARCA biopharma Colorado, Inc. and Silicon Valley Bank.(14)
10.9§	License and Sublicense Agreement, dated October 28, 2003, by and between ARCA Discovery, Inc. and CPEC, L.L.C.(12)
10.10§	Amendment to License and Sublicense Agreement, dated February 22, 2006, by and between ARCA Discovery, Inc. and CPEC L.L.C.(13)
10.11§	Exclusive License Agreement, dated October 14, 2005, by and between ARCA Discovery, Inc. and the University of Colorado s License Equity Holdings, Inc.(12)
10.12§	First Amendment to Exclusive License Agreement, dated June 23, 2006, by and between ARCA Discovery, Inc. and the University of Colorado s License Equity Holdings, Inc.(12)
10.13§	Second Amendment to Exclusive License Agreement, dated July 20, 2006, by and between ARCA Discovery, Inc. and the University of Colorado s License Equity Holdings, Inc.(12)
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	Third Amendment to Exclusive License Agreement, dated July 19, 2007, by and between ARCA Discovery, Inc. and the University of Colorado s License Equity Holdings, Inc.(12)
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10.18§	Manufacturing Agreement, dated September 11, 2006, by and between ARCA Discovery, Inc. and Patheon, Inc.(12)
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10.21§	Amendment No. 2 to Development, Commercialization and Licensing Agreement, dated June 10, 2008, by and between ARCA Discovery, Inc. and Laboratory Corporation of America Holdings, Inc.(12)
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10.39	ARCA biopharma, Inc. 2004 Equity Incentive Plan (f/k/a Nuvelo, Inc. 2004 Equity Incentive Plan), Form of Partial Acceleration Stock Option Agreement.(8)
10.40	ARCA biopharma, Inc. 2004 Equity Incentive Plan (f/k/a Nuvelo, Inc. 2004 Equity Incentive Plan), Form of No Acceleration Stock Option Agreement.(8)
10.41	ARCA biopharma, Inc. 2004 Equity Incentive Plan (f/k/a Nuvelo, Inc. 2004 Equity Incentive Plan), Form of Director Stock Option Agreement.(8)

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Exhibit Number	Description
10.42	ARCA biopharma, Inc. 2004 Equity Incentive Plan (f/k/a Nuvelo, Inc. 2004 Equity Incentive Plan), Form of Notice of Grant of Stock Option.(8)
10.43	ARCA biopharma, Inc. 2004 Equity Incentive Plan (f/k/a Nuvelo, Inc. 2004 Equity Incentive Plan), Form of Notice of Director Grant of Stock Option.(8)
10.44	Form of Indemnification Agreement between Nuvelo, Inc. and its directors and officers.(1)
10.45	Nuvelo, Inc. Amended Executive Change in Control and Severance Benefit Plan.(4)
10.46	Amended and Restated Employment and Retention Agreement, dated June 4, 2008, by and between ARCA biopharma, Inc. and Michael R. Bristow.(8)
10.47	Assignment and Assumption Agreement, dated January 26, 2009, by and between ARCA biopharma, Inc. and ARCA biopharma Colorado, Inc.(8)
10.48	Amended and Restated Employment Agreement, dated June 12, 2008, by and between ARCA biopharma, Inc. and Christopher D. Ozeroff.(8)
10.49	Assignment and Assumption Agreement, dated January 26, 2009, by and between ARCA biopharma, Inc. and ARCA biopharma Colorado, Inc.(8)
10.50	Amended and Restated ARCA biopharma, Inc. 2004 Equity Incentive Plan.(11)
10.51	ARCA biopharma, Inc. Employee Severance Benefit Plan.(18)
10.52	ARCA biopharma, Inc. 2009 Reduction in Force Severance Benefit Plan.(18)
10.53	Form of Option Amendment pursuant to ARCA biopharma, Inc. 2004 Equity Incentive Plan and ARCA biopharma, Inc. 2004 Stock Option Plan (change of control).(18)
10.54	Form of Option Agreement and Grant Notice pursuant to ARCA biopharma, Inc. 2004 Equity Incentive Plan (NDA/change of control acceleration).(18)
10.55	Employment Agreement, dated February 11, 2009, by and between ARCA biopharma, Inc. and Patrick Wheeler. (16)
10.56	Form of Indemnification Agreement between ARCA biopharma, Inc. and its directors and officers.(8)
10.57	Agreement Term Extension Letter dated March 31, 2011, of the Exclusive Option Agreement by and between ARCA biopharma, Inc. and the University of Cincinnati.(22)
10.58	Form of Subscription Agreement.(23)
10.59§	License Agreement, dated April 15, 2011, by and between ARCA biopharma and the University of Cincinnati.(24)
10.60	First Amendment to Lease Agreement, dated June 14, 2011, by and between Arista Place, LLC and ARCA biopharma Inc., (f/k/a ARCA Discovery, Inc.).(25)
10.61§	Amended and Restated Exclusive License Agreement, dated August 12, 2011, by and between the Regents of the University of Colorado and ARCA biopharma, Inc.(26)
10.62	Form of Subscription Agreement.(27)
10.63	Form of Registration Rights Agreement.(27)
10.64	Waiver and Amendment Agreement, dated March 30, 2012, by and between ARCA biopharma, Inc. and Michael Bristow. (28)
10.65	Waiver and Amendment Agreement, dated March 30, 2012, by and between ARCA biopharma, Inc. and Patrick Wheeler. (28)
10.66	Waiver and Amendment Agreement, dated March 30, 2012, by and between ARCA biopharma, Inc. and Christopher Ozeroff. (28)
10.67	Form of Subscription Agreement. (29)
10.68	Form of Subscription Agreement by and among the Company and the purchasers identified therein, dated October 22, 2012. (30)

