GeoVax Labs, Inc.
Form S-1
April 03, 2012
As Filed with the Securities and Exchange Commission on April 3, 2012.
Registration No. 333-

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

FORM S-1

REGISTRATION STATEMENT
UNDER THE SECURITIES ACT OF 1933

GEOVAX LABS, INC.
(Exact name of registrant as specified in its charter)

Delaware	2834	87-0455038
(State or other jurisdiction of incorporation or organization)	(Primary Standard Industrial Classification Code Number)	(I.R.S. Employer Identification Number)

1900 Lake Park Drive, Suite 380, Smyrna, Georgia 30080, (678) 384-7220
(Address, including zip code, and telephone number, including area code, of registrant's principal executive offices)

Robert T. McNally, Ph.D.	With a copy to:
President & Chief Executive Officer	T. Clark Fitzgerald III
GeoVax Labs, Inc.	Womble Carlyle Sandridge & Rice, LLP
1900 Lake Park Drive, Suite 380	271 17th Street NW, Suite 2400
Smyrna, Georgia 30080	Atlanta, Georgia 30363
Tel: (678) 384-7220	Tel: (404) 879-2455
Fax: (678) 384-7283	Fax: (404) 870-4869

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

Approximate date of commencement of proposed sale to the public: From time to time 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, 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, please check the following box and list the Securities Act registration statement number of the earlier effective registration statement for the same offering. o

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. o

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

offering. o

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

Large accelerated filer o	Accelerated filer o	Non-accelerated filer o	Smaller reporting company x

Calculation of Registration Fee

Title of Each Class Of Securities To Be Registered	Amount To Be Registered (1)	Proposed Maximum Offering Price Per Unit	Proposed Maximum Aggregate Offering Price	Amount of Registration Fee
Common stock, $0.001 par value per share underlying Series A convertible preferred stock, $0.001 par value per share	2,933,333(2)	$0.99(3)	$2,904,000(3)	$332.80
Common stock underlying Outstanding Series A and Series C Warrants	5,866,666(4)	1.00(5)	5,866,666(5)	672.32
Common stock underlying outstanding Series B Warrants	2,933,333(4)	$0.75(5)	2,200,000(5)	252.12
Total	11,733,332		$10,970,666	$1,257.24(6)

(1) In accordance with Rule 416(a), the Registrant is also registering hereunder an indeterminate number of shares that may be issued and resold resulting from stock splits, stock dividends or similar transactions.
(2) Represents shares of the Registrant's common stock underlying shares of Series A convertible preferred stock being registered for resale that have been issued to the selling stockholders named in this registration statement.
(3) Estimated pursuant to Rule 457(c) of the Securities Act of 1933 solely for the purpose of computing the amount of the registration fee based on the average of the bid and asked prices reported on the over-the-counter bulletin board on March 30, 2012, which was $.99 per share.
(4) Represents shares of common stock issuable upon exercise of warrants to purchase shares of common stock held by selling stockholders named in this registration statement.
(5) Calculated in accordance with Rule 457(g) based upon the aggregate exercise price of the warrants held by selling stockholders named in this registration statement.
(6) The Registrant previously filed Form S-1 (333-165825) on March 31, 2010, and paid a filing fee of $2,852. The Registrant did not sell any securities pursuant to that Form S-1, and it was withdrawn in December, 2011. Pursuant to Rule 457(p), the Registrant hereby applies $1,257.24 of the previously paid filing fee against amounts due herewith.

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

The information in this prospectus is not complete and may be changed. The selling stockholders may not sell these securities until the registration statement filed with the Securities and Exchange Commission is effective. This prospectus is not an offer to sell these securities and it is not soliciting offers to buy these securities in any state where the offer or sale is not permitted.

SUBJECT TO COMPLETION, DATED APRIL 3, 2012.

PROSPECTUS

GEOVAX LABS, INC.

Up to 11,733,332 Shares of Common Stock

This prospectus relates to up to 11,733,332 shares of common stock, $0.001 par value, of GeoVax Labs, Inc. that may be sold from time to time by the selling stockholders named in this prospectus, which includes up to:

· 2,933,333 shares of common stock underlying Series A convertible preferred stock, par value $0.01 per share, and

· 8,799,999 shares of common stock issuable to the selling stockholders upon the exercise of Series A, B and C Warrants.

The prices at which the Selling Stockholders may sell the shares will be determined by the prevailing market price for the shares or in negotiated transactions. The shares included in this prospectus may be reoffered and sold directly by the selling stockholders in accordance with one or more of the methods described in the plan of distribution, which begins on page 46 of this prospectus.

We will not receive any proceeds from the sales of outstanding shares of common stock by the selling stockholders, but we will receive funds from the exercise of Series A, B or C Warrants held by the selling stockholders, if exercised for cash.

Our common stock is registered under Section 12(g) of the Securities Exchange Act of 1934 and quoted on the over-the-counter bulletin board under the symbol “GOVX.” On March 30, 2012, the last reported sale price for our common stock as reported on the over-the-counter bulletin board was $.97 per share.

This prospectus may only be used where it is legal to offer and sell the shares covered by this prospectus. We have not taken any action to register or obtain permission for this offering or the distribution of this prospectus in any country other than the United States.

Investing in the common stock involves a high degree of risk. See “Risk Factors” beginning on page 3 for a discussion of these risks.

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.

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The date of this Prospectus is April ____, 2012

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You should rely only on the information contained in this prospectus and in any accompanying prospectus supplement. We have not authorized anyone to provide you with different information.

We have not authorized the selling stockholders to make an offer of these shares of common stock in any jurisdiction where the offer is not permitted.

You should not assume that the information in this prospectus or prospectus supplement is accurate as of any date other than the date on the front of this prospectus.

PROSPECTUS SUMMARY

This summary highlights information contained elsewhere in this prospectus. It does not contain all of the information that you should consider before investing in our securities. Please read the entire prospectus carefully, including the section entitled "Risk Factors" and our consolidated financial statements and the related notes. We have not authorized anyone else to provide you with different information, and if you receive any unauthorized information you should not rely on it. The information appearing in this prospectus is accurate only as of its date. Our business, financial condition, results of operations and prospects may have changed since that date.

You should not invest unless you can afford to lose your entire investment.

Company Overview

GeoVax Labs, Inc. is a biotechnology company developing vaccines that prevent and fight Human Immunodeficiency Virus ("HIV") infections. HIV infections result in Acquired Immunodeficiency Syndrome ("AIDS"). We have exclusively licensed from Emory University ("Emory") vaccine technology which was developed in collaboration with the United States National Institutes of Health ("NIH") and the United States Centers for Disease Control and Prevention ("CDC").

Our current vaccines under development address the clade B subtype of the HIV virus that is most prevalent in the United States and the developed world. Our vaccines are being evaluated to determine their potential to (a) prevent HIV infection and (b) to serve as a therapy for individuals who are already infected with HIV. These vaccines are currently being evaluated in humans -- both in those infected with HIV and those who are not.

Our vaccines incorporate two delivery components: a recombinant deoxyribonucleic acid, or DNA vaccine, and a recombinant poxvirus designated modified vaccinia Ankara, or MVA vaccine. Both the DNA and MVA vaccines contain sufficient HIV genes to support the production of non-infectious virus-like particles. These particles display the native trimeric-membrane-bound form of the viral envelope glycoprotein that mediates entry into cells and is the target for protective antibody. When used together, the recombinant DNA component primes immune responses, which are boosted by administration of the recombinant MVA component. We are also testing a new version of our preventive vaccine that co-expresses granulocyte-macrophage colony-stimulating factor (GM-CSF) in the DNA vaccine used to prime the immune response.

Work on our vaccines began during the 1990s at Emory University in Atlanta, Georgia, under the direction of Dr. Harriet L. Robinson, who is now our Chief Scientific Officer. The vaccine technology was developed in collaboration with researchers at the NIH and the CDC. The technology developed by the collaboration is exclusively licensed to us from Emory University.

Our common stock is quoted on the OTC Bulletin Board under the symbol "GOVX." On March 30, 2012, the last reported sale price for our common stock on the OTC Bulletin Board was $0.97 per share.

As used herein, "GeoVax," the "Company," "we," "our," and similar terms include GeoVax Labs, Inc., and its operating subsidiary, GeoVax, Inc., unless the context indicates otherwise.

We are incorporated under the laws of the State of Delaware. Our principal executive offices are located at 1900 Lake Park Drive, Suite 380, Smyrna, Georgia 30080 (metropolitan Atlanta). Our telephone number is (678) 384-7220. The address of our website is www.geovax.com. Information on our website is not part of this prospectus.

