

ORGANOVO HOLDINGS, INC.

Form 424B5

August 02, 2013

Table of Contents

**Filed Pursuant to Rule 424(b)(5)
Registration No. 333-189995**

PROSPECTUS SUPPLEMENT

(to the Prospectus Dated July 26, 2013)

9,000,000 Shares

Common Stock

We are offering shares of our common stock. Shares of our common stock trade on the NYSE MKT under the symbol ONVO. On August 1, 2013, the last reported sale price of our common stock was \$5.35 per share.

Investing in our common stock involves a high degree of risk. See Risk Factors beginning on page S-12 of this prospectus supplement.

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

	Per Share	Total
Public Offering Price	\$ 4.50	\$ 40,500,000
Underwriting Discounts and Commissions	\$ 0.27	\$ 2,430,000
Proceeds to Organovo (Before Expenses)	\$ 4.23	\$ 38,070,000

We estimate the total expenses of this offering, excluding the underwriting discounts and commissions, will be approximately \$350,000. The underwriters may also purchase up to an additional 1,350,000 shares of our common stock from us at the public offering price, less underwriting discounts and commissions, to cover over-allotments, if any, within 30 days of the date of this prospectus supplement.

We anticipate that delivery of the shares of our common stock will be made through the facilities of the Depository Trust Company on or about August 7, 2013, subject to customary closing conditions.

Joint Book-Runners

Lazard Capital Markets

Co-Managers

Oppenheimer & Co.

JMP Securities LLC

Maxim Group LLC

Prospectus Supplement dated August 2, 2013.

Table of Contents

TABLE OF CONTENTS

Prospectus Supplement

	Page
<u>ABOUT THIS PROSPECTUS SUPPLEMENT</u>	S-1
<u>PROSPECTUS SUPPLEMENT SUMMARY</u>	S-3
<u>RISK FACTORS</u>	S-12
<u>SPECIAL NOTE REGARDING FORWARD-LOOKING INFORMATION</u>	S-28
<u>USE OF PROCEEDS</u>	S-29
<u>DIVIDEND POLICY</u>	S-29
<u>DILUTION</u>	S-30
<u>UNDERWRITING</u>	S-32
<u>LEGAL MATTERS</u>	S-38
<u>EXPERTS</u>	S-38
<u>WHERE YOU CAN FIND MORE INFORMATION</u>	S-38
<u>INCORPORATION OF CERTAIN INFORMATION BY REFERENCE</u>	S-38

Prospectus

<u>ABOUT THIS PROSPECTUS</u>	ii
<u>SUMMARY</u>	1
<u>RISK FACTORS</u>	7
<u>SPECIAL NOTE REGARDING FORWARD-LOOKING STATEMENTS</u>	8
<u>STATEMENT OF COMPUTATION OF RATIOS</u>	9
<u>USE OF PROCEEDS</u>	10
<u>SECURITIES WE MAY OFFER</u>	11
<u>DESCRIPTION OF CAPITAL STOCK</u>	12
<u>DESCRIPTION OF DEBT SECURITIES</u>	16
<u>DESCRIPTION OF WARRANTS</u>	23
<u>DESCRIPTION OF UNITS</u>	25
<u>LEGAL OWNERSHIP OF SECURITIES</u>	26
<u>PLAN OF DISTRIBUTION</u>	29
<u>LEGAL MATTERS</u>	31
<u>EXPERTS</u>	31
<u>WHERE YOU CAN FIND MORE INFORMATION</u>	31
<u>INCORPORATION OF CERTAIN INFORMATION BY REFERENCE</u>	32

Table of Contents

ABOUT THIS PROSPECTUS SUPPLEMENT

This document is in two parts. The first part is this prospectus supplement, which describes the specific terms of this common stock offering and also adds to and updates information contained in the accompanying prospectus and the documents incorporated by reference herein. The second part, the accompanying prospectus, provides more general information. Generally, when we refer to this prospectus, we are referring to both parts of this document combined. To the extent there is a conflict between the information contained in this prospectus supplement and the information contained in the accompanying prospectus or any document incorporated by reference therein filed prior to the date of this prospectus supplement, you should rely on the information in this prospectus supplement; provided that if any statement in one of these documents is inconsistent with a statement in another document having a later date—for example, a document incorporated by reference in the accompanying prospectus—the statement in the document having the later date modifies or supersedes the earlier statement.

We further note that the representations, warranties and covenants made by us in any agreement that is filed as an exhibit to any document that is incorporated by reference herein were made solely for the benefit of the parties to such agreement, including, in some cases, for the purpose of allocating risk among the parties to such agreements, and should not be deemed to be a representation, warranty or covenant to you. Moreover, such representations, warranties or covenants were accurate only as of the date when made. Accordingly, such representations, warranties and covenants should not be relied on as accurately representing the current state of our affairs.

You should rely only on the information contained in this prospectus supplement or the accompanying prospectus, or incorporated by reference herein. We have not authorized, and the underwriters have not authorized, anyone to provide you with information that is different. The information contained in this prospectus supplement or the accompanying prospectus, or incorporated by reference herein is accurate only as of the respective dates thereof, regardless of the time of delivery of this prospectus supplement and the accompanying prospectus or of any sale of our common stock. It is important for you to read and consider all information contained in this prospectus supplement and the accompanying prospectus, including the documents incorporated by reference herein and therein, in making your investment decision. You should also read and consider the information in the documents to which we have referred you in the sections entitled “Where You Can Find More Information” and “Incorporation of Certain Information by Reference” in this prospectus supplement and in the accompanying prospectus.

We are offering to sell, and seeking offers to buy, shares of our common stock only in jurisdictions where offers and sales are permitted. The distribution of this prospectus supplement and the accompanying prospectus and the offering of the common stock in certain jurisdictions may be restricted by law. Persons outside the United States who come into possession of this prospectus supplement and the accompanying prospectus must inform themselves about, and observe any restrictions relating to, the offering of the common stock and the distribution of this prospectus supplement and the accompanying prospectus outside the United States. This prospectus supplement and the accompanying prospectus do not constitute, and may not be used in connection with, an offer to sell, or a solicitation of an offer to buy, any securities offered by this prospectus supplement and the accompanying prospectus by any person in any jurisdiction in which it is unlawful for such person to make such an offer or solicitation.

Unless otherwise stated, all references in this prospectus supplement and the accompanying prospectus to we, us, our, Organovo, the Company and similar designations refer to Organovo Holdings, Inc. and its subsidiaries on a consolidated basis.

Table of Contents

This prospectus supplement, the accompanying prospectus, and the information incorporated herein and therein by reference, include trademarks, service marks and trade names owned by us or other companies. All trademarks, service marks and trade names included or incorporated by reference into this prospectus supplement or the accompanying prospectus are the property of their respective owners.

S-2

Table of Contents

PROSPECTUS SUPPLEMENT SUMMARY

*This summary highlights certain information about us, this offering and selected information contained elsewhere in or incorporated by reference in this prospectus supplement. This summary is not complete and does not contain all of the information that you should consider before deciding whether to invest in our common stock. For a more complete understanding of our company and this offering, we encourage you to read and consider carefully the more detailed information in this prospectus supplement and the accompanying prospectus, including the information referred to under the heading **Risk factors** in this prospectus supplement beginning on page S-12 the information incorporated by reference in this prospectus supplement and the accompanying prospectus, and the information included in any free writing prospectus that we have authorized for use in connection with this offering.*

Our Business

Overview

We are developing and commercializing functional human tissues that can be employed in drug discovery and development, biological research, and as therapeutic implants for the treatment of damaged or degenerating tissues and organs. We intend to introduce a paradigm shift in the approach to the generation of three-dimensional human tissues, by utilizing our platform technology to create human tissue constructs in 3D that have the potential to replicate native human biology. We believe we can improve on previous technologies by moving away from monolayer 2D cell cultures and by enabling all or part of the tissues we create to be constructed solely of cells. We believe our demonstrated expertise in printing various fully cellular human tissues as disclosed in peer-reviewed scientific publications provides a strong foundation upon which other tissues can be built to replicate human biology and human disease. We believe that our broad and exclusive commercial rights to patented and patent-pending 3D bioprinting technology, combined with strengths in engineering and biology, put us in an ideal position to provide a wide array of products for use in research, drug discovery and regenerative medicine therapies.

Our foundational proprietary technology derives from research led by Dr. Gabor Forgacs, the George H. Vineyard Professor of Biological Physics at the University of Missouri-Columbia. We have a broad portfolio of intellectual property rights covering principles, enabling instrumentation applications and methods of cell based printing, including exclusive licenses to certain patented and patent pending technologies from the University of Missouri-Columbia, Clemson University, and Becton Dickinson, and outright ownership of patents and pending patent applications, see **Intellectual Property** . We believe that our portfolio of intellectual property rights provides a strong and defensible market position for our commercialization of 3D bioprinting technology.

We believe we have the potential to build and maintain a sustainable business by leveraging our core technology platform across a variety of applications. We have entered into multiple collaborative research agreements with pharmaceutical corporations and academic medical centers. We have also secured federal grants, including Small Business Innovation Research grants to support the development of our technology. The Company developed the NovoGen MMX Bioprinter (our first-generation 3D bioprinter) less than two years after commencing operations. We were selected by MIT's Technology Review magazine among the Most Innovative Companies of 2012 and by Inc. Magazine as one of the Most Audacious Companies in 2013. We believe these corporate achievements provide strong validation for the commercial viability of our technology.

Table of Contents

Our Platform Technology

Our platform technology is centered around multiple 3D bioprinting technologies utilizing our bioprinting instrument, the NovoGen MMX Bioprinter. Our 3D bioprinting technologies enables a wide array of tissue compositions and architectures to be created, using combinations of cellular bio-ink (building blocks comprised solely of cells), hydrogel (building blocks comprised of biocompatible gels), or hybrid bio-ink (building blocks comprised of a mixture of cells and material such as hydrogel). A key distinguishing feature of our bioprinting platform is the ability to generate three-dimensional constructs that have all or some of their components comprised entirely of cells. The fully-cellular feature of our technology enables architecturally and compositionally defined functional human tissues to be generated for in vitro use in drug discovery and development to potentially replicate the functional biology of native human tissue. Furthermore, fully cellular constructs may offer specific advantages for regenerative medicine applications where bioactive cells are required and three-dimensional configuration is necessary, such as augmenting or replacing functional mass in tissues and organs that have sustained acute or chronic damage.

We intend to deliver the following products to the market in the future:

Three-dimensional models of human tissue for utilization in traditional absorption, distribution, metabolism, excretion (ADME) / toxicology (TOX) / and drug metabolism and pharmacokinetics (DMPK) testing in drug development.

Specific models of human biology or pathophysiology, in the form of three-dimensional human tissues, for use in drug discovery and development.

Three-dimensional human tissues for use as therapeutic regenerative medicine products, such as blood vessels for bypass grafting, nerve grafts for nerve damage repair and regenerative patches for treatment of heart disease.

Our Market Opportunity

We believe that our bioprinting technology is uniquely positioned to provide functional human tissues for use in drug discovery and development as well as a broad array of tissues suitable for therapeutic use in regenerative medicine applications.