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Exhibit Number	Description
10.69	Form of Registration Rights Agreement. (30)
10.70	Form of Subscription Agreement by and among the Company and the purchasers identified therein, dated December 18, 2012. (31)
10.71	Form of Registration Rights Agreement. (31)
10.72	Form of Amendment to the Registration Rights Agreement, dated December 18, 2012. (31)
10.73	Form of Subscription Agreement by and among the Company and the purchasers identified therein, dated January 22, 2013. (32)
10.74	Form of Registration Rights Agreement. (32)
10.75	Subscription Agreement. (33)
10.76	Form of Common Stock Certificate.(7)
10.77	Certificate of Designations of Series A Junior Participating Preferred Stock. (included as part of Exhibit 3.1)
10.78	Warrant to Purchase Stock Agreement, dated July 17, 2007, by and between ARCA Discovery, Inc. and Silicon Valley Bank.(8)
10.79	Amendment No. 1 to Warrant to Purchase Stock Agreement, dated February 19, 2009, by and between ARCA biopharma, Inc. and SVB Financial Group.(8)
10.80	Warrant to Purchase Stock Agreement, dated August 19, 2008, by and between ARCA biopharma, Inc. and Silicon Valley Bank.(8)
10.81	Amendment No. 1 to Warrant to Purchase Stock Agreement, dated February 19, 2009, by and between ARCA biopharma, Inc. and SVB Financial Group.(8)
10.82	Warrant to Purchase Stock Agreement, dated October 10, 2008, by and between ARCA biopharma, Inc. and Boulder Ventures IV, L.P.(8)
10.83	Amendment No. 1 to Warrant to Purchase Stock Agreement, dated February 19, 2009, by and between ARCA biopharma, Inc. and Boulder Ventures IV, L.P.(8)
10.84	Warrant to Purchase Stock Agreement, dated October 10, 2008, by and between ARCA biopharma, Inc. and Boulder Ventures IV (Annex), L.P.(8)
10.85	Amendment No. 1 to Warrant to Purchase Stock Agreement, dated February 19, 2009, by and between ARCA biopharma, Inc. and Boulder Ventures IV (Annex), L.P.(8)
10.86	Warrant to Purchase Stock Agreement, dated October 10, 2008, by and between ARCA biopharma, Inc. and InterWest Partners IX, LP.(8)
10.87	Amendment No. 1 to Warrant to Purchase Stock Agreement, dated February 19, 2009, by and between ARCA biopharma, Inc. and InterWest Partners IX, LP.(8)
10.88	Warrant to Purchase Stock Agreement, dated October 10, 2008, by and between ARCA biopharma, Inc. and Atlas Venture Fund VII, L.P.(8)
10.89	Amendment No. 1 to Warrant to Purchase Stock Agreement, dated February 19, 2009, by and between ARCA biopharma, Inc. and Atlas Venture Fund VII, L.P.(8)
10.90	Warrant to Purchase Stock Agreement, dated October 10, 2008, by and between ARCA biopharma, Inc. and The Peierls Foundation, Inc.(8)
10.91	Amendment No. 1 to Warrant to Purchase Stock Agreement, dated February 19, 2009, by and between ARCA biopharma, Inc. and The Peierls Foundation, Inc.(8)
10.92	Warrant to Purchase Stock Agreement, dated October 10, 2008, by and between ARCA biopharma, Inc. and Skyline Venture Partners Qualified Purchaser Fund IV, L.P.(8)
10.93	Amendment No. 1 to Warrant to Purchase Stock Agreement, dated February 19, 2009, by and between ARCA biopharma, Inc. and Skyline Venture Partners Qualified Purchaser Fund IV, L.P.(8)