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The Offering

Common stock offered by selling stockholders	Up to 11,733,332 shares, consisting of 2,933,333 shares of common stock underlying Series A Preferred Stock owned by selling stockholders and 8,799,999 shares of common stock issuable upon the exercise of Series A, B or C Warrants held by the selling stockholders. This number represents approximately 41% of our current outstanding common stock, on a fully diluted basis.(1)
Common stock outstanding before the offering	16,850,610 shares (1)
Common stock outstanding after the offering, assuming all the shares of Series A Preferred Stock are converted into common stock and the Series A, B and C Warrants are exercised for cash.	28,583,942 shares (1)
Proceeds to us	We will not receive any proceeds from the sale of common stock covered by this prospectus. We will, however, receive approximately $8.1 million from the exercise of the Series A, B, and C Warrants held by the selling stockholders, if they are exercised in full for cash.
Trading Symbol	GOVX
Risk Factors	There are significant risks involved in investing in our Company. For a discussion of risk factors you should consider before buying our common stock. See “Risk Factors” beginning on page 3.

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(1) The number of shares of our common stock to be outstanding after this offering is based on the number of shares outstanding as of March 30, 2012 and excludes:

- 1,197,529 shares of common stock reserved for future issuance under our equity incentive plans. As of March 30, 2012, there were options to purchase 922,042 shares of our common stock outstanding under our equity incentive plans with a weighted average exercise price of $5.45 per share;

- 2,482,560 shares of common stock issuable upon exercise of currently outstanding warrants (but not including the Series A, B and C Warrants) as of March 30, 2012, with a weighted average exercise price of $6.24 per share;

RISK FACTORS

You should carefully consider the risks, uncertainties and other factors described below before you decide whether to buy shares of our common stock. Any of the factors could materially and adversely affect our business, financial condition, operating results and prospects and could negatively impact the market price of our common stock. Also, you should be aware that the risks and uncertainties described below are not the only ones we face. Additional risks and uncertainties, of which we are not yet aware, or that we currently consider to be immaterial, may also impair our business operations. You should also refer to the other information contained in and incorporated by reference into this prospectus, including our financial statements and the related notes.

Risks Related to Our Financial Results and Need for Additional Financing

We have a history of operating losses, and we expect losses to continue for the foreseeable future.

We have had no product revenue to date and there can be no assurance that we will ever generate any product revenue. We have experienced operating losses since we began operations in 2001. As of December 31, 2011, we had an accumulated deficit of approximately $22.6 million. We expect to incur additional operating losses and expect cumulative losses to increase as our research and development, pre-clinical, clinical, manufacturing and marketing efforts expand. Our ability to generate revenue and achieve profitability depends on our ability to successfully complete the development of our product candidates, conduct pre-clinical tests and clinical trials, obtain the necessary regulatory approvals, and manufacture and market the resulting products. Unless we are able to successfully meet these challenges, we will not be profitable and may not remain in business.

Our business will require continued funding. If we do not receive adequate funding, we will not be able to continue our operations.

To date, we have financed our operations principally through the private placement of equity securities and through NIH grants. We will require substantial additional financing at various intervals for our operations, including clinical trials, operating expenses, intellectual property protection and enforcement, for pursuit of regulatory approvals, and for establishing or contracting out manufacturing, marketing and sales functions. There is no assurance that such additional funding will be available on terms acceptable to us or at all. If we are not able to secure the significant funding that is required to maintain and continue our operations at current levels, or at levels that may be required in the future, we may be required to delay clinical studies or clinical trials, curtail operations, or obtain funds through collaborative arrangements that may require us to relinquish rights to some of our products or potential markets.

The costs of conducting all of our human clinical trials to date have been borne by the HIV Vaccine Trials Network ("HVTN"), funded by the NIH, with GeoVax incurring costs associated with manufacturing the clinical vaccine supplies and other study support. This includes the cost of conducting the ongoing Phase 2a human clinical study of our preventive vaccine. We cannot predict the level of support we will receive from the HVTN or the NIH for any additional clinical trials. We are currently not receiving any governmental support for our Phase 1/2 therapeutic vaccine human clinical trial.

Our operations are also partially supported by the Integrated Preclinical/Clinical AIDS Vaccine Development ("IPCAVD") grant awarded to us to support our HIV/AIDS vaccine program. The project period for the grant covers a five year period which commenced October 2007, with an aggregate award of $20.4 million. As of December 31, 2011, there is approximately $3.9 million of unused grant funds remaining and available for use through August 31, 2012 (the end of the original project period). We intend to pursue additional grants from the federal government. However, as we progress to the later stages of our vaccine development activities, government financial support may be more difficult to obtain, or may not be available at all. Therefore, it will be necessary for us

to look to other sources of funding in order to finance our development activities.

Our current working capital, combined with proceeds from the IPCAVD grant awarded from the NIH will be sufficient to support our planned level of operations into the first quarter of 2013, without giving consideration to the potential proceeds from exercise of the Series A, B or C Warrants. In order to meet our operating cash flow requirements we plan additional offerings of our equity securities, debt, or convertible debt instruments. Should the financing we require to sustain our working capital needs be unavailable or prohibitively expensive when we require it, the consequences could have a material adverse effect on our business, operating results, financial condition and prospects.

The current economic conditions may adversely impact our ability to raise capital.

The recession and adverse conditions in the national and global markets may negatively affect both our ability to raise capital and our operations in the future. The volatile equity markets and adverse credit markets may make it difficult for us to raise capital or procure credit in the future to fund the growth of our business, which could have a negative impact on our business and results of operations.

Risks Related to Development and Commercialization of Product Candidates and Dependence on Third Parties

Our products are still being developed and are unproven. These products may not be successful.

To become profitable, we must generate revenue through sales of our products. However our products are in varying stages of development and testing. Our products have not been proven in human clinical trials and have not been approved by any government agency for sale. If we cannot successfully develop and prove our products and processes, or if we do not develop other sources of revenue, we will not become profitable and at some point we would discontinue operations.

Whether we are successful will be dependent, in part, upon the leadership provided by our management. If we were to lose the services of any of these individuals, our business and operations may be adversely affected. Further, we may not carry key man life insurance on our executive officers or directors.

Whether our business will be successful will be dependent, in part, upon the leadership provided by our officers, particularly our President and Chief Executive Officer and our Chief Scientific Officer. The loss of the services of these individuals may have an adverse effect on our operations. Although we carry some key man life insurance on Dr. Harriet L. Robinson, the amount of such coverage may not be sufficient to offset any adverse economic effects on our operations and we do not carry key man insurance on any of our other executive officers or directors. Further, our employees, including our executive officers and directors, are not subject to any covenants not to compete against the Company, and our business could be adversely affected if any of our employees or directors engaged in an enterprise competitive with the Company.

Regulatory and legal uncertainties could result in significant costs or otherwise harm our business.

To manufacture and sell our products, we must comply with extensive domestic and international regulation. In order to sell our products in the United States, approval from the FDA is required. Satisfaction of regulatory requirements, including FDA requirements, typically takes many years, and if approval is obtained at all, it is dependent upon the type, complexity and novelty of the product, and requires the expenditure of substantial resources. We cannot predict whether our products will be approved by the FDA. Even if they are approved, we cannot predict the time frame for approval. Foreign regulatory requirements differ from jurisdiction to jurisdiction and may, in some cases, be more stringent or difficult to meet than FDA requirements. As with the FDA, we cannot predict if or when we may obtain these regulatory approvals. If we cannot demonstrate that our products can be used safely and successfully in a broad segment of the patient population on a long-term basis, our products would likely be denied approval by the FDA and the regulatory agencies of foreign governments.

We will face intense competition and rapid technological change that could result in products that are superior to the products we will be commercializing or developing.

The market for vaccines that protect against or treat HIV/AIDS is intensely competitive and is subject to rapid and significant technological change. We will have numerous competitors in the United States and abroad, including, among others, large companies with substantially greater resources than us. These competitors may develop

technologies and products that are more effective or less costly than any of our future technology or products or that could render our technology or products obsolete or noncompetitive. If our technology or products are not competitive, we may not be able to remain in business.

Our product candidates are based on new medical technology and, consequently, are inherently risky. Concerns about the safety and efficacy of our products could limit our future success.

We are subject to the risks of failure inherent in the development of product candidates based on new medical technologies. These risks include the possibility that the products we create will not be effective, that our product candidates will be unsafe or otherwise fail to receive the necessary regulatory approvals, and that our product candidates will be hard to manufacture on a large scale or will be uneconomical to market.

Many pharmaceutical products cause multiple potential complications and side effects, not all of which can be predicted with accuracy and many of which may vary from patient to patient. Long term follow-up data may reveal additional complications associated with our products. The responses of potential physicians and others to information about complications could materially affect the market acceptance of our products, which in turn would materially harm our business.

We may experience delays in our clinical trials that could adversely affect our financial results and our commercial prospects.