There are multiple addressable markets for our technology platform:

- 1) **Specialized Models for Drug Discovery and Development:** The NovoGen MMX Bioprinter can produce highly specialized functional human tissues that can be utilized to model specific tissue physiology or pathophysiology. Our bioprinting technology has demonstrated the ability to create human blood vessel constructs, and to create fully human tissue containing micro vascular structures. These capabilities are anticipated to broaden the scope and scale of 3D tissues that can be generated, and to facilitate the development of disease models in such areas as cardiovascular disease, oncology, and fibrosis.
- 2) **Biological Research Tools:** Absorption, distribution, metabolism, excretion (ADME) testing is used to determine which factors enhance or inhibit how a potential drug compound reaches the blood stream. Distribution of a compound can be affected by binding to plasma proteins; age, genetics, and other factors can influence metabolism of a compound; and the presence of certain disease states can have

Table of Contents

effects on excretion of a compound. Many companies perform ADME studies utilizing various cell-based assays or automated bioanalytical techniques. Drug metabolism and pharmacokinetics (DMPK) testing is a subset of ADME. Determining the DMPK properties of a drug helps the drug developer to understand its safety and efficacy. Toxicology (TOX) testing is a further requirement to determine the detrimental effects of a particular drug on specific tissues. We believe that the NovoGen MMX Bioprinter is positioned to deliver highly differentiated products for use in traditional cell-based ADME / TOX / DMPK studies. Products in this arena may replace or complement traditional cell based assays that typically employ primary hepatocytes, intestinal cell lines, renal epithelial cells and cell lines grown in a traditional two-dimensional format. Importantly, the combination of tissue-like three-dimensionality and human cellular components is believed to provide an advantage over non-human animal systems toward predicting *in vivo* human outcomes.

- 3) **Regenerative Medicine:** The field of regenerative medicine is advancing via multiple strategic approaches in development and practice, including cell therapies and scaffold-based products (+/-cells). The architectural precision and flexibility of our technology may facilitate the optimization, development, and clinical use of three-dimensional tissue constructs. Importantly, our technology offers a next-generation strategy whereby three-dimensional structures can be generated without the use of scaffolding or biomaterial components. The ultimate goal is to enable fully cellular constructs to be generated in a configuration compatible with surgical modes of delivery, thereby enabling restoration of significant functional mass to a damaged tissue or organ.

We believe that our technology can capitalize, via strategic partnerships, on additional market opportunities in the provision of enabling tools for drug discovery and development as well as the discovery and development of therapeutic implants that augment or replace damaged tissues and organs. We believe there are multiple short- and long-term revenue opportunities for us in these areas, including direct sales of 3D human tissue constructs for drug screening and development, licensing fees for commercial access to our technology, and royalties from product enablement, particularly in the area of therapeutic products for regenerative medicine.

Recent Developments

June 30, 2013 Preliminary Financial Results

We are currently finalizing our financial results for the three months ended June 30, 2013. While complete financial information and operating data as of and for such period are not yet available, based on the information and data currently available, our management preliminarily estimates that for the three months ended June 30, 2013 our net loss was approximately \$(3.8) million, compared to a net loss of \$(16.1) million for the three months ended March 31, 2013. Additionally, our management estimates that as of June 30, 2013, we had cash and cash equivalents of approximately \$12.8 million and an accumulated deficit of approximately \$(70.1) million, as compared to \$15.6 million and \$(66.4) million, respectively, at March 31, 2013. At June 30, 2013, management estimates negative cash flow from operations was approximately \$2.7 million, as compared to \$2.8 million for the three months ended March 31, 2013.

The preliminary financial data above have been prepared by, and is the responsibility of, our management. Our independent registered public accounting firm has not audited, reviewed, compiled, or performed any procedures with respect to this preliminary financial data and does not express an opinion or any other form of assurance with respect thereto. Because the three months ended June 30, 2013 has recently ended, the financial information presented above for the three months ended June 30, 2013

Table of Contents

reflects estimates based only upon preliminary information available to us as of the date of this prospectus supplement and is not a comprehensive statement of our financial results for the three months ended June 30, 2013. Our financial statements and operating data as of and for the three months ended June 30, 2013 will not be available until after this offering is completed and may differ from the preliminary unaudited financial information we have provided. Such differences may be material. Accordingly, you should not place undue reliance on these preliminary estimates. The estimates for the three months ended June 30, 2013 are not necessarily indicative of any future period and should be read together with Risk Factors, Special Note Regarding Forward-looking Statements, included elsewhere in this prospectus supplement and Management's Discussion and Analysis of Financial Condition and Results of Operations, Selected Historical Financial Data and our financial statements and related notes incorporated by reference into this prospectus supplement and the accompanying prospectus.

Legal Matters

In addition to commitments and obligations in the ordinary course of business, we are subject to various claims and pending and potential legal actions arising out of the normal conduct of our business. We assess contingencies to determine the degree of probability and range of possible loss for potential accrual in our financial statements. We accrue an estimated loss contingency in our financial statements if it is probable that a liability has been incurred and the amount of the loss can be reasonably estimated. Because litigation is inherently unpredictable and unfavorable resolutions could occur, assessing litigation contingencies is highly subjective and requires judgments about future events. When evaluating contingencies, we may be unable to provide a meaningful estimate due to a number of factors, including the procedural status of the matter in question, the presence of complex or novel legal theories, and/or the ongoing discovery and development of information important to the matters. In addition, damage amounts claimed in litigation against us may be unsupported, exaggerated or unrelated to possible outcomes, and as such are not meaningful indicators of our potential liability. We regularly review contingencies to determine the adequacy of our accruals and related disclosures. The amount of ultimate loss may differ from these estimates. It is possible that our cash flows or results of operations could be materially affected in any particular period by the unfavorable resolution of one or more of these contingencies. Whether any losses finally determined in any claim, action, investigation or proceeding could reasonably have a material adverse effect on our business, financial condition, results of operations or cash flows will depend on a number of variables, including: the timing and amount of such losses; the structure and type of any remedies; the monetary significance of any such losses, damages or remedies may have on our consolidated financial statements; and the unique facts and circumstances of the particular matter that may give rise to additional factors.

Spencer Trask Matter. On June 28, 2013, we filed a lawsuit for declaratory relief in the Supreme Court for the State of New York (case # 652305/2013) against Spencer Trask Ventures, Inc. ("STV") in connection with a Warrant Solicitation Agency Agreement (the "WSAA") that we entered into with STV in February 2013. In this action, we are seeking a declaration that the WSAA remains a valid and enforceable agreement. Over the course of several weeks in February 2013, Organovo and STV, through their respective attorneys, negotiated the WSAA pursuant to which we engaged STV as our warrant solicitation agent in connection with our efforts to solicit the exercise of outstanding Organovo warrants during the first quarter of 2013. STV's President signed the WSAA on behalf of STV, and our CEO executed the agreement on behalf of Organovo. Spencer Trask provided services to us pursuant to the WSAA, and we have paid STV for those services.

Table of Contents

Our dispute with Spencer Trask arose in March 2013 after we approached Spencer Trask about exercising their outstanding warrants to help the Company qualify for uplisting its common stock on the NYSE MKT. Previously, Spencer Trask had not asserted any claims for additional compensation as a result of the warrant tender offer we completed in December 2012. In March 2013, we received two demand letters from STV, and a demand for arbitration notice in June 2013. In the first demand letter, STV alleges that it is entitled to compensation (including a cash fee and warrants to purchase common stock) as a result of the warrant tender offer we completed in December 2012 and as a result of the warrant redemption we completed in March 2013. In the second letter, STV alleges it is entitled to damages because we allegedly violated confidentiality provisions in the Placement Agency Agreement (the "PAA") we had previously entered into with STV in December 2012 in connection with the private placement financings we completed in February and March 2012 (the "Private Placements"), by contacting the warrant holders who participated in the warrant tender offer. In response, on June 28, 2013, we filed a lawsuit for declaratory relief in the Supreme Court for the State of New York against STV. Our tender offer was made to warrant holders of record relating to warrants already owned by them and whose identity was public information via a Registration Statement on Form S-1 we were required to file to register the resale of the shares underlying their warrants. For these and other reasons, including applicability of the WSAA, we believe STV is not entitled to compensation under the PAA and there was no violation of confidentiality. To our knowledge, STV has not filed its arbitration demand with the arbitrator.

We believe that the assertions made against us by STV are without merit and we intend to continue to vigorously defend against the claims made by STV, including any arbitration matter filed by STV. We have not established a loss contingency accrual for these claims because any potential liability is not probable or estimable. Nonetheless, an unfavorable resolution of these claims could have a material adverse effect on our business, liquidity or financial condition in the reporting period in which such resolution occurs.

Other Legal Matters. In addition to the matter described above, the Company is subject to normal and routine litigation in the ordinary course of business. We have not accrued any loss contingencies for such matters. We intend to defend ourselves in any such matters and do not currently believe that the outcome of such matters will have a material adverse effect on our business, liquidity or financial position.

Board of Directors

On July 25, 2013, Andras Forgacs, a member of our Board of Directors, resigned from the Board, effective on July 25, 2013. Mr. Forgacs was serving as a Class II director, with his term expiring at our Annual Meeting of Stockholders scheduled for August 21, 2013. There are no disagreements between Mr. Forgacs and the Company relative to his resignation. Mr. Forgacs holds approximately 1.2% of our outstanding common stock and while he is subject to Rule 144 limitations and a black-out period surrounding the filing of our Quarterly Report on Form 10-Q, he has not entered into a lock-up agreement in connection with this offering.

Risk Factors

An investment in our common stock is subject to a number of risks and uncertainties. Before investing in our common stock, you should carefully consider the following, as well as the more detailed discussion of risk factors and other information included in this prospectus supplement.

Table of Contents

We have a limited operating history and a history of operating losses, and expect to incur significant additional operating losses.

We will need to secure additional financing to support our planned operations.

We are an early-stage company with an unproven business strategy, and may never achieve profitability.

We may not be able to correctly estimate our future operating expenses, which could lead to cash shortfalls.

Our drug discovery, biological research and therapeutic tools and products are new and unproven.

Our technology, tools and products are subject to the risks associated with new and rapidly evolving technologies and industries.

The commercialization of our drug discovery and biological research tools and products is subject to a variety of risks.

Corporate Background

Real Estate Restoration and Rental, Inc. (RERR), our predecessor company, was incorporated in 2007 in the state of Nevada. On December 28, 2011, RERR entered into an Agreement and Plan of Merger pursuant to which RERR merged with its newly formed, wholly owned subsidiary, Organovo Holdings, Inc. (Merger Sub), a Nevada corporation (the RERR Merger). Upon the consummation of the RERR Merger, the separate existence of Merger Sub ceased and RERR, the surviving corporation in the RERR Merger, became known as Organovo Holdings, Inc. (Holdings-Nevada).

As permitted by Chapter 92A.180 of Nevada Revised Statutes, the sole purpose of the RERR Merger was to effect a change of RERR 's name. Upon the filing of Articles of Merger with the Secretary of State of Nevada on December 28, 2011 to effect the RERR Merger, RERR 's articles of incorporation were deemed amended to reflect the change in RERR 's corporate name.

On January 30, 2012, Holdings-Nevada entered into an Agreement and Plan of Merger pursuant to which Holdings-Nevada merged with and into its newly formed, wholly owned subsidiary, Organovo Holdings, Inc. (Holdings-Delaware or Pubco), a Delaware corporation (the Reincorporation Merger). Upon the consummation of the Reincorporation Merger, the separate existence of Holdings-Nevada ceased and Holdings-Delaware was the surviving corporation in the Reincorporation Merger. The sole purpose of the Reincorporation Merger was to change the domicile of Pubco from Nevada to Delaware.

On February 8, 2012, Organovo Acquisition Corp. (Acquisition Corp.), a wholly-owned subsidiary of Pubco, merged (the Merger) with and into Organovo, Inc., a Delaware corporation. Organovo, Inc. was the surviving corporation of that Merger. As a result of the Merger, Pubco acquired the business of Organovo, and continued the existing business operations of Organovo as Organovo Holdings, Inc.