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Exhibit Number	Description
10.94	Warrant to Purchase Stock Agreement, dated October 18, 2009, by and between ARCA biopharma, Inc. and BioMed Realty, L.P.(16)
10.95	Form of Common Stock Purchase Warrant.(23)
10.96	Form of Warrant to Purchase Common Stock.(27)
10.97	Form of Common Stock Purchase Warrant. (29)
10.98	Form of Warrants to Purchase Shares of Common Stock, dated October 22, 2012. (30)
10.99	Form of Warrants to Purchase Shares of Common Stock, dated December 20, 2012. (31)
10.100	Form of Warrants to Purchase Shares of Common Stock. (32)
10.101	Form of Common Stock Purchase Warrant. (33)
10.102§	Clinical Trial Collaboration Agreement between ARCA biopharma, Inc. and Medtronic, Inc. dated as of April 18, 2013.(35)
10.103	Placement Agency Agreement by and between ARCA biopharma, Inc. and Dawson James Securities, Inc., dated January 31, 2013.(33)
14.1	Code of Business Conduct and Ethics.(9)
16.1	Letter from Ernst & Young LLP to the Securities and Exchange Commission, dated March 30, 2009.(15)
23.1*	Consent of KPMG LLP, Independent Registered Public Accounting Firm.
24.1#	Power of Attorney (see page II-7 to the original filing of this registration statement on Form S-1).

* Filed herewith

\# Previously filed.

Compensatory plan or agreement.

§ Confidential treatment has been requested for portions of this document, which are omitted and filed separately with the SEC.

XBRL (Extensible Business Reporting Language) information is furnished and not filed or a part of a registration statement or prospectus for purposes of sections 11 or 12 of the Securities Act of 1933, as amended, is deemed not filed for purposes of section 18 of the Securities Exchange Act of 1934, as amended, and otherwise is not subject to liability under these sections.

(1) Previously filed with the SEC as an Exhibit to and incorporated herein by reference from Hyseq, Inc. s Form S-1, filed on June 12, 1997, as amended, File No. 333-29091.

(2) Previously filed with the SEC as an Exhibit to and incorporated herein by reference from Nuvelo, Inc. s Form 10-Q, filed on November 8, 2006, File No. 000-22873.

(3) Previously filed with the SEC as an Appendix to and incorporated herein by reference from Nuvelo, Inc. s Proxy Statement on Schedule 14A, filed on April 18, 2007, File No. 000-22873.

(4) Previously filed with the SEC as an Exhibit to and incorporated herein by reference from Nuvelo, Inc. s Form 10-Q, filed on November 7, 2007, File No. 000-22873.

(5) Previously filed with the SEC as an Exhibit to and incorporated herein by reference from Nuvelo, Inc. s Form 8-K, filed on September 25, 2008, File No. 000-22873.

(6) Previously filed with the SEC as an Exhibit to and incorporated herein by reference from Nuvelo, Inc. s Form 8-K, filed on October 29, 2008, File No. 000-22873.

(7) Previously filed with the SEC as an Exhibit to and incorporated herein by reference from ARCA biopharma, Inc. s Form 8-K, filed on January 28, 2009, File No. 000-22873.

(8) Previously filed with the SEC as an Exhibit to and incorporated herein by reference from ARCA biopharma, Inc. s Form 10-K, filed on March 27, 2009, File No. 000-22873.

(9) Previously filed with the SEC as an Exhibit to and incorporated herein by reference from ARCA biopharma, Inc. s Form 10-Q, filed on November 16, 2009, File No. 000-22873.

(10) Previously filed with the SEC as an Exhibit to and incorporated herein by reference from ARCA biopharma, Inc. s Form 8-K, filed on September 24, 2009, File No. 000-22873.

(11) Previously filed with the SEC as an Exhibit to and incorporated herein by reference from ARCA biopharma, Inc. s Form 10-Q/A, filed on August 21, 2009, File No. 000-22873.