We do not know whether planned clinical trials will begin on time or whether we will complete any of our clinical trials on schedule, if at all. Product development costs will increase if we have delays in testing or approvals or if we need to perform more or larger clinical trials than planned. Significant delays may adversely affect our financial results and the commercial prospects for our products, and delay our ability to become profitable.

We rely heavily on the HVTN, independent clinical investigators, and other third party service providers for successful execution of our clinical trials, but do not control many aspects of their activities. We are responsible for ensuring that each of our clinical trials is conducted in accordance with the general investigational plan and protocols for the trial. Moreover, the FDA requires us to comply with standards, commonly referred to as Good Clinical Practices, for conducting, recording, and reporting the results of clinical trials to assure that data and reported results are credible and accurate and that the rights, integrity and confidentiality of trial participants are protected. Our reliance on third parties that we do not control does not relieve us of these responsibilities and requirements. Third parties may not complete activities on schedule, or may not conduct our clinical trials in accordance with regulatory requirements or our stated protocols. The failure of these third parties to carry out their obligations could delay or prevent the development, approval and commercialization of our product candidates.

Failure to obtain timely regulatory approvals required to exploit the commercial potential of our products could increase our future development costs or impair our future sales.

None of our vaccines are approved by the FDA for sale in the United States or by other regulatory authorities for sale in foreign countries. To exploit the commercial potential of our technologies, we are conducting and planning to conduct additional pre-clinical studies and clinical trials. This process is expensive and can require a significant amount of time. Failure can occur at any stage of testing, even if the results are favorable. Failure to adequately demonstrate safety and efficacy in clinical trials could delay or preclude regulatory approval and restrict our ability to commercialize our technology or products. Any such failure may severely harm our business. In addition, any approvals we obtain may not cover all of the clinical indications for which approval is sought, or may contain significant limitations in the form of narrow indications, warnings, precautions or contraindications with respect to conditions of use, or in the form of onerous risk management plans, restrictions on distribution, or post-approval study requirements.

State pharmaceutical marketing compliance and reporting requirements may expose us to regulatory and legal action by state governments or other government authorities.

In recent years, several states have enacted legislation requiring pharmaceutical companies to establish marketing compliance programs and file periodic reports on sales, marketing, pricing and other activities. Similar legislation is being considered in other states. Many of these requirements are new and uncertain, and available guidance is limited. Unless we are in full compliance with these laws, we could face enforcement action and fines and other penalties and could receive adverse publicity, all of which could harm our business.

We may be subject to new federal and state legislation to submit information on our open and completed clinical trials to public registries and databases.

In 1997, a public registry of open clinical trials involving drugs intended to treat serious or life-threatening diseases or conditions was established under the FDA Modernization Act, or the FDMA, to promote public awareness of and access to these clinical trials. Under the FDMA, pharmaceutical manufacturers and other trial sponsors are required to post the general purpose of these trials, as well as the eligibility criteria, location and contact information of the trials.

Since the establishment of this registry, there has been significant public debate focused on broadening the types of trials included in this or other registries, as well as providing for public access to clinical trial results. A voluntary coalition of medical journal editors has adopted a resolution to publish results only from those trials that have been registered with a no-cost, publicly accessible database, such as www.clinicaltrials.gov. Federal legislation was introduced in the fall of 2004 to expand www.clinicaltrials.gov and to require the inclusion of trial results in this registry. The Pharmaceutical Research and Manufacturers of America also issued voluntary principles for its members to make results from certain clinical trials publicly available and established a website for this purpose. Other groups have adopted or are considering similar proposals for clinical trial registration and the posting of clinical trial results. Failure to comply with any clinical trial posting requirements could expose us to negative publicity, fines and other penalties, all of which could materially harm our business.

We will face uncertainty related to pricing and reimbursement and health care reform.

In both domestic and foreign markets, sales of our products will depend in part on the availability of reimbursement from third-party payers such as government health administration authorities, private health insurers, health maintenance organizations and other health care-related organizations. Reimbursement by such payers is presently undergoing reform and there is significant uncertainty at this time how this will affect sales of certain pharmaceutical products.

Medicare, Medicaid and other governmental healthcare programs govern drug coverage and reimbursement levels in the United States. Federal law requires all pharmaceutical manufacturers to rebate a percentage of their revenue arising from Medicaid-reimbursed drug sales to individual states. Generic drug manufacturers' agreements with federal and state governments provide that the manufacturer will remit to each state Medicaid agency, on a quarterly basis, 11% of the average manufacturer price for generic products marketed and sold under abbreviated new drug applications covered by the state's Medicaid program. For proprietary products, which are marketed and sold under new drug applications, manufacturers are required to rebate the greater of (a) 15.1% of the average manufacturer price or (b) the difference between the average manufacturer price and the lowest manufacturer price for products sold during a specified period.

Both the federal and state governments in the United States, and foreign governments, continue to propose and pass new legislation, rules and regulations designed to contain or reduce the cost of health care. Existing regulations that affect the price of pharmaceutical and other medical products may also change before any of our products are approved for marketing. Cost control initiatives could decrease the price that we receive for any product developed in the future. In addition, third-party payers are increasingly challenging the price and cost-effectiveness of medical products and services and litigation has been filed against a number of pharmaceutical companies in relation to these issues. Additionally, some uncertainty may exist as to the reimbursement status of newly approved injectable pharmaceutical products. Our products may not be considered cost-effective or adequate third-party reimbursement may not be available to enable us to maintain price levels sufficient to realize an adequate return on our investment.

We may not be successful in establishing collaborations for product candidates we may seek to commercialize, which could adversely affect our ability to discover, develop, and commercialize products.

We expect to seek collaborations for the development and commercialization of product candidates in the future. The timing and terms of any collaboration will depend on the evaluation by prospective collaborators of the clinical trial results and other aspects of our vaccine's safety and efficacy profile. If we are unable to reach agreements with suitable collaborators for any product candidate, we will be forced to fund the entire development and commercialization of such product candidates, ourselves, and we may not have the resources to do so. If resource constraints require us to enter into a collaboration agreement early in the development of a product candidate, we may be forced to accept a more limited share of any revenues this product may eventually generate. We face significant competition in seeking appropriate collaborators. Moreover, these collaboration arrangements are complex and time-consuming to negotiate and document. We may not be successful in our efforts to establish collaborations or other alternative arrangements for any product candidate. Even if we are successful in establishing collaborations, we may not be able to ensure fulfillment by collaborators of their obligations or our expectations.

We do not have manufacturing, sales or marketing experience.

We do not have experience in manufacturing, selling, or marketing vaccines. To obtain the expertise necessary to successfully manufacture, market, and sell our vaccines, we will require the development of our own commercial infrastructure and/or collaborative commercial arrangements and partnerships. Our ability to execute our current operating plan is dependent on numerous factors, including, the performance of third party collaborators with whom

we may contract.

Our vaccines under development may not gain market acceptance.

Our vaccines may not gain market acceptance among physicians, patients, healthcare payers and the medical community. Significant factors in determining whether we will be able to compete successfully include:

- the efficacy and safety of our vaccines;
- the time and scope of regulatory approval;
- reimbursement coverage from insurance companies and others;
- the price and cost-effectiveness of our products, and
- the ability to maintain patent protection.

We may be required to defend lawsuits or pay damages for product liability claims.

Product liability is a major risk in testing and marketing biotechnology and pharmaceutical products. We may face substantial product liability exposure in human clinical trials and for products that we sell after regulatory approval. We carry product liability insurance and we expect to continue such policies. However, product liability claims, regardless of their merits, could exceed policy limits, divert management's attention, and adversely affect our reputation and the demand for our products.

Risks Related to Our Intellectual Property

We could lose our license rights to our important intellectual property if we do not fulfill our contractual obligations to our licensors.

Our rights to significant parts of the technology we use in our vaccines are licensed from third parties and are subject to termination if we do not fulfill our contractual obligations to our licensors. Termination of intellectual property rights under any of our license agreements could adversely impact our ability to produce or protect our vaccines. Our obligations under our license agreements include requirements that we make milestone payments to our licensors upon the achievement of clinical development and regulatory approval milestones, royalties as we sell commercial products, and reimbursement of patent filing and maintenance expenses. Should we become bankrupt or otherwise unable to fulfill our contractual obligations, our licensors could terminate our rights to critical technology that we rely upon.

Other parties may claim that we infringe their intellectual property or proprietary rights, which could cause us to incur significant expenses or prevent us from selling products.

Our success will depend in part on our ability to operate without infringing the patents and proprietary rights of third parties. The manufacture, use and sale of new products have been subject to substantial patent rights litigation in the pharmaceutical industry. These lawsuits generally relate to the validity and infringement of patents or proprietary rights of third parties. Infringement litigation is prevalent with respect to generic versions of products for which the patent covering the brand name product is expiring, particularly since many companies that market generic products focus their development efforts on products with expiring patents. Pharmaceutical companies, biotechnology companies, universities, research institutions or other third parties may have filed patent applications or may have been granted patents that cover aspects of our products or our licensors' products, product candidates or other technologies.