Table of Contents

On July 11, 2013, our common stock began trading on the NYSE MKT under the symbol ONVO and the quotation of our common stock on the OTCQX was terminated following the closing of trading on July 10, 2013.

Our principal executive offices are located at 6275 Nancy Ridge Dr., San Diego, California 92121 and our phone number is (858) 550-9994. Our Internet address can be found at <http://www.organovo.com>. The information found on our Internet site is not part of this prospectus supplement.

Change in Fiscal Year End

On March 31, 2013, our Board of Directors approved a change in our fiscal year end from December 31st to March 31st. As a result of this change, we filed a Transition Report on Form 10-K for the three-month transition period ended March 31, 2013. References to any of our previous fiscal years mean the fiscal years ending on December 31st.

Table of Contents

THE OFFERING

Common stock offered by us in this offering	9,000,000 shares
Option to purchase additional shares	We have granted the underwriters an option for a period of up to 30 days from the date of this prospectus supplement to purchase up to 1,350,000 additional shares of common stock at the public offering price less the underwriting discounts and commissions to cover over-allotments, if any.
Common stock to be outstanding immediately after this offering	73,686,919 shares (or 75,036,919 shares if the underwriters exercises in full their over-allotment option to purchase additional shares)
Use of proceeds	We intend to use all of the net proceeds from this offering for general corporate purposes, including research and development, the development and commercialization of our products, general administrative expenses, license or technology acquisitions, and working capital and capital expenditures. See Use of Proceeds on page S-29 of this prospectus supplement.
NYSE MKT	ONVO
Risk factors	Investing in our common stock involves a high degree of risk. See Risk Factors beginning on page S-12 of this prospectus supplement.

Outstanding Shares

The number of shares of common stock to be outstanding immediately after this offering as shown above assumes that all of the shares offered hereby are sold and is based on 64,686,919 shares of common stock outstanding as of March 31, 2013. This number of shares excludes, as of March 31, 2013:

3,618,567 shares of common stock issuable upon the exercise of outstanding stock options, having a weighted average exercise price of \$2.11 per share; and

4,283,889 shares of our common stock issuable upon the exercise of outstanding warrants with a weighted-average exercise price of \$1.17 per share.

Table of Contents

Unless otherwise indicated, all information in this prospectus supplement assumes:

that the underwriters do not exercise their option to purchase up to 1,350,000 additional shares of our common stock to cover over-allotments, if any; and

no options, restricted stock awards, warrants, or shares of common stock were issued after March 31, 2013, no outstanding options or warrants were exercised after March 31, 2013 and no outstanding restricted stock awards vested after such date.

S-11

Table of Contents

RISK FACTORS

An investment in our common stock involves a high degree of risk. Before deciding whether to invest in our common stock, you should consider carefully the risks described below, together with other information in this prospectus supplement, the accompanying prospectus, the information and documents incorporated by reference, and in any free writing prospectus that we have authorized for use in connection with this offering. If any of these risks actually occurs, our business, financial condition, results of operations or cash flow could be seriously harmed. This could cause the trading price of our common stock to decline, resulting in a loss of all or part of your investment. The risks and uncertainties described below are not the only ones facing us. Additional risks and uncertainties not presently known to us, or that we currently see as immaterial, may also harm our business.

Risks related to our Business and our Industry

We have a limited operating history and a history of operating losses, and expect to incur significant additional operating losses.

We were incorporated in 2007, opened our laboratories in San Diego, California in January 2009, and have only a limited operating history. Therefore, there is limited historical financial information upon which to base an evaluation of our performance and future prospects. Our future prospects must be considered in light of the uncertainties, risks, expenses, and difficulties frequently encountered by companies in their early stages of operations and competing in new and rapidly developing technology areas. We have generated operating losses since we began operations, including \$4.0 million for the three months ended March 31, 2013 and \$9.3 million, \$2.3 million and \$1.2 million for the years ended December 31, 2012, 2011 and 2010, respectively. As of March 31, 2013, we had incurred cumulative operating losses of \$17.7 million and cumulative net losses totaling \$66.4 million. We expect to incur substantial additional operating losses over the next several years as our research, development, and commercial activities increase. The amount of future losses and when, if ever, we will achieve profitability are uncertain. Our ability to generate revenue and achieve profitability will depend on, among other things, successfully developing drug discovery and biological research tools and products that are more effective than existing technologies; entering into collaborative relationships with strategic partners; obtaining any necessary regulatory approval for our drug discovery, biological research and therapeutic tools and products; entering into successful manufacturing, sales, and marketing arrangements; and raising sufficient funds to finance our activities and business plan. We might not succeed at any of these undertakings. If we are unsuccessful at some or all of these undertakings, our business, prospects, and results of operations will be materially adversely affected.

We will need to secure additional financing to support our planned operations.

We will require additional funds for our anticipated operations. We expect that we will be required to issue additional equity or debt securities or enter into other commercial arrangements, including relationships with corporate and other partners, to secure the additional financial resources to support our development efforts and future operations. Depending upon market conditions, we may not be successful in raising sufficient additional capital on a timely basis, or at all. If we fail to obtain sufficient additional financing, or enter into relationships with others that provide additional financial resources, we will not be able to develop our technology and products on our planned timeline, or at all, and we may be required to delay significantly, reduce the scope of or eliminate one or more of our research or development programs, downsize our general and administrative infrastructure, or seek

Table of Contents

alternative measures to avoid insolvency, including arrangements with collaborative partners or others that may require us to relinquish rights to certain of our technologies, product candidates or products. In such event, our business, prospects, financial condition and results of operations would be adversely affected.

We are an early-stage company with an unproven business strategy, and may never achieve profitability.

We are in the early stages of using our proprietary platform technology to develop and commercialize functional human tissues that can be employed in drug discovery and development, biological research, and as therapeutic implants for the treatment of damaged or degenerating tissues and organs. Our success will depend upon our ability to enter into additional collaboration agreements on favorable terms, to determine which drug discovery, biological research and therapeutic tools and products can be successfully developed with our platform technology, obtain any necessary regulatory approvals for such tools and products, and to select an appropriate commercialization strategy for the tools and products we or our collaborators choose to pursue. If we are not successful in implementing our development and commercialization strategies, which are new and unproven, we may never achieve, maintain or increase profitability.

We may not be able to correctly estimate our future operating expenses, which could lead to cash shortfalls.

Our operating expenses may fluctuate significantly in the future as a result of a variety of factors, many of which are outside of our control. These factors include:

the time and resources required to develop our drug discovery, biological research and therapeutic tools and products;

the time and cost of obtaining any necessary regulatory approvals;

the cost to create effective sales and marketing capabilities;

the expenses we incur to maintain and improve our platform technology;

the costs to attract and retain personnel with the skills required for effective operations; and

the costs of preparing, filing, prosecuting, defending and enforcing patent claims and other patent related costs, including litigation costs and the results of such litigation.

In addition, our budgeted expense levels are based in part on our expectations concerning future revenues from sales of our tools and products and from collaborations with third parties. However, we may not correctly predict the amount or timing of future revenues. In addition, we may not be able to adjust our operations in a timely manner to compensate for any unexpected shortfall in our revenues. As a result, a significant shortfall in our planned revenues could have an immediate and material adverse effect on our business and financial condition.

Table of Contents

Our drug discovery, biological research and therapeutic tools and products are new and unproven.

Our drug discovery and biological research tools and products involve new and unproven models and approaches. We have not proven that our tools and products will enable us or our collaborators to conduct drug discovery and biological research more effectively than through the use of existing technologies. Our success depends on commercial acceptance of our drug discovery and biological research tools and products. Even if we or our collaborators are successful in their drug discovery and biological research efforts, we or our collaborators may not be able to discover or develop commercially viable products therefrom. To date, no one has developed or commercialized any therapeutic or other life science products based on our drug discovery and biological research tools and products. If our drug discovery and biological research products and tools do not assist in the discovery and development of such therapeutic or life science products, our current and potential collaborators may lose confidence in us and our drug discovery and biological research tools and products. Our inability to achieve and maintain commercial acceptance for our tools and products would materially adversely affect our business, financial condition and results of operations.

Our technology, tools and products are subject to the risks associated with new and rapidly evolving technologies and industries.

Our proprietary tissue creation technology and our drug discovery, biological research and therapeutic tools and products are subject to the risks associated with new, rapidly evolving technologies and industries. We may experience unforeseen technical complications, unrecognized defects and limitations in the development and commercialization of our tools and products. These complications could materially delay or limit the use of those tools and products, substantially increase the anticipated cost of manufacturing them or prevent us or our collaborators from implementing their drug discovery or biological research projects successfully or at all. In addition, the process of developing new technologies, tools and products is complex, and if we are unable to develop enhancements to, and new features for, our existing tools and products or acceptable new tools and products that keep pace with technological developments or industry standards, our tools and products may become obsolete, less marketable and less competitive.

The commercialization of our drug discovery and biological research tools and products is subject to a variety of risks.

The commercialization of our drug discovery and biological research tools and products are subject to risks and uncertainties, including:

failing to provide enhanced results over existing technologies;

failing to be cost effective;

failing to receive necessary regulatory approvals;

being difficult or impossible to manufacture on a large scale;

being costly to commercialize or market;

Table of Contents

failing to develop our tools and products before the successful marketing of similar tools and products by competitors; or

infringing the proprietary rights of third parties or competing with superior products marketed by third parties.

If any of these risks and uncertainties occur, our efforts to commercialize our drug discovery and biological research tools and products may be unsuccessful, which would harm our business and results of operations.

We cannot control our collaborators' allocation of resources or the amount of time that our collaborators devote to developing our programs or potential products, which may have a material adverse effect on our business.

Our agreements with our collaborators typically allow them significant discretion in electing whether to pursue product development, regulatory approval, manufacturing and marketing of the products they may develop with the help of our technology. We cannot control the amount and timing of resources our collaborators may devote to our programs or potential products. As a result, we cannot be certain that our collaborators will choose to develop and commercialize these products or that we will realize any milestone payments, royalties and other payments to which we may become entitled. In addition, if a partner is involved in a business combination, such as a merger or acquisition, or if a partner changes its business focus, its performance pursuant to its agreement with us may suffer and, as a result, we may not generate any revenues from royalty, milestone and similar provisions that may be included in our collaborative agreement with that partner.

In addition, our drug discovery collaborative partners or other clients that utilize our research tools will be required to submit their research for regulatory review in order to proceed with human testing of drug candidates. This review by the FDA and other regulatory agencies may result in timeline setbacks or complete rejection of an application to begin human studies, such as an Investigative New Drug (IND) application. Should our collaborative partners or other clients face such setbacks, we would be at risk of not being paid if there were agreed upon milestone and royalty payments. The risks of non-approval for our partners or other clients will include the inherent risks of unfavorable regulator opinion of a drug candidate's safety or efficacy, as well as the risk that the data generated by our platform technology is not found to be suitable to support the safety or efficacy of the drug. In addition, our platform technology is subject to the requirements of Good Laboratory Practice (GLP) to provide suitable data for INDs and other regulatory filings; no regulatory review of data from this platform has yet been conducted and there is no guarantee that our technology will be acceptable under GLP.

Any termination or breach by or conflict with our collaborators or licensees could harm our business.