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(12) Previously filed with the SEC as an Exhibit to and incorporated herein by reference from ARCA biopharma, Inc. s Form 10-Q, filed on May 15, 2009, File No. 000-22873.
(13) Previously filed with the SEC as an Exhibit to and incorporated herein by reference from ARCA biopharma, Inc. s Form 10-Q/A, filed on November 6, 2009, File No. 000-22873.
(14) Previously filed with the SEC as an Exhibit to and incorporated herein by reference from ARCA biopharma, Inc. s Form 8-K, filed on April 10, 2009, File No. 000-22873.
(15) Previously filed with the SEC as an Exhibit to and incorporated herein by reference from ARCA biopharma, Inc. s Form 8-K, filed on March 30, 2009, File No. 000-22873.
(16) Previously filed with the SEC as an Exhibit to and incorporated herein by reference from ARCA biopharma, Inc. s Form 10-K, filed on March 4, 2010, File No. 000-22873.
(17) Previously filed with the SEC as an Exhibit to and incorporated herein by reference from ARCA biopharma, Inc. s Form 10-Q, filed on August 10, 2010, File No. 000-22873.
(18) Previously filed with the SEC as an Exhibit to and incorporated herein by reference from ARCA biopharma, Inc. s Form 10-Q, filed on August 10, 2009, File No. 000-22873.
(19) Previously filed with the SEC as an Exhibit to and incorporated herein by reference from ARCA biopharma, Inc. s Form 8-K, filed on December 14, 2010, File No. 000-22873.
(20) Previously filed with the SEC as an Exhibit to and incorporated herein by reference from ARCA biopharma, Inc. s Form 8-K, filed on December 22, 2010, File No. 000-22873.
(21) Previously filed with the SEC as an Exhibit to and incorporated herein by reference from ARCA biopharma, Inc. s Form 8-K, filed on January 26, 2011, File No. 000-22873.
(22) Previously filed with the SEC as an Exhibit to and incorporated herein by reference from ARCA biopharma, Inc. s Form 8-K, filed on April 5, 2011, File No. 000-22873.
(23) Previously filed with the SEC as an Exhibit to and incorporated herein by reference from ARCA biopharma, Inc. s Form 8-K filed on April 18, 2011, File No. 000-22873.
(24) Previously filed with the SEC as an Exhibit to and incorporated herein by reference from ARCA biopharma, Inc. s Form 10-Q, filed on May 16, 2011, File No. 000-22873.
(25) Previously filed with the SEC as an Exhibit to and incorporated herein by reference from ARCA biopharma, Inc. s Form 8-K filed on June 20, 2011, File No. 000-22873.
(26) Previously filed with the SEC as an Exhibit to and incorporated herein by reference from ARCA biopharma, Inc. s Form 10-Q, filed on August 15, 2011, File No. 000-22873.
(27) Previously filed with the SEC as an Exhibit to and incorporated herein by reference from ARCA biopharma, Inc. s Form 8-K filed on December 22, 2011, File No. 000-22873.
(28) Previously filed with the SEC as an Exhibit to and incorporated herein by reference from ARCA biopharma, Inc. s Form 10-Q, filed on May 14, 2012, File No. 000-22873.
(29) Previously filed with the SEC as an exhibit and incorporated herein by reference from ARCA biopharma, Inc s Form 8-K, filed on August 3, 2012, File No. 000-22873.
(30) Previously filed with the SEC as an exhibit and incorporated herein by reference from ARCA biopharma, Inc s Form 8-K, filed on October 23, 2012, File No. 000-22873.
(31) Previously filed with the SEC as an exhibit and incorporated herein by reference from ARCA biopharma, Inc s Form 8-K, filed on December 19, 2012, File No. 000-22873.
(32) Previously filed with the SEC as an exhibit and incorporated herein by reference from ARCA biopharma, Inc s Form 8-K, filed on January 23, 2013, File No. 000-22873.
(33) Previously filed with the SEC as an exhibit and incorporated herein by reference from ARCA biopharma, Inc s Form 8-K, filed on February 1, 2013, File No. 000-22873.
(34) Previously filed with the SEC as an exhibit and incorporated herein by reference from ARCA biopharma, Inc s Form 8-K, filed on March 5, 2013, File No. 000-22873.
(35) Previously filed with the SEC as an Exhibit to and incorporated herein by reference from ARCA biopharma, Inc s Form 8-K, filed April 22, 2013, File No. 000-22873.