Future or existing patents issued to third parties may contain patent claims that conflict with our products. We expect to be subject to infringement claims from time to time in the ordinary course of business, and third parties could assert infringement claims against us in the future with respect to our current products or with respect to products that we may develop or license. Litigation or interference proceedings could force us to:

- stop or delay selling, manufacturing or using products that incorporate, or are made using the challenged intellectual property;
- pay damages; or
- enter into licensing or royalty agreements that may not be available on acceptable terms, if at all.

Any litigation or interference proceedings, regardless of their outcome, would likely delay the regulatory approval process, be costly and require significant time and attention of our key management and technical personnel.

Any inability to protect intellectual property rights in the United States and foreign countries could limit our ability to manufacture or sell products.

We will rely on trade secrets, unpatented proprietary know-how, continuing technological innovation and, in some cases, patent protection to preserve our competitive position. Our patents and licensed patent rights may be challenged, invalidated, infringed or circumvented, and the rights granted in those patents may not provide proprietary protection or competitive advantages to us. We and our licensors may not be able to develop patentable products. Even if patent claims are allowed, the claims may not issue, or in the event of issuance, may not be sufficient to protect the technology owned by or licensed to us. If patents containing competitive or conflicting claims are issued to third parties, we may be prevented from commercializing the products covered by such patents, or may be required to obtain or develop alternate technology. In addition, other parties may duplicate, design around or independently develop similar or alternative technologies.

We may not be able to prevent third parties from infringing or using our intellectual property, and the parties from whom we may license intellectual property may not be able to prevent third parties from infringing or using the licensed intellectual property. We generally will attempt to control and limit access to, and the distribution of, our product documentation and other proprietary information. Despite efforts to protect this proprietary information, unauthorized parties may obtain and use information that we may regard as proprietary. Other parties may independently develop similar know-how or may even obtain access to these technologies.

The laws of some foreign countries do not protect proprietary information to the same extent as the laws of the United States, and many companies have encountered significant problems and costs in protecting their proprietary information in these foreign countries.

Neither the U.S. Patent and Trademark Office nor the courts have established a consistent policy regarding the breadth of claims allowed in pharmaceutical patents. The allowance of broader claims may increase the incidence and cost of patent interference proceedings and the risk of infringement litigation. On the other hand, the allowance of narrower claims may limit the value of our proprietary rights.

Risks Related to Our Common Stock

The market price of our common stock is highly volatile.

The market price of our common stock has been, and is expected to continue to be, highly volatile. Certain factors, including announcements of new developments by us or other companies, regulatory matters, new or existing medicines or procedures, concerns about our financial position, operating results, litigation, government regulation, developments or disputes relating to agreements, patents or proprietary rights, may have a significant impact on the market price of our stock. In addition, potential dilutive effects of future sales of shares of common stock by us, and subsequent sales of common stock by the holders of warrants and options could have an adverse effect on the market price of our shares.

Our common stock does not have a vigorous trading market and investors may not be able to sell their securities when desired.

We have a limited active public market for our common shares. A more active public market, allowing investors to sell large quantities of our common stock, may never develop. Consequently, investors may not be able to liquidate their investments in the event of an emergency or for any other reason.

We have never paid dividends and have no plans to do so.

Holders of shares of our common stock are entitled to receive such dividends as may be declared by our Board of Directors. To date, we have paid no cash dividends on our shares of common stock and we do not expect to pay cash dividends on our common stock in the foreseeable future. We intend to retain future earnings, if any, to provide funds for operations of our business. Therefore, any potential return investors in our common stock may have will be in the form of appreciation, if any, in the market value of their shares of common stock.

If we fail to maintain an effective system of internal controls, we may not be able to accurately report our financial results or prevent fraud.

We are subject to reporting obligations under the United States securities laws. The Securities and Exchange Commission, or the SEC, as required by the Sarbanes-Oxley Act of 2002, adopted rules requiring every public company to include a management report on such company’s internal controls over financial reporting in its annual report. Effective internal controls are necessary for us to produce reliable financial reports and are important to help prevent fraud. As a result, our failure to achieve and maintain effective internal controls over financial reporting could result in the loss of investor confidence in the reliability of our financial statements, which in turn could negatively impact the trading price of our stock.

If we fail to remain current in our reporting requirements, our securities could be removed from the OTC Bulletin Board, which would limit the ability of broker-dealers to sell our securities and the ability of stockholders to

sell their securities in the secondary market.

United States companies trading on the OTC Bulletin Board must be reporting issuers under Section 12 of the Exchange Act, and must be current in their reports under Section 13. If we fail to remain current on our reporting requirements, we could be removed from the OTC Bulletin Board. As a result, the market liquidity for our securities could be severely adversely affected by limiting the ability of broker-dealers to sell our securities and the ability of stockholders to sell their securities in the secondary market.

We expect to need additional capital, and the sale of additional shares or other equity securities could result in additional dilution to our stockholders.

We believe that our current cash and cash equivalents, combined with anticipated cash flow from the IPCAVD grant, will be sufficient to meet our anticipated cash needs into the first quarter of 2013, without giving consideration to the potential proceeds from exercise of the Series A, B or C Warrants. In order to meet our operating cash flow requirements we plan additional offerings of our equity securities, debt, or convertible debt instruments. The sale of additional equity securities could result in additional dilution to our stockholders. Certain equity securities, such as convertible preferred stock, or warrants, may contain anti-dilution provisions which could result in the issuance of additional shares at lower prices if we sell other shares below specified prices. The incurrence of indebtedness would result in debt service obligations and could result in operating and financing covenants that would restrict our operations. We cannot assure investors that financing will be available in amounts or on terms acceptable to us, if at all.

Our directors and executive officers beneficially own a significant amount of our common stock and will be able to exercise significant influence on matters requiring stockholder approval.

Our directors and executive officers collectively beneficially own approximately 14.3% of our common stock as of March 30, 2012. Consequently, our directors and executive officers as a group are able to exert significant influence over the election of directors and the outcome of most corporate actions requiring stockholder approval and our business, which may have the effect of delaying or precluding a third party from acquiring control of us. Furthermore, Emory University beneficially owns 27.4% of our common stock as of March 30, 2012. If our directors and executive officers move to act in concert with Emory University, their ability to influence stockholder actions will be even more significant.

The exercise of warrants or options or conversion of our Series A Convertible Preferred Stock may depress our stock price and may result in significant dilution to our common stockholders.

There are a significant number of outstanding warrants and options to purchase our stock and we have issued Series A Convertible Preferred Stock that is convertible into our Common Stock. If the market price of our Common Stock exceeds the exercise price of outstanding warrants and options or the conversion price of the Series A Convertible Preferred Stock, holders of those securities may be likely to exercise their warrants and options or convert their preferred shares and sell the Common Stock acquired upon exercise or conversion of such securities, as applicable, in the open market. Sales of a substantial number of shares of our Common Stock in the public market by holders of warrants, options, or preferred shares may depress the prevailing market price for our Common Stock and could impair our ability to raise capital through the future sale of our equity securities. Additionally, if the holders of outstanding options, warrants, or preferred shares exercise those options or warrants or convert those preferred shares, as applicable, our common stockholders will incur dilution in their relative percentage ownership. The prospect of this possible dilution may also impact the price of our Common Stock.

Our outstanding warrants include the Series A, B, and C Warrants to purchase up to 8,799,999 shares of our Common Stock that were issued in March 2012. Of these, warrants to purchase up to 2,933,333 shares have an exercise price of $0.75 per share, and warrants to purchase up to 5,866,666 shares have an exercise price of $1.00 per share. These warrants contain anti-dilution provisions, which may, under certain circumstances, reduce the exercise price (but have no effect on the number of shares subject to the warrants) to match if we sell or grant options to purchase, including rights to reprice, our common stock or common stock equivalents at a price lower than the exercise price of the warrants, or if we announce plans to do so. This potential reduction in exercise price could reduce the funds the Company receives upon exercise of the warrants, and increase the likelihood that a dilutive issuance will occur.

The Series A Convertible Preferred Stock provides for an adjustment to the conversion price if on specified dates certain conditions relating to the ability of the holders to sell the Common Stock issuable upon conversion of the preferred shares pursuant to either an effective registration statement under the Securities Act of 1933 or Rule 144 are not satisfied, then the conversion price shall be reduced to the lesser of (a) the then conversion price, as adjusted and taking into consideration any prior resets, (b) 85% of the volume weighted average price of the Common Stock for the 5 trading days immediately following each such date, as calculated pursuant to the AQR function on Bloomberg L.P., (c) 85% of the average of the volume weighted average prices for the Common Stock for each of the 5 trading days immediately following the date and (d) 85% of the closing bid price on the last trading day of the 5 trading days immediately following each such date, which shall thereafter be the new conversion price. The adjusted Conversion Price shall not be lower than $0.32. This potential reduction in conversion price could increase the number of shares that could be issued upon conversion of the preferred shares and the resulting dilution to the other holders of Common Stock.