If we or any of our collaborators or licensees fail to renew or terminate any of our collaboration or license agreements or if either party fails to satisfy its obligations under any of our collaboration or license agreements or complete them in a timely manner, we could lose significant sources of revenue, which could result in volatility in our future revenue. In addition, our agreements with our collaborators and licensees may have provisions that give rise to disputes regarding the rights and obligations of the parties. These and other possible disagreements could lead to termination of the agreement or delays in collaborative research, development, supply or commercialization of certain

Table of Contents

products, or could require or result in litigation or arbitration. Moreover, disagreements could arise with our collaborators over rights to our intellectual property or our rights to share in any of the future revenues of products developed by our collaborators. These kinds of disagreements could result in costly and time-consuming litigation. Any such conflicts with our collaborators could reduce our ability to obtain future collaboration agreements and could have a negative impact on our relationship with existing collaborators, adversely affecting our business and revenues. Finally, any of our collaborations or license agreements may prove to be unsuccessful.

Our collaborators could develop competing research, reducing the available pool of potential collaborators and increasing competition, which may adversely affect our business and revenues.

Our collaborators and potential collaborators could develop research tools similar to our own, reducing our pool of possible collaborative parties and increasing competition. Any of these developments could harm our product and technology development efforts, which could seriously harm our business. In addition, we may pursue opportunities in fields that could conflict with those of our collaborators. Developing products that compete with our collaborators or potential collaborators products could preclude us from entering into future collaborations with our collaborators or potential collaborators. Any of these developments could harm our product development efforts and could adversely affect our business and revenues.

If restrictions on reimbursements and health care reform limit our collaborators actual or potential financial returns on therapeutic products that they develop based on our platform technology, our collaborators may reduce or terminate their collaborations with us.

Our collaborators abilities to commercialize therapeutic and other life science products that are developed through the research tools or services that we provide may depend in part on the extent to which coverage and adequate payments for these products will be available from government payers, such as Medicare and Medicaid, private health insurers, including managed care organizations, and other third-party payers. These payers are increasingly challenging the price of medical products and services. Significant uncertainty exists as to the reimbursement status of newly approved therapeutic and other life science products, and coverage and adequate payments may not be available for these products.

In recent years, officials have made numerous proposals to change the health care system in the U.S. These proposals included measures to limit or eliminate payments for some medical procedures and treatments or subject the pricing of pharmaceuticals and other medical products to government control. Government and other third-party payers increasingly attempt to contain health care costs by limiting both coverage and the level of payments of newly approved health care products. In some cases, they may also refuse to provide any coverage of uses of approved products for disease indications other than those for which the FDA has granted marketing approval. Governments may adopt future legislative proposals and federal, state or private payers for healthcare goods and services may take action to limit their payments for goods and services. Any of these events could limit our ability to form collaborations or collaborators and our ability to commercialize therapeutic products successfully.

Table of Contents

Any therapeutic implants we develop are subject to extensive and uncertain regulatory requirements, which could adversely affect our ability to obtain regulatory approval in a timely manner, or at all, for products that we identify or develop.

Therapeutic and other life science products are subject to an extensive, lengthy and uncertain regulatory approval process by the Food and Drug Administration (FDA) and comparable agencies in other countries. The regulation of new products is extensive, and the required process of laboratory testing and human studies is lengthy and expensive. We may not be able to obtain FDA approvals for those products in a timely manner, or at all. We may encounter significant delays or excessive costs in our efforts to secure necessary approvals or licenses. Even if we obtain FDA regulatory approvals, the FDA extensively regulates manufacturing, labeling, distributing, marketing, promotion and advertising after product approval. Moreover, several of our product development areas may involve relatively new technology and have not been the subject of extensive product testing in humans. The regulatory requirements governing these products and related clinical procedures remain uncertain and the products themselves may be subject to substantial review by foreign governmental regulatory authorities that could prevent or delay approval in those countries. Regulatory requirements ultimately imposed on our products could limit our ability to test, manufacture and, ultimately, commercialize our products and thereby could adversely affect our financial condition and results of operations.

We face intense competition which could result in reduced acceptance and demand for our research tools and products.

The biotechnology industry is subject to intense competition and rapid and significant technological change. We have many potential competitors, including major drug companies, specialized biotechnology firms, academic institutions, government agencies and private and public research institutions. Many of these competitors have significantly greater financial and technical resources, experience and expertise in research and development, preclinical testing, designing and implementing clinical trials; regulatory processes and approvals; production and manufacturing; and sales and marketing of approved products than we have experienced to date. Principal competitive factors in our industry include the quality and breadth of technology; management and the execution of strategy; skill and experience of employees, ability to recruit and retain skilled, experienced employees; intellectual property portfolio; the range of capabilities, including target identification, validation, drug and device discovery, development, manufacturing, marketing; and the availability of substantial capital resources to fund discovery, development and commercialization activities.

Large and established companies compete in the biotech market. In particular, these companies have greater experience and expertise than we have in securing government contracts and grants to support their research and development efforts, conducting testing and clinical trials, obtaining regulatory approvals to market products, manufacturing such products on a broad scale and marketing approved products than we have currently.

Smaller or early-stage companies and research institutions may also prove to be significant competitors, particularly through collaborative arrangements with large and established biotech or other companies, or the obtaining of substantial private financing. We will also face competition from these parties in recruiting and retaining qualified scientific and management personnel.

In order to effectively compete, we will have to make substantial investments in development, testing, manufacturing and sales and marketing or partner with one or more established companies. There is no assurance that we or our collaborators will be successful in commercializing and gaining

Table of Contents

significant market share for any products developed in part through use of our technology. Our technologies, products and services also may be rendered obsolete or noncompetitive as a result of products and services introduced by our competitors.

We may have product liability exposure from the sale of our research tools and therapeutic products or the services we provide.

We may have exposure to claims for product liability. Product liability coverage is expensive and sometimes difficult to obtain. Given our operations to date, we currently do not maintain any product liability insurance coverage. At such point that we determine it is prudent to obtain this insurance, we may not be able to obtain or maintain insurance at a reasonable cost. There can be no assurance that existing insurance coverage will extend to other products in the future. Any product liability insurance coverage may not be sufficient to satisfy all liabilities resulting from product liability claims. A successful claim may prevent us from obtaining adequate product liability insurance in the future on commercially desirable items, if at all. Even if a claim is not successful, defending such a claim would be time-consuming and expensive, may damage our reputation in the marketplace, and would likely divert management's attention.

The near and long-term viability of our products and services will depend on our ability to successfully establish strategic relationships.

The near and long-term viability of our products and services will depend in part on our ability to successfully establish new strategic collaborations with biotechnology companies, pharmaceutical companies, universities, hospitals, insurance companies and government agencies. Establishing strategic collaborations is difficult and time-consuming. Potential collaborators may reject collaborations based upon their assessment of our financial, regulatory or intellectual property position. If we fail to establish a sufficient number of collaborations on acceptable terms, we may not be able to commercialize our products or generate sufficient revenue to fund further research and development efforts.

Even if we establish new collaborations, these relationships may never result in the successful development or commercialization of any product or service candidates for several reasons both within and outside of our control.

Although our current focus is on providing drug discovery services and research tools in the research setting, we may develop tissue therapeutic products and seek approval to sell them as medical care. Before we could begin commercial manufacturing of any of our product candidates, we or our manufacturers must pass a pre-approval inspection by the FDA and comply with the FDA's current Good Manufacturing Practices. If our manufacturers fail to comply with these requirements, our product candidates would not be approved. If our collaborators fail to comply with these requirements after approval, we would be subject to possible regulatory action and may be limited in the jurisdictions in which we are permitted to sell products.

We may be dependent on third-party research organizations to conduct some of our future laboratory testing, animal and human studies.

We may be dependent on third-party research organizations to conduct some of our laboratory testing, animal and human studies with respect to therapeutic tissues and other life science products that we may develop in the future. If we are unable to obtain any necessary testing services on

Table of Contents

acceptable terms, we may not complete our product development efforts in a timely manner. If we rely on third parties for laboratory testing and/or animal and human studies, we may lose some control over these activities and become too dependent upon these parties. These third parties may not complete testing activities on schedule or when we so request. We may not be able to secure and maintain suitable research organizations to conduct our laboratory testing and/or animal and human studies. We are responsible for confirming that each of our clinical trials is conducted in accordance with our general plan and protocol. Moreover, the FDA and foreign regulatory agencies require us to comply with regulations and 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 trial participants are adequately protected. Our reliance on third parties does not relieve us of these responsibilities and requirements. If these third parties do not successfully carry out their contractual duties or regulatory obligations or meet expected deadlines, if the third parties need to be replaced or if the quality or accuracy of the data they obtain is compromised due to the failure to adhere to our clinical protocols or regulatory requirements or for other reasons, our pre-clinical development activities or clinical trials may be extended, delayed, suspended or terminated, and we may not be able to obtain regulatory approval for our future product candidates.

We will require access to a constant, steady, reliable supply of human cells to successfully commercialize our tools and products.

Commercialization of our tools and products will require that we have access to a constant, steady and reliable supply of human cells. We will also require access to, or development of, facilities to manufacture a sufficient supply of our tools and products. If we are unable to manufacture our products in commercial quantities, our business and future results will suffer.

We may rely on third-party suppliers for some of our materials.

We may rely on third-party suppliers and vendors for some of the materials we require in our drug discovery and biological research products and tool businesses as well as for the manufacture of any product candidates that we may develop in the future. Any significant problem experienced by one of our suppliers could result in a delay or interruption in the supply of materials to us until such supplier resolves the problem or an alternative source of supply is located. Any delay or interruption could negatively affect our operations.

Violation of government regulations or quality programs could harm demand for our products or services, and the evolving nature of government regulations could have an adverse impact on our business.

To the extent that our collaborators or customers use our products in the manufacturing or testing processes for their drug and medical device products, such end-products or services may be regulated by the FDA under Quality System Regulations (QSR) or the Centers for Medicare & Medicaid Services (CMS) under Clinical Laboratory Improvement Amendments of 1988 (CLIA '88) regulations. The customer is ultimately responsible for QSR, CLIA '88 and other compliance requirements for their products; however, we may agree to comply with certain requirements, and, if we fail to do so, we could lose sales and customers and be exposed to product liability claims.

Products that are intended for the diagnosis or treatment of disease are subject to government regulation. Our drug discovery and research tool offerings are currently intended for research or investigational uses. Research uses are not subject to FDA or premarket approval or other regulatory

Table of Contents

requirements. Investigational uses are not subject to FDA premarket approval or most regulatory requirements, but are subject to limited regulatory controls for entities conducting investigational studies.

As we continue to adapt and develop parts of our product line in the future, including tissue-based products in the field of regenerative medicine, the manufacture and marketing of our products will become subject to government regulation in the United States and other countries. In the United States and most foreign countries, we will be required to complete rigorous preclinical testing and extensive human clinical trials that demonstrate the safety and efficacy of a product in order to apply for regulatory approval to market the product.

The steps required by the FDA before our proposed products may be marketed in the United States include performance of preclinical (animal and laboratory) tests; submissions to the FDA of an IDE (Investigational Device Exemption), NDA (New Drug Application), or BLA (Biologic License Application) which must become effective before human clinical trials may commence; performance of adequate and well-controlled human clinical trials to establish the safety and efficacy of the product in the intended target population; performance of a consistent and reproducible manufacturing process intended for commercial use; Pre-Market Approval Application (PMA); and FDA approval of the PMA before any commercial sale or shipment of the product.

The processes are expensive and can take many years to complete, and we may not be able to demonstrate the safety and efficacy of our products to the satisfaction of such regulatory authorities. The start of clinical trials can be delayed or take longer than anticipated for many and varied reasons, many of which are outside of our control. Safety concerns may emerge that could lengthen the ongoing trials or require additional trials to be conducted. Regulatory authorities may also require additional testing, and we may be required to demonstrate that our proposed products represent an improved form of treatment over existing therapies, which we may be unable to do without conducting further clinical studies. Moreover, if the FDA grants regulatory approval of a product, the approval may be limited to specific indications or limited with respect to our distribution. Expanded or additional indications for approved devices or drugs may not be approved, which could limit our revenues. Foreign regulatory authorities may apply similar limitations or may refuse to grant any approval. Consequently, even if we believe that preclinical and clinical data are sufficient to support regulatory approval for our product candidates, the FDA and foreign regulatory authorities may not ultimately grant approval for commercial sale in any jurisdiction. If our products are not approved, our ability to generate revenues will be limited and our business will be adversely affected.

Even if a product gains regulatory approval, such approval is likely to limit the indicated uses for which it may be marketed, and the product and the manufacturer of the product will be subject to continuing regulatory review, including adverse event reporting requirements and the FDA's general prohibition against promoting products for unapproved uses. Failure to comply with any post-approval requirements can, among other things, result in warning letters, product seizures, recalls, substantial fines, injunctions, suspensions or revocations of marketing licenses, operating restrictions and criminal prosecutions. Any of these enforcement actions, any unanticipated changes in existing regulatory requirements or the adoption of new requirements, or any safety issues that arise with any approved products, could adversely affect our ability to market products and generate revenues and thus adversely affect our ability to continue our business.

Table of Contents

We also may be restricted or prohibited from marketing or manufacturing a product, even after obtaining product approval, if previously unknown problems with the product or our manufacturer are subsequently discovered and we cannot provide assurance that newly discovered or developed safety issues will not arise following any regulatory approval. With the use of any treatment by a wide patient population, serious adverse events may occur from time to time that initially do not appear to relate to the treatment itself, and only if the specific event occurs with some regularity over a period of time does the treatment become suspect as having a causal relationship to the adverse event. Any safety issues could cause us to suspend or cease marketing of our approved products, possibly subject us to substantial liabilities, and adversely affect our ability to generate revenues.

We are subject to various environmental, health and safety laws.

We are subject to various laws and regulations relating to safe working conditions, laboratory and manufacturing practices, the experimental use of animals, emissions and wastewater discharges, and the use and disposal of hazardous or potentially hazardous substances used in connection with our research, including infectious disease agents. We also cannot accurately predict the extent of regulations that might result from any future legislative or administrative action. Any of these laws or regulations could cause us to incur additional expense or restrict our operations. Compliance with environmental laws and regulations may be expensive, and current or future environmental regulations may impair our research, development or production efforts.

We will depend on our patent portfolio, our licensed technology and other trade secrets in the conduct of our business.

Our success in large part depends on our ability to maintain the proprietary nature of our technology and other trade secrets. To do so, we and our licensors must prosecute and maintain existing patents, obtain new patents and pursue trade secret and other intellectual property protection. We may be unsuccessful in prosecuting our patent applications or patents may not issue from our patent applications. Even if patents are issued and maintained, these patents may not be of adequate scope to benefit us. We also must operate without infringing the proprietary rights of third parties or allowing third parties to infringe our rights. Our research, development and commercialization activities, including any tools or products resulting from these activities, may infringe or be claimed to infringe patents owned by third parties and as to which we do not hold licenses or other rights. There may be rights that we are not aware of, including applications that have been filed but not published that, when issued, could be asserted against us. These third parties could bring claims against us that would cause us to incur substantial expenses and, if successful, could cause us to pay substantial damages. Further, if a patent infringement suit were brought against us, we could be forced to stop or delay research, development, manufacturing or sales of the product or biologic treatment candidate that is the subject of the suit.

In addition, competitors may infringe our patents or the patents of our collaborators or licensors. As a result, we may be required to file infringement claims to counter infringement for unauthorized use. This can be expensive and time-consuming. In addition, in an infringement proceeding, a court may decide that a patent owned by us is not valid or is unenforceable, or may refuse to stop the other party from using the technology at issue on the grounds that our patents do not cover our technology. An adverse determination of any litigation or defense proceedings could put one or more of our patents at risk of being invalidated or interpreted narrowly and could put our patent applications at the risk of not issuing.

Table of Contents

Furthermore, because of the substantial amount of discovery required in connection with intellectual property litigation, there is a risk that some of our confidential information could be compromised by disclosure during this type of litigation.

A significant portion of our sales are dependent upon our customers' capital spending policies and research and development budgets, and government funding of research and development programs at universities and other organizations, which are each subject to significant and unexpected decrease.

Our prospective customers include pharmaceutical and biotechnology companies, academic institutions, government laboratories, and private research foundations. Fluctuations in the research and development budgets at these organizations could have a significant effect on the demand for our products and services. Research and development budgets fluctuate due to changes in available resources, patent expirations, mergers of pharmaceutical and biotechnology companies, spending priorities, general economic conditions, and institutional and governmental budgetary policies, including but not limited to reductions in grants for research by federal and state agencies as a result of the current budget crises and budget reduction measures. In addition, our business could be seriously damaged by any significant decrease in life sciences research and development expenditures by pharmaceutical and biotechnology companies, academic institutions, government laboratories, or private foundations.

The timing and amount of revenues from customers that rely on government funding of research may vary significantly due to factors that can be difficult to forecast. Research funding for life science research has increased more slowly during the past several years compared to the previous years and has declined in some countries, and some grants have been frozen for extended periods of time or otherwise become unavailable to various institutions, sometimes without advance notice. Government funding of research and development is subject to the political process, which is inherently fluid and unpredictable. Other programs, such as homeland security or defense, or general efforts to reduce the federal budget deficit could be viewed by the United States government as a higher priority. These budgetary pressures may result in reduced allocations to government agencies that fund research and development activities. Current steps to reduce the federal budget deficit include reduced National Institute of Health and other research and development allocations. The prolonged or increased shift away from the funding of life sciences research and development or delays surrounding the approval of government budget proposals may cause our customers to delay or forego purchases of our products or services, which could seriously damage our business.

Risks Related to Our Common Stock and Liquidity Risks

The Company has a limited trading history and there is no assurance that an active market in the Company's common stock will continue at present levels or increase in the future.

There is limited trading history in our common stock, and although our common stock is now traded on the NYSE MKT, there is no assurance that an active market in our common stock will continue at present levels or increase in the future. As a result, an investor may find it difficult to dispose of our common stock. This factor limits the liquidity of our common stock, and may have a material adverse effect on the market price of our common stock and on our ability to raise additional capital.

Table of Contents

Compliance with the reporting requirements of federal securities laws can be expensive.

We are a public reporting company in the United States, and accordingly, subject to the information and reporting requirements of the Exchange Act and other federal securities laws, and the compliance obligations of the Sarbanes-Oxley Act. The costs of preparing and filing annual and quarterly reports and other information with the SEC and furnishing audited reports to stockholders could be substantial. In addition, in order to comply with the Sarbanes-Oxley Act and the related rules and regulations of the SEC, we will be required to expand disclosures and accelerate our financial reporting requirements. If we are unable to complete the required Section 404(b) assessment as to the adequacy of our internal control over financial reporting on a timely basis, if we fail to maintain or implement adequate controls, or if our independent registered public accounting firm is unable to provide us with an unqualified report as to the effectiveness of our internal control over financial reporting as of the date of our first Form 10-K for which compliance is required, our ability to obtain additional financing could be impaired. In addition, investors could lose confidence in the reliability of our internal control over financial reporting and in the accuracy of our periodic reports filed under the Exchange Act. A lack of investor confidence in the reliability and accuracy of our public reporting could cause our stock price to decline.

Applicable regulatory requirements, including those contained in and issued under the Sarbanes-Oxley Act of 2002, may make it difficult for us to retain or attract qualified officers and directors, which could adversely affect the management of its business and its ability to obtain or retain listing of our common stock.

We may be unable to attract and retain those qualified officers, directors and members of board committees required to provide for effective management because of the rules and regulations that govern publicly held companies, including, but not limited to, certifications by principal executive officers. The enactment of the Sarbanes-Oxley Act has resulted in the issuance of a series of related rules and regulations and the strengthening of existing rules and regulations by the SEC, as well as the adoption of new and more stringent rules by the stock exchanges. The perceived increased personal risk associated with these changes may deter qualified individuals from accepting roles as directors and executive officers.

Further, some of these changes heighten the requirements for board or committee membership, particularly with respect to an individual's independence from the corporation and level of experience in finance and accounting matters. We may have difficulty attracting and retaining directors with the requisite qualifications. If we are unable to attract and retain qualified officers and directors, the management of our business and our ability to retain listing of our shares of common stock on the NYSE MKT could be adversely affected.

We may have undisclosed liabilities and any such liabilities could harm our revenues, business, prospects, financial condition and results of operations.

Prior to our reverse merger in February 2012, the assets and liabilities of the public company shell we eventually merged into were transferred in a split-off transaction (the "Split-Off") to a separate entity (the "Split-Off Entity") owned by the then outstanding stockholders of the public company shell (the "Split-Off Shareholders"). Even though the pre-merger assets and liabilities were transferred to the Split-Off Entity in the Split-Off, there can be no assurance that we will not be liable for any or all of such liabilities. Any such liabilities that survived our reverse merger could harm our revenues, business, prospects, financial condition and results of operations upon our acceptance of

Table of Contents

responsibility for such liabilities. The transfer of the operating assets and liabilities to Split-Off Entity, coupled with the Split-Off, will result in taxable income to us in an amount equal to the difference between the fair market value of the assets transferred and the pre-merger tax basis of the assets. Any gain recognized, to the extent not offset by our net operating loss carryforward, if any, will be subject to federal income tax at regular corporate income tax rates.

The price of our common stock may continue to be volatile, which could lead to losses by investors and costly securities litigation.

The trading price of our common stock is likely to be highly volatile and could fluctuate in response to factors such as:

actual or anticipated variations in our operating results;

announcements of developments by us or our competitors;

regulatory actions regarding our products;

reduced government funding for research and development activities;

announcements by us or our competitors of significant acquisitions, strategic partnerships, joint ventures or capital commitments;

adoption of new accounting standards affecting our industry;

additions or departures of key personnel;

introduction of new products by us or our competitors;

sales of our common stock or other securities in the open market; and

other events or factors, many of which are beyond our control.

The stock market is subject to significant price and volume fluctuations. In the past, following periods of volatility in the market price of a company's securities, securities class action litigation has often been initiated against such a company. Litigation initiated against us, whether or not successful, could result in substantial costs and diversion of our management's attention and resources, which could harm our business and financial condition.

Investors may experience dilution of their ownership interests because of the future issuance of additional shares of our common stock.

We are authorized to issue 150,000,000 shares of our common stock. As of March 31, 2013, there were an aggregate of 72,589,375 shares of our common stock issued and outstanding on a fully diluted basis. That total includes 3,618,567 shares of our common stock that may be issued upon the exercise of outstanding stock options, and 4,283,889 shares of our common stock that may be issued upon the exercise of outstanding warrants.

In the future, we may issue additional authorized but previously unissued equity securities, resulting in the dilution of the ownership interests of our present stockholders. We may also issue additional shares of our common stock or other securities that are convertible into or exercisable for

S-24

Table of Contents

our common stock in connection with presently outstanding warrants, hiring or retaining employees, future acquisitions, future sales of our securities for capital raising purposes, or for other business purposes. The future issuance of any such additional shares of common stock may create downward pressure on the trading price of our common stock. There can be no assurance that we will not be required to issue additional shares, warrants or other convertible securities in the future in conjunction with any capital raising efforts, including at a price (or exercise prices) below the price at which shares of our common stock is currently traded on the NYSE MKT.