Our Common Stock is and likely will remain subject to the SEC's "Penny Stock" rules, which may make its shares more difficult to sell.

Our Common Stock is currently and may remain classified as a "penny stock." The SEC rules regarding penny stocks may have the effect of reducing trading activity in our shares, making it more difficult for investors to sell. Under these rules, broker-dealers who recommend such securities to persons other than institutional accredited investors must:

- make a special written suitability determination for the purchaser;
- receive the purchaser's written agreement to a transaction prior to sale;
- provide the purchaser with risk disclosure documents which identify certain risks associated with investing in "penny stocks" and which describe the market for these "penny stocks" as well as a purchaser's legal remedies;
- obtain a signed and dated acknowledgment from the purchaser demonstrating that the purchaser has received the required risk disclosure document before a transaction in a "penny stock" can be completed; and
- give bid and offer quotations and broker and salesperson compensation information to the customer orally or in writing before or with the confirmation.

These rules make it more difficult for broker-dealers to effectuate customer transactions and trading activity in our securities and may result in a lower trading volume of our common stock and lower trading prices.

Certain provisions of our certificate of incorporation which authorize the issuance of additional shares of preferred stock may make it more difficult for a third party to effect a change in control.

Our certificate of incorporation authorizes our Board of Directors to issue up to 10,000,000 shares of preferred stock. We have issued 2,200 shares of Series A Convertible Preferred Stock. We believe the terms of these preferred shares would not have a substantial impact on the ability of a third party to effect a change in control. The remaining shares of preferred stock may be issued in one or more series, the terms of which may be determined at the time of issuance by our Board of Directors without further action by the stockholders. These terms may include voting rights including the right to vote as a series on particular matters, preferences as to dividends and liquidation, conversion rights, redemption rights and sinking fund provisions. The issuance of any preferred stock could diminish the rights of holders of our common stock, and therefore could reduce the value of our common stock. In addition, specific rights granted to future holders of preferred stock could be used to restrict our ability to merge with, or sell assets to, a third party. The ability of our Board of Directors to issue preferred stock could make it more difficult, delay, discourage, prevent or make it more costly to acquire or effect a change-in-control, which in turn could prevent the stockholders from recognizing a gain in the event that a favorable offer is extended and could materially and negatively affect the market price of our common stock.

Certain provision of the warrants we issued in March 2012 may make it more difficult for a third party to effect a change in control.

The Series A, B and C Warrants contain provisions which permit the holders to require the payment to them of an amount of cash equal to the value (based on a Black-Scholes computation) of the remaining unexercised portion of the warrants on the date of the consummation of a fundamental transaction (as defined, but generally a change in control of the Company) that is (i) an all cash transaction, (ii) a "going private" transaction, or (ii) a transacting involving a person or entity not traded on a national securities exchange. The prospect of making such payments may discourage a potential third party acquirer.

FORWARD-LOOKING STATEMENTS

The information contained in this prospectus, includes forward-looking statements as defined in the Private Securities Reform Act of 1995. These forward-looking statements are often identified by words such as “may,” “will,” “expect,” “intend,” “anticipate,” “believe,” “estimate,” “continue,” “plan,” their negatives, and similar expressions, although not all forward-looking statements contain these identifying words. These statements involve estimates, assumptions and uncertainties that could cause actual results to differ materially from those expressed for the reasons described in this prospectus. You should not place undue reliance on these forward-looking statements.

The forward-looking statements contained in this prospectus are based on our expectations, which reflect estimates and assumptions made by our management. These estimates and assumptions reflect our best judgment based on currently known industry developments, our scientific work, contractual arrangements, and other factors. Although we believe such estimates and assumptions to be reasonable, they are inherently uncertain and involve a number of risks and uncertainties that are beyond our control. In addition, our assumptions about future events may prove to be inaccurate. We caution all readers that the forward-looking statements contained in this prospectus are not guarantees of future performance, and we cannot assure any reader that such statements will be realized or the forward-looking events and circumstances will occur. Actual results may differ materially from those anticipated or implied in the forward-looking statements due to the factors listed in the “Risk Factors” section and elsewhere in this prospectus. All forward-looking statements speak only as of the date of this prospectus. We do not intend to publicly update or revise any forward-looking statements as a result of new information, future events or otherwise. These cautionary statements qualify all forward-looking statements attributable to us, or persons acting on our behalf. The risks, contingencies and uncertainties relate to, among other matters, the following: our history of operating losses, our need for continued funding, the development stage of our vaccines, regulatory and legal uncertainties, competition, the difficulty of obtaining timely regulatory approvals, uncertainty as to third party reimbursements, the impact of healthcare reform, difficulties related to our intellectual property, and other factors discussed under “Risk Factors.”

Other factors besides those described in this prospectus and any prospectus supplement could also affect our actual results. These forward-looking statements are largely based on our expectations and beliefs concerning future events, which reflect estimates and assumptions made by our management. These estimates and assumptions reflect our best judgment based on currently known market conditions and other factors relating to our operations and business environment, all of which are difficult to predict and many of which are beyond our control.

USE OF PROCEEDS

We will not receive proceeds from the sales by the selling stockholders. If the Series A, B or C Warrants are exercised for cash, then we will receive the proceeds payable by the selling stockholders upon exercise of those warrants. If all of Series A, B, and C Warrants are exercised in full for cash, we will receive approximately $8.1 million. We will use these proceeds, if received, for general working capital purposes.

MARKET FOR OUR COMMON STOCK AND RELATED STOCKHOLDER MATTERS

Market Information

Our common stock is currently traded on the over-the-counter bulletin board market under the symbol “GOVX”. The following table sets forth the high and low bid prices for our common stock for the periods indicated. The prices represent quotations between dealers and do not include retail mark-up, markdown, or commission, and do not necessarily represent actual transactions:

	High	Low
2012		
First Quarter	$1.24	$0.77
2011		
Fourth Quarter	$1.94	$0.82
Third Quarter	$1.10	$0.80
Second Quarter	$1.40	$0.76
First Quarter	$1.53	$1.10
2010		
Fourth Quarter	$2.18	$0.63
Third Quarter	$3.35	$1.52
Second Quarter	$6.50	$2.25
First Quarter	$9.00	$5.00

On March 30, 2012, the last reported sale price for our common stock as reported in the over-the-counter bulletin board was $0.97 per share.

Holders

On March 30, 2012, there were approximately 1,000 holders of record of our common stock. The number of record holders does not reflect the number of beneficial owners of our common stock for whom shares are held by brokerage firms and other institutions.

Dividends

We have not paid any dividends since our inception and do not contemplate paying dividends in the foreseeable future.

BUSINESS

Company Overview

GeoVax, Labs, Inc. was formed in 2001 and is a biotechnology company developing vaccines that prevent and fight human immunodeficiency virus (HIV). HIV infections result in acquired immunodeficiency syndrome (AIDs). We are incorporated in Delaware, and our offices and laboratory facilities are located in Smyrna, Georgia (metropolitan Atlanta).

Our vaccines are being evaluated to determine their potential to (a) prevent HIV infection and (b) to serve as a treatment for individuals who are already infected with HIV. These vaccines are currently being evaluated in humans -- both in those infected with HIV and those who are not.

Our current vaccines under clinical development are designed to function against the clade B subtype of the HIV virus that is prevalent in the United States and the developed world. An estimated 3.5 million people are infected with clade B HIV virus and between 55,000 and 58,000 new infections occur in the U.S. every year. The cost of treating HIV infected individuals in the United States is estimated at $500,000 for each infected individual over their lifetime. We estimate the worldwide market opportunity for a clade B HIV vaccine (preventive and therapeutic) to be approximately $5 billion annually.

Subject to the availability of funding support from governmental or nongovernmental organizations, we also plan to develop vaccines designed for use to combat the subtypes of HIV that predominate in the developing countries.

Work on our vaccines began during the 1990s at Emory University in Atlanta, Georgia, under the direction of Dr. Harriet L. Robinson, who is now our Chief Scientific Officer. The vaccine technology was developed in collaboration with researchers at Emory University, the U.S. National Institutes of Health (NIH), and the U.S. Centers for Disease Control and Prevention (CDC). The technology developed by the collaboration is exclusively licensed to us from Emory University. We also have nonexclusive licenses to certain patents owned by the NIH and exclusive license rights to certain manufacturing process patents of MFD, Inc.

Our Vaccine Pipeline

The following table summarizes key information regarding our vaccine candidates:

Vaccine Candidate	Indication	Stage of Development	Clinical Trial Sponsor
B – DNA/MVA	HIV – Preventive Vaccine (Clade B)	Clinical – Phase 2a	NIH/HVTN
B – DNA-GM/MVA	HIV – Preventive Vaccine (Clade B)	Clinical – Phase 1	NIH/HVTN
B – DNA/MVA	HIV – Treatment Vaccine (Clade B)	Clinical – Phase 1/2	GeoVax
B – DNA-GM/MVA	HIV – Treatment Vaccine (Clade B)	Planning – Phase 1/2	NIH/IMPAACT
C – DNA/MVA	HIV – Preventive Vaccine (Clade C)	Preclinical	n/a
C – MVA	HIV – Preventive Vaccine (Clade C)	Preclinical	n/a

Our preventive vaccines are being tested in humans by the HVTN and are funded by the NIH. The first generation of our preventive vaccine is one of only 5 vaccine candidates out of more than 80 tested by the HVTN to have successfully progressed to Phase 2 testing. In Phase 1 human trials in uninfected people, our vaccines have shown excellent safety and induced both anti-viral antibodies and anti-viral T cells. The results of a two group, 30 participant, Phase 1 trial (designated HVTN 048) are published in AIDS RESEARCH AND HUMAN RETROVIRUSES 22:678 (2006) and of a four group 120 participant trial (HVTN 065) in The Journal of Infectious Diseases 203:610

(2011). Our Phase 1 trials have tested both safety and dosing regimens.

The 300 participant Phase 2a clinical trial of our preventive vaccine (HVTN 205) further tested safety and immunogenicity of the two most promising regimens evaluated in phase 1: (1) Priming with DNA at months 0 and 2 and boosting with MVA at months 4 and 6 and (2) priming and boosting with MVA at months 0, 2 and 6. The HVTN 205 trial is fully enrolled and patient inoculations were completed in January 2012. We expect study analysis and completion of the trial during 2012.

The HVTN has also agreed to sponsor and conduct clinical testing in humans of a new version of our preventive vaccine that co-expresses granulocyte-macrophage colony-stimulating factor (GM-CSF) in the DNA vaccine used to prime the vaccine response. In preclinical studies in non-human primates, co-expression of GM-CSF in a simian prototype of the DNA vaccine improved the ability of the vaccine to prevent infection. In a study employing 12 successive weekly exposures to simian immunodeficiency virus (SIV), vaccinating in the presence of co-expressed GM-CSF prevented infection in 70% of the animals for a 90% reduction in per exposure risk of transmission, whereas vaccinating in the absence of the co-expressed GM-CSF prevented infection in only 25% of animals and achieved a less effective 60% reduction in the per exposure risk of transmission (The Journal of Infectious Diseases, 204:164 (2011)). In normal humans, GM-CSF stimulates the expansion and differentiation of cells in the macrophage and dendritic cell lineages that promote immune responses. The use of GM-CSF in humans is anticipated to have good safety based on its licensure for stimulating production of white blood cells after autologous bone marrow transplantation, as a treatment for fungal infections, and as an adjuvant for the Provenge® prostate cancer vaccine. Research into the potential benefits of adding GM-CSF to our vaccine has been supported by a $20.4 million IPCAVD grant awarded by the NIH to GeoVax in 2007 and covering a five year period ending in 2012. Clinical testing of the GM-CSF co-expressing vaccine is expected to commence in the second quarter of 2012. Pending successful outcome of this trial, we expect to carry forward this version of our preventive vaccine into Phase 2b efficacy testing. We have scheduled vaccine production and have begun discussions about protocol development with potential government sponsors.

Our therapeutic (treatment) vaccine is in Phase 1/2 human clinical testing that we are sponsoring. These trials were initiated based on promising preclinical data from therapeutic trials in HIV-infected non-human primates. In these studies, non-human primates were infected, drug-treated, vaccinated and then drug-interrupted. Following treatment interruption, median levels of virus in blood, measured as viral RNA, were 10 to 1000-times lower (overall median of 100-times lower) than those measured prior to drug and vaccine treatment. The therapeutic reductions in virus levels were associated with the vaccination regimen eliciting T-cells (a form of white blood cell) with functional characteristics known to successfully control viral infections. We expect to complete patient enrollment of the Phase 1/2 human trial of our therapeutic vaccine during 2012 and to generate data in 2013.

We are also planning a Phase 1 therapeutic clinical trial to investigate the use of our vaccine in combination with standard-of-care drug therapy in young adults. This trial would be supported by the International Maternal Pediatric Adolescent AIDS Clinical Trial Group (IMPAACT). The NIH has recently prioritized searching for a cure for those individuals who are HIV positive. Because of the mechanisms by which current oral drugs work, if the virus is in a latent phase these drugs are not effective, thus it is impossible to totally eradicate the virus. Current approaches to a cure include using an effective vaccine and oral medication together to more effectively eradicate virus. This trial has been assigned a clinical study number (P-1082) and, pending successful committee reviews and FDA approval, we are hopeful that this study will commence in late 2012.

Background – Viruses and Vaccines

What are Viruses? Viruses are microscopic organisms consisting of genetic material comprised of deoxyribonucleic acid (“DNA”) or ribonucleic acid (“RNA”), surrounded by a protein, lipid (fat), or glycoprotein coat. Viruses invade healthy, living host cells in order to replicate and spread. In many cases, the body’s immune system can recognize and effectively combat an infection caused by a virus. However, with certain viral infections, the body’s immune system is unable to fully destroy or inhibit the replication of the virus, which results in persistent and ongoing viral replication resulting in disease.

Infections caused by viruses can be chronic or acute. Chronic infections, such as those caused by HIV, do not typically self-resolve with time and can cause chronic disease. Acute infections associated with viruses, such as influenza, generally last for a relatively short period of time, and self-resolve in most immuno-competent individuals.

Viruses can also be characterized as either active or latent. An active virus can cause a persistent infection or disease over an extended period of time. A latent virus will remain in the body for very long periods of time after the initial infection and generally will only cause disease when the body’s immune system weakens, fails or is suppressed, allowing the virus to once again replicate. Vaccines have been widely used to prevent active viral infections from occurring.

Viruses that develop resistance to antiviral drugs are increasingly becoming a challenge in the treatment of viral infections, particularly those that are chronic in nature. The ability of viruses to mutate spontaneously during replication allows drug-resistant strains to emerge when patients are using drugs that are not potent enough to quickly and completely inhibit viral replication. Drug resistance occurs because viruses continually replicate making millions of copies of themselves, some of which contain mutations in their genetic material. Mutations that emerge in the presence of a suppressive antiviral drug will give rise to mutant strains that are wholly or partially resistant to that drug. These mutant viruses, while initially low in number, eventually become the predominant strain in an infected patient as those strains that remain susceptible to the drug are inhibited from replicating. Once this occurs, the treatment benefit of that particular antiviral drug often diminishes, resulting in treatment failure and the need for an alternate therapy with different or possibly new drugs, or classes of drugs. In general, viruses that cause chronic infections, such as HIV, are more likely to develop drug resistance due to the long-term and persistent exposure of the virus to the antiviral therapy.

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What are Vaccines? Vaccines represent an approach to broaden the ability to prevent serious infectious diseases caused by both viruses and bacteria. A vaccine is a substance introduced into the human body that teaches the immune system to detect and destroy a pathogen (a virus or bacterium that causes disease). All vaccines contain some harmless form or part of the pathogen they target. They exert their effects through the adaptive immune response, an arm of the immune system that learns to recognize and neutralize specific pathogens.

There are several types of vaccines:

- Whole-killed/Whole-inactivated vaccines: The active ingredient in these vaccines is an intact virus or bacterium that has been killed or otherwise stripped of its ability to infect humans. Examples include the cholera and injectable polio vaccines. This approach has not been applied to the development of vaccines against HIV due to the small but inevitable risk that the viruses harvested for such preparations may not all have been killed or adequately inactivated.
- Live attenuated vaccines: These vaccines use a form of the targeted pathogen that is highly unlikely to be harmful—one capable, say, of multiplying, but not causing disease. Examples include the measles vaccine and the oral vaccine against polio, which has been widely deployed in global eradication efforts. Such vaccines can be very effective because they closely mimic the behavior of the targeted pathogen, giving the immune system a truer picture of what it would be up against. Due to the risk that attenuated HIV might revert to its disease-causing form, this approach has not been applied to the development of human AIDS vaccines.
- Subunit vaccines: Vaccines of this variety are composed of purified pieces of the pathogen (known as antigens) that generate a vigorous, protective immune response. Common subunit vaccines include the seasonal flu and hepatitis B vaccines. This approach was employed to devise the first AIDS vaccine candidate tested in humans, which failed to induce protection from HIV infection.
- DNA vaccines: These vaccine candidates are also designed to train the immune system to recognize a piece of the targeted bacterium or virus. The difference is that the active ingredients are not the purified antigens themselves but circles of DNA, called plasmids, that carry genes encoding those antigens. Human cells passively take up these plasmids and produce the antigens that, in turn, train the immune system to recognize the targeted pathogen.
- Recombinant vector vaccines: These vaccines, like DNA vaccines, introduce genes for targeted antigens into the body. But the genes are inserted into a virus that actively infects human cells. The viruses chosen as vectors are safe to use because they do not ordinarily cause disease in humans and/or have been stripped of their ability to proliferate.