Our common stock is controlled by insiders.

Our current executive officers and directors beneficially own approximately 14% of our outstanding shares of common stock, as of July 1, 2013. To our knowledge, Dr. Gabor Forgacs, the father of one of our former directors and an advisory board member, beneficially owns another 9% of our outstanding shares of common stock. Although we are not aware of any voting arrangements between our officers, directors and Dr. Forgacs, such concentrated control may adversely affect the price of our common stock. Investors who acquire our common stock may have no effective voice in the management of our operations.

Our current executive offices and directors have agreed with the underwriters, subject to certain exceptions, not to dispose of or hedge any of our shares of common stock or securities convertible into or exercisable or exchangeable for common stock for 60 days after the date of this prospectus supplement without first obtaining the written consent of the representative. As of July 1, 2013, our former director, Andras Forgacs, holds, to our knowledge, approximately 1.2% of our outstanding common stock and while he is subject to Rule 144 limitations and a black-out period surrounding the filing of the our Quarterly Report on Form 10-Q, he has not entered into a lock-up agreement. The sales by our executive officers and directors after the lock-up period and sales by other insiders or affiliates, along with any other market transactions, could affect the market price of our common stock. We determined the number of shares of common stock beneficially owned by each person under rules promulgated by the SEC, based on information obtained from Company records and filings with the SEC as of July 1, 2013.

We do not intend to pay dividends for the foreseeable future.

We have paid no dividends on our common stock to date and it is not anticipated that any dividends will be paid to holders of our common stock in the foreseeable future. While our future dividend policy will be based on the operating results and capital needs of our business, it is currently anticipated that any earnings will be retained to finance our future expansion and for the implementation of our business plan. As an investor, you should take note of the fact that a lack of a dividend can further affect the market value of our stock, and could significantly affect the value of any investment.

Table of Contents

Anti-takeover provisions in our organizational documents and Delaware law may discourage or prevent a change of control, even if an acquisition would be beneficial to our stockholders, which could affect our stock price adversely and prevent attempts by our stockholders to replace or remove our current management.

Our certificate of incorporation and bylaws contain provisions that could delay or prevent a change of control of our company or changes in our board of directors that our stockholders might consider favorable. Some of these provisions:

authorize the issuance of preferred stock which can be created and issued by the board of directors without prior stockholder approval, with rights senior to those of the common stock;

provide for a classified board of directors, with each director serving a staggered three-year term;

prohibit our stockholders from filling board vacancies, calling special stockholder meetings, or taking action by written consent; and

require advance written notice of stockholder proposals and director nominations.

In addition, we are subject to the provisions of Section 203 of the Delaware General Corporation Law, which may prohibit certain business combinations with stockholders owning 15% or more of our outstanding voting stock. These and other provisions in our certificate of incorporation, bylaws and Delaware law could make it more difficult for stockholders or potential acquirers to obtain control of our board of directors or initiate actions that are opposed by our then-current board of directors, including delaying or impeding a merger, tender offer, or proxy contest involving our company. Any delay or prevention of a change of control transaction or changes in our board of directors could cause the market price of our common stock to decline.

Risks Related to This Offering

Management will have broad discretion as to the use of the net proceeds from this offering, and we may not use the proceeds effectively.

Our management will have broad discretion in the application of the net proceeds from this offering and could spend the proceeds in ways that do not improve our results of operations or enhance the value of our common stock. Our failure to apply these funds effectively could have a material adverse effect on our business, delay the development of our product candidates and cause the price of our common stock to decline.

You will experience immediate and substantial dilution in the net tangible book value per share of the common stock you purchase.

Since the price per share of our common stock being offered is substantially higher than the net tangible book value per share of our common stock, you will suffer substantial dilution in the net tangible book value of the common stock you purchase in this offering. Based on the public offering of 9,000,000 shares at the public offering price of \$4.50 per share and after deducting underwriting discounts and commissions and estimated offering expenses payable by us, and based on a net tangible book value of our common stock of \$0.14 per share as of March 31, 2013, if you purchase shares of common stock in this offering, you will suffer immediate and substantial dilution of \$3.87 per share in the net tangible book value of common stock. See the section entitled "Dilution" below for a more detailed discussion of the dilution you will incur if you purchase common stock in this offering.

Table of Contents

You may experience future dilution as a result of future equity offerings.

In order to raise additional capital, we may in the future offer additional shares of our common stock or other securities convertible into or exchangeable for our common stock at prices that may not be the same as the price per share in this offering. We cannot assure you that we will be able to sell shares or other securities in any other offering at a price per share that is equal to or greater than the price per share paid by investors in this offering, and investors purchasing shares or other securities in the future could have rights superior to existing stockholders, including investors who purchase shares of common stock in this offering. The price per share at which we sell additional shares of our common stock or securities convertible into common stock in future transactions may be higher or lower than the price per share in this offering.

If securities and/or industry analysts fail to continue publishing research about our business, if they change their recommendations adversely or if our results of operations do not meet their expectations, our stock price and trading volume could decline.

The trading market for our common stock will be influenced by the research and reports that industry or securities analysts publish about us or our business. If one or more of these analysts cease coverage of our company or fail to publish reports on us regularly, we could lose visibility in the financial markets, which in turn could cause our stock price or trading volume to decline. In addition, it is likely that in some future period our operating results will be below the expectations of securities analysts or investors. If one or more of the analysts who cover us downgrade our stock, or if our results of operations do not meet their expectations, our stock price could decline.

Our stockholders may be diluted by the exercise of outstanding options or warrants to purchase common stock.

As of March 31, 2013, we have 3,618,567 shares of common stock issuable upon the exercise of outstanding stock options, at exercise prices ranging from \$0.08 to \$4.85 (with a weighted average exercise price of \$2.11 per share) and outstanding warrants to purchase 4,283,889 shares of our common stock at exercise prices ranging from \$0.85 to \$3.24 per share (with a weighted average exercise price of \$1.17). You may incur dilution upon the grant of shares upon exercise of such outstanding options or warrants.

Table of Contents

SPECIAL NOTE REGARDING FORWARD-LOOKING INFORMATION

This prospectus supplement and the accompanying prospectus and the documents incorporated herein by reference contain, or will contain, certain forward-looking statements within the meaning of Section 27A of the Securities Act, and Section 21E of the Exchange Act. These statements relate to anticipated future events, future results of operations or future financial performance. These forward-looking statements include, but are not limited to, statements relating to our ability to develop, market and sell products based on our technology, the expected benefits and efficacy of our products and technology, the availability of substantial additional funding to support our operations, our ability to enter into successful collaboration arrangements, our ability to achieve our business, research, product development, regulatory approval, marketing and distribution plans and strategies, market acceptance of our technology and product offerings, our ability to attract and retain key personnel, our ability to protect our intellectual property, our ability to develop commercially viable products from our technology and estimates of our cash expenditures for the next 12 to 36 months. In some cases, you can identify forward-looking statements by terminology such as *may*, *might*, *will*, *should*, *intends*, *expects*, *plans*, *goals*, *projects*, *anticipates*, *believes*, *estimates*, *predicts*, *potential*, or *could*, or other comparable terminology.

These forward-looking statements are only predictions, are uncertain and involve substantial known and unknown risks, uncertainties and other factors which may cause our (or our industry's) actual results, levels of activity or performance to be materially different from any future results, levels of activity or performance expressed or implied by these forward-looking statements. The *Risk Factors* section of this prospectus supplement and the accompanying prospectus sets forth detailed risks, uncertainties and cautionary statements regarding our business and these forward-looking statements. You should consider these Risk Factors, as well as any Risk Factors that we include in any of our future filings with the SEC pursuant to Sections 13(a), 13(c), 14 or 15(d) of the Securities Exchange Act of 1934, as amended, incorporated by reference into this prospectus supplement and the accompanying prospectus before making an investment decision. Any of the risks, as well as additional risks and uncertainties not currently known to us or that we currently deem immaterial, could materially and adversely affect our results of operations or financial condition.

We cannot guarantee future results, levels of activity or performance. You should not place undue reliance on these forward-looking statements, which speak only as of the date that they were made. These cautionary statements should be considered with any written or oral forward-looking statements that we may issue in the future. Except as required by applicable law, including the securities laws of the United States, we do not intend to update any of the forward-looking statements to conform these statements to reflect actual results, later events or circumstances or to reflect the occurrence of unanticipated events.

You should read this prospectus supplement, the accompanying prospectus, the documents we have filed with the SEC that are incorporated by reference and any free writing prospectus that we have authorized for use in connection with this offering completely and with the understanding that our actual future results may be materially different from what we expect. We qualify all of the forward-looking statements in the foregoing documents by these cautionary statements.

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

Table of Contents

USE OF PROCEEDS

We estimate that the net proceeds to us from the sale of 9,000,000 shares of our common stock offered hereby, at the public offering price of \$4.50 per share, will be approximately \$37.7 million, or approximately \$43.4 million if the underwriters exercise in full their over-allotment option to purchase additional shares of common stock, after deducting the estimated underwriting discounts and commissions and estimated offering expenses payable by us.

We intend to use the net proceeds from the sale of the securities offered under this prospectus supplement for general corporate purposes, including research and development, the development and commercialization of our products, general administrative expenses, license or technology acquisitions, and working capital and capital expenditures. We may also use the net proceeds to repay any debts and/or invest in or acquire complementary businesses, products or technologies, although we have no current commitments or agreements with respect to any such investments or acquisitions as of the date of this prospectus supplement.

DIVIDEND POLICY

We have never declared or paid any dividends on our common stock and do not anticipate paying any in the foreseeable future. We currently intend to retain all of our future earnings, if any, to finance the operation and expansion of our business. Any future determination relating to our dividend policy will be made at the discretion of our board of directors and will depend on a number of factors, including future earnings, capital requirements, financial conditions, future prospects, contractual restrictions and covenants and other factors that our board of directors may deem relevant.

Table of Contents**DILUTION**

If you purchase our common stock in this offering, your interest will be diluted to the extent of the difference between the offering price per share and the net tangible book value per share of our common stock after this offering. Our net tangible book value as of March 31, 2013 was approximately \$8.9 million, or \$0.14 per share. Net tangible book value per share is determined by dividing our total tangible assets, less total liabilities, by the number of shares of our common stock outstanding as of March 31, 2013. Dilution in net tangible book value per share represents the difference between the amount per share paid by purchasers of shares of common stock in this offering and the net tangible book value per share of our common stock immediately after this offering.

After taking into account the sale by us of 9,000,000 shares of our common stock in this offering at the public offering price of \$4.50 per share, after deducting underwriting discounts and commissions and estimated offering expenses payable by us, our as adjusted net tangible book value as of March 31, 2013 would have been approximately \$46.6 million, or \$0.63 per share. This would represent an immediate increase in net tangible book value of \$0.49 per share to existing stockholders and an immediate dilution of \$3.87 per share to investors purchasing our common stock in this offering at the public offering price. The following table illustrates this dilution on a per share basis:

Public offering price per share	\$ 4.50
Net tangible book value per share as of March 31, 2013	\$ 0.14
Increase per share attributable to investors purchasing our common stock in this offering	\$ 0.49
As adjusted net tangible book value per share as of March 31, 2013, after giving effect to this offering	\$ 0.63
Dilution in net tangible book value per share to investors purchasing our common stock in this offering	\$ 3.87

If the underwriters exercise in full their option to purchase 1,350,000 additional shares of common stock at the public offering price of \$4.50 per share, the pro forma as adjusted net tangible book value after this offering would be approximately \$0.70 per share, representing an increase in net tangible book value of approximately \$0.56 per share to existing stockholders and immediate dilution in net tangible book value of approximately \$3.80 per share to investors purchasing our common stock in this offering at the public offering price.

The number of shares of common stock to be outstanding immediately after this offering as shown above assumes that all of the shares offered hereby are sold and is based on 64,686,919 shares of common stock outstanding as of March 31, 2013. This number of shares excludes, as of March 31, 2013:

3,618,567 shares of common stock issuable upon the exercise of outstanding stock options, having a weighted average exercise price of \$2.11 per share; and

4,283,889 shares of our common stock issuable upon the exercise of outstanding warrants with a weighted-average exercise price of \$1.17 per share.

Table of Contents

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

S-31

Table of Contents**UNDERWRITING**

Under the terms and subject to the conditions in an underwriting agreement dated the date of this prospectus supplement, the underwriters named below, for whom Lazard Capital Markets is acting as the representative, have severally agreed to purchase, and we have agreed to sell to them, the number of shares of our common stock at the public offering price, less the underwriting discounts and commissions, as set forth on the cover page of this prospectus supplement as indicated below:

Underwriters	Number of Shares
Lazard Capital Markets LLC	4,050,000
Oppenheimer & Co. Inc.	3,150,000
JMP Securities LLC	1,350,000
Maxim Group LLC	450,000
Total	9,000,000

The underwriters are offering the shares of common stock subject to their acceptance of the shares from us and subject to prior sale. The underwriting agreement provides that the obligations of the underwriters to pay for and accept delivery of the shares of common stock offered by this prospectus supplement are subject to the approval of certain legal matters by their counsel and to other conditions. The underwriters are obligated to take and pay for all of the shares of common stock offered by this prospectus supplement if any such shares are taken.

The underwriters have an option to buy up to 1,350,000 additional shares of common stock from us to cover sales of shares by the underwriters which exceed the number of shares specified in the table above. The underwriters may exercise this option at any time and from time to time during the 30-day period from the date of this prospectus supplement. If any additional shares of common stock are purchased, the underwriters will offer the additional shares on the same terms as those on which the shares are being offered.

The underwriters initially propose to offer the shares of common stock directly to the public at the public offering price listed on the cover page of this prospectus supplement. After the initial offering of the shares of common stock, the offering price and other selling terms may from time to time be varied by the underwriters.

Certain of our directors and executive officers have indicated an interest in purchasing shares of common stock in this offering at the price to the public. However, because indications of interest are not binding agreements or commitments to purchase, these directors and officers may elect not to purchase any shares in this offering or the underwriters may elect not to sell any shares in this offering to them.

The underwriting agreement provides that the obligations of the underwriters are subject to certain conditions precedent, including the absence of any material adverse change in our business and the receipt of customary legal opinions, letters and certificates.

Table of Contents**Commissions and Discounts**

The following table summarizes the public offering price, underwriting discounts and commissions and proceeds before expenses to us assuming both no exercise and full exercise of the underwriters' option to purchase additional shares:

	Per Share	Without Over- Allotment	Total With Over- Allotment
Public offering price	\$ 4.50	\$ 40,500,000	\$ 46,575,000
Underwriting discounts and commissions	0.27	2,430,000	2,794,500
Proceeds, before expenses, to us	4.23	38,070,000	43,780,500

We estimate that the total expenses of this offering, including registration, filing and listing fees, printing fees, and legal and accounting expenses, but excluding the underwriting discounts and commissions, will be approximately \$350,000. We have agreed to reimburse the underwriters for certain legal fees and expenses up to \$150,000.

The relationship between Lazard Frères & Co. LLC and Lazard Capital Markets LLC is governed by a business alliance agreement between their respective parent companies. Pursuant to such agreement, Lazard Frères & Co. LLC referred this transaction to Lazard Capital Markets LLC and will receive a referral fee from Lazard Capital Markets LLC in connection therewith; however, such referral fee is not in addition to the fee paid by us to Lazard Capital Markets LLC described above.

Spencer Trask, pursuant to a placement agency agreement (the "PAA") we entered into in connection with our February 2012 private placement, may be entitled to compensation, including fees and warrants to purchase common stock, if selling stockholders listed in the Registration Statement on Form S-1 we filed on June 13, 2012, as amended July 5, 2012, participate in this offering. We do not believe any of the selling stockholders are participating in this offering.

Indemnification

We and the underwriters have agreed to indemnify each other, and we have also agreed to indemnify the underwriters against certain liabilities, including certain liabilities under the Securities Act of 1933, as amended, and liabilities arising from breaches of representations and warranties contained in the underwriting agreement. We have also agreed to contribute to payments the underwriters may be required to make in respect of such liabilities.

No Sales of Similar Securities

We and each of our executive officers and directors, subject to certain exceptions, have agreed with the underwriters not to dispose of or hedge any of our shares of common stock or securities convertible into or exercisable or exchangeable for common stock for (sixty) 60 days after the date of this prospectus supplement without first obtaining the written consent of the representative. The exceptions to the lock-up for executive officers and directors are: (a) transfers of beneficially owned shares, common stock or securities convertible into or exercisable or exchangeable for common stock (i) as a bona fide gift or gifts, (ii) to any trust for the direct or indirect benefit of the undersigned or the

Table of Contents

immediate family of the undersigned or (iii) by will or intestacy to the executive officer s or director s, as applicable, legal representative, heir or legatee; or (b) solely with respect to Sharon Presnell, our Chief Technology Officer and Executive Vice President of Research and Development, up to 75,000 shares sold on or after August 12, 2013 pursuant to any contract, instruction or plan complying with Rule 10b5-1 under the Securities Exchange Act of 1934, as amended, that has been entered into by Ms. Presnell prior to the date of the underwriting agreement; provided that in the case of any transfer or distribution pursuant to clause (a), each donee or distributee or transferee shall execute and deliver to Lazard a lock-up letter for the balance of the lock-up period in the form required. The exceptions to the lock-up for us are: (w) our sale of shares in this offering; and (x) the issuance of restricted common stock or options to acquire common stock pursuant to our benefit plans, qualified equity incentive plans or other compensation plans. The 60-day lock-up period during which we and our executive officers and directors are restricted from engaging in transactions in our common stock or securities convertible into or exercisable or exchangeable for common stock is subject to extension such that, in the event that either (i) during the last 17 days of the lock-up period, we issue an earnings or financial results release or material news or a material event relating to us occurs, or (ii) prior to the expiration of the lock-up period, we announce that we will release earnings or financial results during the 16-day period beginning on the last day of the lock-up period, then in either case the expiration of the lock-up period will be extended until the expiration of the 18-day period beginning on the issuance of the earnings or financial results release or the occurrence of the material news or material event, as applicable, unless the representative waives, in writing, such an extension.

Price Stabilization, Short Positions

In order to facilitate the offering of our common stock, the underwriters may engage in transactions that stabilize, maintain or otherwise affect the price of our common stock. Specifically, the underwriters may sell more shares than they are obligated to purchase under the underwriting agreement, creating a short position. The underwriters must close out any short position by purchasing shares in the open market. A short position may be created if the underwriters are concerned that there may be downward pressure on the price of the common stock in the open market after pricing that could adversely affect investors who purchased in this offering. As an additional means of facilitating this offering, the underwriters may bid for, and purchase, shares of our common stock in the open market to stabilize the price of the common stock. These activities may raise or maintain the market price of our common stock above independent market levels or prevent or slow a decline in the market price of our common stock. The underwriters are not required to engage in these activities, and may end any of these activities at any time.

A prospectus in electronic format may be made available on websites maintained by the underwriters. The representative may agree to allocate a number of shares of common stock to other underwriters for sale to their online brokerage account holders. Internet distributions will be allocated by the underwriters on the same basis as other allocations.

United Kingdom

This document is only being distributed to and is only directed at (i) persons who are outside the United Kingdom or (ii) to investment professionals falling within Article 19(5) of the Financial Services and Markets Act 2000 (Financial Promotion) Order 2005 (the Order) or (iii) high net worth entities, and other persons to whom it may lawfully be communicated, falling within Article 49(2)(a) to (e) of the Order (all such persons together being referred to as relevant persons). The shares of

Table of Contents

common stock are only available to, and any invitation, offer or agreement to subscribe, purchase or otherwise acquire such common stock will be engaged in only with, relevant persons. Any person who is not a relevant person should not act or rely on this document or any of its contents.

Each underwriter has represented and agreed that:

(a) it has only communicated or caused to be communicated and will only communicate or cause to be communicated an invitation or inducement to engage in investment activity (within the meaning of Section 21 of the Financial Services and Markets Act 2000 or FSMA) received by it in connection with the issue or sale of the shares in circumstances in which Section 21(1) of the FSMA does not apply to us, and

(b) it has complied with, and will comply with all applicable provisions of FSMA with respect to anything done by it in relation to the shares in, from or otherwise involving the United Kingdom.

European Economic Area

To the extent that the offer of the common stock is made in any Member State of the European Economic Area that has implemented the Prospectus Directive before the date of publication of a prospectus in relation to the common stock which has been approved by the competent authority in the Member State in accordance with the Prospectus Directive (or, where appropriate, published in accordance with the Prospectus Directive and notified to the competent authority in the Member State in accordance with the Prospectus Directive), the offer (including any offer pursuant to this document) is only addressed to qualified investors in that Member State within the meaning of the Prospectus Directive or has been or will be made otherwise in circumstances that do not require us to publish a prospectus pursuant to the Prospectus Directive.

In relation to each Member State of the European Economic Area which has implemented the Prospectus Directive (each, a Relevant Member State), each underwriter has represented and agreed that with effect from and including the date on which the Prospectus Directive is implemented in that Relevant Member State (the Relevant Implementation Date) it has not made and will not make an offer of shares to the public in that Relevant Member State prior to the publication of a prospectus in relation to the shares which has been approved by the competent authority in that Relevant Member State or, where appropriate, approved in another Relevant Member State and notified to the competent authority in that Relevant Member State, all in accordance with the Prospectus Directive, except that it may, with effect from and including the Relevant Implementation Date, make an offer of shares to the public in that Relevant Member State at any time:

(a) to legal entities which are authorized or regulated to operate in the financial markets or, if not so authorized or regulated, whose corporate purpose is solely to invest in securities,

(b) to any legal entity which has two or more of (1) an average of at least 250 employees during the last financial year; (2) a total balance sheet of more than 43,000,000 and (3) an annual net turnover of more than 50,000,000, as shown in its last annual or consolidated accounts, or

(c) in any other circumstances which do not require the publication by us of a prospectus pursuant to Article 3 of the Prospectus Directive. For the purposes of this provision, the

Table of Contents

expression an offer of shares to the public in relation to any shares in any Relevant Member State means the communication in any form and by any means of sufficient information on the terms of the offer and the shares to be offered so as to enable an investor to decide to purchase or subscribe the shares, as the same may be varied in that Relevant Member State by any measure implementing the Prospectus Directive in that Relevant Member State and the expression Prospectus Directive means Directive 2003/71/EC and includes any relevant implementing measure in each Relevant Member State.