Overview of HIV/AIDS

What is HIV? HIV is a retrovirus that carries its genetic code in the form of ribonucleic acid, or RNA. Retroviruses use RNA and the reverse transcriptase enzyme to create DNA from the RNA template. The HIV-1 virus invades human cells and produces its viral DNA that is subsequently inserted into the chromosomes, which are the genetic material of a cell. HIV preferentially infects and replicates in T-cells, which are a type of white blood cell. Infection of T-cells alters them from immunity mediating cells to cells that produce and release HIV. This process results in the destruction of the immune defense system of infected individuals and ultimately, the development of AIDS.

There are several AIDS-causing HIV virus subtypes, or clades, that are found in different regions of the world. These clades are identified as clade A, clade B and so on. The predominant clade found in Europe, North America, parts of South America, Japan and Australia is clade B whereas the predominant clades in Africa are clades A and C. In India the predominant clade is clade C. Each clade differs by at least 20% with respect to its genetic sequence from other clades. These differences may mean that vaccines or treatments developed against HIV of one clade may only be partially effective or ineffective against HIV of other clades. Thus there is often a geographical focus to designing and developing vaccines suited for the local clade.

HIV, even within clades, has a high rate of mutation that supports a significant level of genetic variation. In drug treatment programs, virus mutation can result in the development of drug resistance, referred to as virus drug escape,

thereby rendering drug therapy ineffective. Hence, we believe that multi-drug therapy is very important. If several drugs are active against virus replication, the virus must undergo multiple simultaneous mutations to escape, which is less likely. The same is true for immune responses. HIV can escape single targeted immune responses. However, our scientists believe if an immune response is directed against multiple targets, which are referred to as epitopes, virus escape is much less frequent. Vaccination against more than one of the proteins found in HIV increases the number of targets for the immune response as well as the chance that HIV will not escape the vaccine-stimulated immune response, thus resulting in protection against infection or the development of clinical AIDS once infection occurs.

What is AIDS? AIDS is the final, life-threatening stage of infection with the virus known as HIV. Infection with HIV severely damages the immune system, the body’s defense against disease. HIV infects and gradually destroys T-cells and macrophages, which are white blood cells that play key roles in protecting humans against infectious disease caused by viruses, bacteria, fungi and other micro-organisms.

Opportunistic infections by organisms, normally posing no problem for control by a healthy immune system, can ravage persons with immune systems damaged by HIV infections. Destruction of the immune system occurs over years. The average onset of the clinical disease recognized as AIDS occurs after three to ten years of HIV infection if the virus is not treated effectively with drugs, but the time to developing AIDS is highly variable.

AIDS in humans was first identified in the United States in 1981, but researchers believe that it was present in Central Africa as early as 1959. AIDS is most often transmitted sexually from one person to another but it is also transmitted by blood in shared needles and through pregnancy and childbirth. Heterosexual activity is the most frequent route of transmission worldwide.

The level of virus in blood, known as viral load, is the best indicator of the speed with which an individual will progress to AIDS and the frequency with which an individual will spread infection. An estimated 1% or fewer of those infected have low enough levels of the virus to preclude progression to AIDS and to not transmit the infection. These individuals are commonly called elite controllers or long-term non-progressors.

AIDS is considered by many in the scientific and medical community to be the most lethal infectious disease in the world. According to the 2011 World AIDS Day Report published by UNAIDS, the Joint United Nations Programme on HIV/AIDS, at the end of 2010, an estimated 34 million people were living with HIV worldwide, with approximately 2.7 million newly infected in 2010 alone. Approximately 25 million people infected with HIV have died since the 1981 start of the HIV pandemic. The United States currently suffers about 56,000 infections per year with the highest rates found in Washington, D.C., where an estimated 3% of the population is infected, a prevalence rate higher than in some developing countries.

According to the International AIDS Vaccine Initiative (IAVI) in a model developed with Advanced Marketing Commitment dated June 2005, the annual global market for a safe and effective preventive AIDS vaccine (all clades) is estimated at approximately $4 billion or more.

At present, the standard approach to treating HIV infection is to inhibit viral replication through the use of combinations of drugs. Available drugs include reverse transcriptase inhibitors, protease inhibitors, integration inhibitors and inhibitors of cell entry to block multiple essential steps in virus replication. However, HIV is prone to genetic changes that can produce strains that are resistant to currently approved drugs. When HIV acquires resistance to one drug within a class, it can often become resistant to the entire class, meaning that it may be impossible to re-establish control of a genetically altered strain by substituting different drugs in the same class. Furthermore, these treatments continue to have significant limitations which include toxicity, patient non-adherence to the treatment regimens and cost. As a result, over time, many patients develop intolerance to these medications or simply give up taking the medications due to the side effects.

According to the IAVI, the cost and complexity of new treatment advances for AIDS puts them out of reach for most people in the countries where treatment is most needed, and as noted above, in industrialized nations, where drugs are more readily available, side effects and increased rates of viral resistance have raised concerns about their long term use. AIDS vaccines, therefore, are seen by many as the most promising way to end the HIV/AIDS pandemic. It is expected that vaccines for HIV/AIDS, once developed, will be used universally and administered worldwide by organizations that provide health care services, including hospitals, medical clinics, the military, prisons and schools.

Our Vaccine Candidates

Our vaccines, initially developed by our Chief Scientific Officer, Dr. Harriet L. Robinson at Emory University in collaboration with scientists at the NIH and the CDC, incorporate two vaccine delivery components: (1) a recombinant DNA (deoxyribonucleic acid) and (2) a recombinant poxvirus, known as MVA (modified vaccinia Ankara), both of

which deliver genes that encode inactivated HIV derived proteins to the immune system. Both the DNA and MVA vaccines contain sufficient HIV genes to support the production of non-infectious virus-like particles which display the native trimeric membrane-bound form of the viral envelope glycoprotein that appears authentic to the immune system. When used together, the recombinant DNA component is used to prime the immune response, which is then boosted by administration of the recombinant MVA component. However, in certain settings the recombinant MVA alone may be sufficient for priming and boosting the immune responses.

Our initial work focused on the development of a preventive vaccine for use in uninfected humans to prevent infection should they be exposed to the virus. Later, based on encouraging data in preclinical primate models, we undertook the development of a therapeutic vaccine for use in HIV infected humans to supplement approved drug regimens. For both preventive and therapeutic applications, our current focus is on a vaccine for use against clade B, which is common in the United States and the industrially developed world. However, if efficacy is documented against clade B, we plan to develop vaccines designed for use to combat the subtypes of HIV that predominate in developing countries, including clades A, C and an AG recombinant.

Induction of T-cell and Antibody Immune Responses. In both preclinical and clinical trials, our vaccines induce both anti-viral antibody and T-cell responses. The induction of both antibodies and T-cells is beneficial because these immune responses work through different mechanisms. Antibodies can prevent infection by blocking viruses from infecting cells. In preclinical vaccine studies using repeated rectal challenges with moderate doses of virus, the avidity, or tightness, of antibody binding to the surface envelope glycoprotein of HIV correlates with the prevention of infection (The Journal of Infectious Diseases, 204:164 (2011)). In high dose challenges that infect all animals at the first exposure, the avidity of the antibody for envelope glycoprotein correlates with reduced levels of virus replication (Journal of Virology, 83:4102 (2009)). These results likely reflect the tightly binding antibody both blocking infection as well as tagging the virus and infected cells for destruction. Our vaccines elicit CD8 T-cells, a type of T-cell that can recognize and kill cells that become infected by virus. CD8 T-cells are important for the control of the virus that has established an infection. In our therapeutic vaccinations, our vaccines elicit high frequencies of CD8 T-cells with the functional characteristics of CD8 T-cells associated with control of viral infections in individuals termed “elite controllers”. Elite controllers, who constitute less than 1% of all HIV-infected individuals, enjoy years of disease-free life without the use of drugs.

DNA and MVA as Vaccine Vectors. Both the DNA and MVA vaccines produce virus-like particles containing the three major proteins of HIV. The virus-like particles cannot cause disease because they were designed with mutated or deleted enzymatic functions that are essential for virus replication. The virus-like particles display trimeric membrane bound forms of the HIV envelope glycoprotein (Env). This is important because the natural form of the envelope glycoprotein elicits antibody capable of recognizing incoming virus and blocking infections. Expression of multiple proteins by the vaccine is important because each protein provides targets for cytotoxic T-cells. Elicitation of a multi-target T-cell response limits immune escape, just as multi-drug therapies limit drug escape.

Figure 1. Electron micrographs showing the virus-like-particles (VLPs) produced by GeoVax recombinant DNA and recombinant MVA vaccines. For the DNA Prime, VLPs are seen budding from a DNA-expressing cell. For the MVA boost, fully formed particles as well as a budding particle are shown. The VLPs display trimeric membrane-bound forms of the viral envelope glycoprotein (Env). This is an important feature of the vaccine because display of the normal Env means that the antibody elicited by the vaccine can recognize the Env on incoming viruses. The VLPs are immature and are rendered non-infectious by deletion of essential genes and introduction of inactivating mutations in essential viral enzymes.

MVA was selected for use as the live viral component of our vaccines because of its well established safety record and because of the ability of this vector to carry sufficient HIV proteins to produce virus-like particles. MVA was originally developed as a safer smallpox vaccine for use in immune compromised humans. It was developed by attenuating the standard smallpox vaccine by making over 500 passages of the virus in chicken embryos or chick embryo fibroblasts which resulted in large genomic deletions. These deletions limited the ability of MVA to replicate in human cells, which can cause safety problems, but did not compromise the ability of MVA to grow on avian cells that are used for manufacturing the virus. The deletions also resulted in the loss of immune evasion genes which assist the spread of wild type smallpox infections, even in the presence of human immune responses. MVA was safely administered to over 120,000 people in the 1970s as a smallpox vaccine.

The availability of DNA and MVA vaccine delivery vectors provides GeoVax with the means to use combination vaccines that induce different patterns of T-cell and antibody responses. Specifically, the use of DNA to prime immune responses and MVA to boost immune responses elicits high levels of T-cells and thus could be particularly well-suited for therapeutic uses. Alternatively, the use of MVA to both prime and boost the immune response elicits higher levels of antibodies and therefore could be well-suited for use in prevention. The DNA prime also facilitates expressing genetic adjuvants, which are co-expressed by the vaccine vector with HIV proteins, at the site of immunization. This has proven to be particularly effective in our work using GM-CSF as an adjuvant in which a

single DNA expresses both virus-like particles and GM-CSF. By co-expressing GM-CSF and HIV proteins in the DNA vaccine, GM-CSF is present at the site of the HIV vaccination where it enhances the ability of the vaccine to elicit blocking antibodies for the HIV virus. Blocking antibodies can stop a virus before it infects cells.

Pre-clinical Studies. During the development of our preventive vaccines, preclinical efficacy trials were conducted by vaccinating non-human primates with simian immunodeficiency virus prototypes of our HIV vaccines and then testing them for resistance to simian immunodeficiency virus. The experimental data produced by these trials documented the ability of the simian prototypes of our vaccines to induce immune responses that can prevent infection as well as reduce the levels of viral replication in those animals that become infected.

GeoVax's research pipeline includes the use of adjuvants together with our DNA/MVA vaccine. Adjuvants are additives to vaccines that improve vaccine efficacy. One of these, GM-CSF, a normal human protein that stimulates the first stages of immune responses, has shown particular promise. When GM-CSF is co-expressed in the DNA prime for the MVA boost, the vaccine achieved 70% prevention of infection with a >90% reduction in the per exposure risk of transmission in a study employing 12 successive weekly exposures to simian immunodeficiency virus, whereas vaccinating in the absence of the co-expressed GM-CSF achieved 25% prevention of infection and a less effective 60% reduction in the per exposure risk of transmission (The Journal of Infectious Diseases 204:164 (2011)).

Survivors from this first series of exposures were rested a year, boosted once with the MVA vaccine, and then exposed to a 2nd series of challenges (Figure 2). Greater than 90% reduction in risk of infection per exposure was achieved against the 2nd series of exposures. Survivors of this 2nd series of exposures were again rested for 6 months and are being exposed to a 3rd series of challenges. Again, 94% reduction in risk of infection per exposure was achieved. The 1st two series of exposures were to SIVE660, a virus that has neutralization characteristics like viruses undergoing transmission in the current epidemic. The 3rd series of challenges is with SIV251, a virus that is considered the most potent SIV used in nonhuman primate studies and is an outlier in its high resistance to neutralization.

Figure 2. Schematic of serial exposures testing vaccine efficacy. Heavy vertical arrows indicate vaccinations, clusters of thin arrows, serial exposures. Exposures to virus were rectal to mimic mucosal transmissions. Protection against the 3rd series of exposures is shown in Figure 3C below.

To our knowledge, the level of protection achieved by the simian prototype for the GeoVax GM-CSF-adjuvanted HIV vaccine is unprecedented and far better than has been achieved with simian prototypes of other vaccines currently in, or slated for efficacy trials (see Figure 3 below). Figure 3A shows prevention of serial infections by the vaccine currently in efficacy trials that was developed by the NIH Vaccine Research Center. This vaccine consists of priming with a DNA vaccine and boosting with a recombinant Adenovirus 5 vaccine (DNA/Ad5). When challenged with SIV251, vaccinated animals were infected more rapidly than the unvaccinated animals. Figure 3B shows a Johnson and Johnson (Crucell) vaccine developed at Harvard and tested in conjunction with the US military. This vaccine initially provides some protection, however only 13% of the animals remained protected after 6 exposures to SIV251. Figure 3C shows data from serial exposures to the simian prototype for the GeoVax GM-CSF-co-expressing vaccine. This vaccine has a 72% per exposure reduction in risk of infection over 12 serial exposures. We are very pleased with the reduction in risk of infection per exposure that the GeoVax prototype vaccine has achieved.

Figure 3. Comparison of protection against serial exposures to SIV251 induced by vaccines undergoing or slated for efficacy trials.
A. Vaccine consisting of priming with a DNA vaccine and boosting with and adenovirus5 vaccine (Ad5) developed by the NIH Vaccine Research Center and currently in an efficacy trial in North America.
B. Vaccine consisting of priming with an adenovirus 26 vaccine (Ad26) and boosting with an MVA vaccine developed by Harvard and the U.S. Military, owned by Johnson and Johnson (Crucell) and slated for an efficacy trial in South Africa.
C. GeoVax vaccine consisting of priming with a GM-CSF co-expressing DNA and boosting with MVA..

Preventive Vaccine — Phase 1 Human Clinical Trials. All of our preventive vaccination trials in humans have been conducted by the HVTN, a network that is funded and supported by the NIH. The HVTN is the largest worldwide clinical trials network focused on the development and testing of HIV/AIDS vaccines. Figure 4 below summarizes our clinical trials conducted by the HVTN. In our first Phase 1 clinical trial, HVTN 045, our DNA vaccine was tested without MVA boosting to document the safety of the DNA. Our second Phase 1 clinical trial, HVTN 065, was designed to test the combined use of DNA and MVA and consisted of a dose escalation as well as regimen studies. The low dose consisted of 0.3 mg of DNA and 1x107 tissue culture infectious doses (TCID50) of MVA. Once safety was demonstrated for the low dose in 10 participants, the full dose (3 mg of DNA and 1x108 TCID50 of MVA) was administered to 30 participants. A single dose of DNA at time 0 followed by MVA at weeks 8 and 24, a DMM regimen, and three doses of MVA administered at weeks 0, 8 and 24, an MMM regimen, were also tested in 30 participants each. Participants were followed for 12 months to assess vaccine safety and to measure vaccine-induced immune responses.

Data from the HVTN 065 trial again documented the safety of the vaccine products but also showed that the DDMM and MMM regimens induced different patterns of immune responses (Journal of Infectious Diseases 203: 610 (2011)). The full dose DDMM regimen induced higher response rates of CD4+ T-cells (77%) and CD8+ T-cells (42%) compared to the MMM regimen (43% CD4 and 17% CD8 response rates). In contrast, the highest response rates and highest titers of antibodies to the HIV Env protein were induced in the group that received only the MVA using the MMM regimen. Antibody response rates were documented to be higher for the MMM group using three different assays designed to measure total binding antibody levels for an immune dominant portion of the Env protein (27% for DDMM and 75% for MMM), binding of antibodies to the gp120 subunit of the envelope glycoprotein (81% for DDMM and 86% for MMM) and neutralizing antibodies (7% for DDMM and 30% for MMM). The 1/10th dose DDMM regimen induced overall similar T-cell responses but reduced antibody responses while the response rates were intermediate in the DMM group.