The EEA selling restriction is in addition to any other selling restrictions set out below. In relation to each Relevant Member State, each purchaser of shares of common stock (other than the underwriters) will be deemed to have represented, acknowledged and agreed that it will not make an offer of shares of common stock to the public in any Relevant Member State, except that it may, with effect from and including the date on which the Prospectus Directive is implemented in the Relevant Member State, make an offer of shares of common stock to the public in that Relevant Member State at any time in any circumstances which do not require the publication by us of a prospectus pursuant to Article 3 of the Prospectus Directive, provided that such purchaser agrees that it has not and will not make an offer of any shares of common stock in reliance or purported reliance on Article 3(2)(b) of the Prospectus Directive. For the purposes of this provision, the expression an offer of shares to the public in relation to any shares of common stock in any Relevant Member State has the same meaning as in the preceding paragraph.

Switzerland

This document does not constitute a prospectus within the meaning of Art. 652a of the Swiss Code of Obligations. The shares of common stock may not be sold directly or indirectly in or into Switzerland except in a manner which will not result in a public offering within the meaning of the Swiss Code of Obligations. Neither this document nor any other offering materials relating to the shares of common stock may be distributed, published or otherwise made available in Switzerland except in a manner which will not constitute a public offer of the shares of common stock in Switzerland.

Israel

In the State of Israel, the shares offered hereby may not be offered to any person or entity other than the following, all of whom must acquire the securities for their own account and not for purposes of distribution and/or sale to others:

- (a) a fund for joint investments in trust (i.e., mutual fund), as such term is defined in the Law for Joint Investments in Trust, 5754-1994, or a management company of such a fund;
- (b) a provident fund as defined in the Control of Financial Services law (Provident Funds), 5765-2005;
- (c) an insurer, as defined under the Insurance Business (Control) Law 5741-1981;
- (d) a banking entity or satellite entity, as such terms are defined in the Banking Law (Licensing), 5741-1981, other than a joint services company, acting for their own account or for the account of investors of the type listed in Section 15A(b) of the Securities Law 1968;

Table of Contents

(e) a portfolio manager, as such term is defined in Section 8(b) of the Law for the Regulation of Investment Advisors and Portfolio Managers, 5755-1995, acting on its own account or for the account of investors of the type listed in Section 15A(b) of the Securities Law 1968;

(f) an investment advisor, as such term is defined in Section 7(c) of the Law for the Regulation of Investment Advisors and Portfolio Managers, 5755-1995, acting on its own account;

(g) a member of the Tel Aviv Stock Exchange, acting on its own account or for the account of investors of the type listed in Section 15A(b) of the Securities Law 1968;

(h) an underwriter fulfilling the conditions of Section 56(c) of the Securities Law 1968, purchasing for itself;

(i) a venture capital fund (defined as an entity primarily involved in investments in companies which, at the time of investment, (i) are primarily engaged in research and development or manufacture of new technological products or processes and (ii) where the risk of investment is higher than what is customary for other investments);

(j) a corporation primarily engaged in capital markets activities and which is wholly owned by investors listed in Section 15A(b) of the Securities Laws 1968; and

(k) an entity, other than an entity formed for the purpose of purchasing the shares in this offering, in which the shareholders equity (including pursuant to foreign accounting rules, international accounting regulations and U.S. generally accepted accounting rules, as defined in the Securities Law Regulations (Preparation of Annual Financial Statements), 1993) is in excess of NIS 250 million.

Listing on NYSE MKT

Our common shares are traded on the NYSE MKT under the symbol ONVO. The transfer agent for our common shares to be issued in this offering is VStock Transfer, LLC, located at 77 Spruce Street, Suite 201, Cedarhurst, NY 11516.

Table of Contents

LEGAL MATTERS

DLA Piper LLP (US), San Diego, California will pass upon the validity of the issuance of the common stock offered by this prospectus supplement and the accompanying prospectus. Proskauer Rose LLP, New York, New York, is counsel for the underwriters in connection with this offering.

EXPERTS

The consolidated financial statements incorporated in this prospectus supplement by reference to our Transition Report on Form 10-KT and our Annual Report on Form 10-K have been audited by Mayer Hoffman McCann P.C., an independent registered public accounting firm, as stated in their reports, which are incorporated herein by reference. Such financial statements have been so incorporated in reliance upon the reports of such firm given upon their authority as experts in accounting and auditing.

WHERE YOU CAN FIND MORE INFORMATION

We have filed with the SEC a registration statement on Form S-3 (File No. 333-189995), of which this prospectus supplement and the accompanying prospectus are a part, under the Securities Act, to register the shares of common stock offered by this prospectus supplement. However, this prospectus supplement and the accompanying prospectus do not contain all of the information contained in the registration statement and the exhibits and schedules to the registration statement. We encourage you to carefully read the registration statement and the exhibits and schedules to the registration statement.

We file annual, quarterly and current reports, proxy statements and other information electronically with the SEC. You may read and copy these reports, proxy statements and other information at the SEC's public reference room at 100 F Street, N.E., Washington, D.C. 20549. Please call the SEC at 1-800-SEC-0330 for more information about the operation of the public reference room. You can request copies of these documents by writing to the SEC and paying a fee for the copying costs. The SEC also maintains an Internet site that contains reports, proxy and information statements, and other information regarding issuers that file electronically with the SEC, including us. The SEC's Internet site can be found at <http://www.sec.gov>. In addition, we make available on or through our Internet site copies of these reports as soon as reasonably practicable after we electronically file or furnish them to the SEC. Our Internet site can be found at <http://www.organovo.com>.

INCORPORATION OF CERTAIN INFORMATION BY REFERENCE

We are allowed to incorporate by reference information contained in documents that we file with the SEC. This means that we can disclose important information to you by referring you to those documents and that the information in this prospectus supplement is not complete. You should read the information incorporated by reference for more detail. We incorporate by reference in two ways. First, we list below certain documents that we have already filed with the SEC. The information in these documents is considered part of this prospectus supplement. Second, the information in documents that we file in the future will update and supersede the information currently in, and be incorporated by reference in, this prospectus supplement.

Table of Contents

We incorporate by reference into this prospectus supplement the documents listed below, and any filings we make with the SEC pursuant to Section 13(a), 13(c), 14 or 15(d) of the Exchange Act after the date of this prospectus supplement until the termination of this offering (in each case, except for the information furnished under Item 2.02 or Item 7.01 in any current report on Form 8-K and Form 8-K/A):

our transition report on Form 10-KT for the three months ended March 31, 2013 filed with the SEC on May 24, 2013 (File No. 000-54621-13872067);

our annual report on Form 10-K for the year ended December 31, 2012 filed with the SEC on March 15, 2013 (File No. 000-54621-13695277);

our current reports on Form 8-K filed with the SEC on February 5, 2013, March 19, 2013, April 3, 2013, June 10, 2013, July 9, 2013, July 25, 2013 and August 2, 2013 (File Nos. 000-54621-13575105, 000-54621-3702598, 000-54621-13737571, 000-54621-13902546, 000-54621-13958670, 001-35996-13987108 and 001-35996-131004886, respectively);

our definitive proxy statement filed pursuant to Section 14 of the Exchange Act in connection with our 2013 Annual Meeting of Stockholders filed with the SEC on July 12, 2013 (File No. 001-35996-13965363); and

the description of our common stock contained in our registration statement on Form 8-A filed with the SEC on July 9, 2013 (File No. 001-35996-13958682).

We will provide each person, including any beneficial owner, to whom a prospectus supplement and the accompanying prospectus is delivered, a copy of any or all of the information that has been incorporated by reference into this prospectus supplement but not delivered with this prospectus supplement upon written or oral request at no cost to the requester. Requests should be directed to: Organovo Holdings, Inc., 6275 Nancy Ridge Dr., San Diego, California, Attn: Investor Relations, telephone: (858) 550-9994.

Table of Contents

PROSPECTUS

\$100,000,000

Common Stock

Preferred Stock

Debt Securities

Warrants

Units

ORGANOVO HOLDINGS, INC.

We may, from time to time in one or more offerings, offer and sell up to \$100,000,000 in the aggregate of common stock, preferred stock, debt securities, warrants to purchase common stock, preferred stock or debt securities, or any combination of the foregoing, either individually or as units comprised of one or more of the other securities.

This prospectus provides a general description of the securities we may offer. We will provide the specific terms of the securities offered in one or more supplements to this prospectus. The prospectus supplement and any related free writing prospectus may also add, update or change information contained in this prospectus. We may also authorize one or more free writing prospectuses to be provided to you in connection with these offerings. You should read carefully this prospectus, the applicable prospectus supplement and any related free writing prospectus, as well as any documents incorporated by reference herein or therein before you invest in any of our securities. **This prospectus may not be used to consummate a sale of securities unless accompanied by the applicable prospectus supplement.**

Our common stock is listed on the NYSE MKT under the symbol ONVO. On July 16, 2013 the last reported sale price for our common stock was \$6.75 per share. The applicable prospectus supplement will contain information, where applicable, as to any other listing on the NYSE MKT or any securities market or other exchange of the securities, if any, covered by the prospectus supplement.

INVESTING IN OUR SECURITIES INVOLVES RISKS. YOU SHOULD REVIEW CAREFULLY THE RISKS AND UNCERTAINTIES DESCRIBED UNDER THE HEADING RISK FACTORS ON PAGE 7 AND CONTAINED IN THE APPLICABLE PROSPECTUS SUPPLEMENT AND ANY RELATED FREE WRITING PROSPECTUS AND UNDER SIMILAR HEADINGS IN THE OTHER DOCUMENTS THAT ARE INCORPORATED BY REFERENCE INTO THIS PROSPECTUS.

We will sell these securities directly to investors, through agents designated from time to time or to or through underwriters or dealers. For additional information on the methods of sale, you should refer to the section entitled Plan of Distribution in this prospectus. If any underwriters are involved in the sale of any securities with respect to which this prospectus is being delivered, the names of such underwriters and any

Edgar Filing: ORGANOVO HOLDINGS, INC. - Form 424B5

applicable commissions or discounts will be set forth in a prospectus supplement. The price to the public of such securities and the net proceeds we expect to receive from such sale will also be set forth in a prospectus supplement.

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

The date of this prospectus is July 26, 2013.

Table of Contents

TABLE OF CONTENTS

<u>ABOUT THIS PROSPECTUS</u>	ii
<u>SUMMARY</u>	1
<u>RISK FACTORS</u>	7
<u>SPECIAL NOTE REGARDING FORWARD-LOOKING STATEMENTS</u>	8
<u>STATEMENT OF COMPUTATION OF RATIOS</u>	9
<u>USE OF PROCEEDS</u>	10
<u>SECURITIES WE MAY OFFER</u>	11
<u>DESCRIPTION OF CAPITAL STOCK</u>	12
<u>DESCRIPTION OF DEBT SECURITIES</u>	16
<u>DESCRIPTION OF WARRANTS</u>	23
<u>DESCRIPTION OF UNITS</u>	25
<u>LEGAL OWNERSHIP OF SECURITIES</u>	26
<u>PLAN OF DISTRIBUTION</u>	29
<u>LEGAL MATTERS</u>	31
<u>EXPERTS</u>	31
<u>WHERE YOU CAN FIND MORE INFORMATION</u>	31
<u>INCORPORATION OF CERTAIN INFORMATION BY REFERENCE</u>	32

Table of Contents

ABOUT THIS PROSPECTUS

This prospectus is part of a registration statement that we filed with the Securities and Exchange Commission (the SEC) under the Securities Act of 1933, as amended (the Securities Act) using a shelf registration process. Under this shelf registration process, we may from time to time sell common stock, preferred stock, debt securities or warrants to purchase common stock, preferred stock or debt securities, or any combination of the foregoing, either individually or as units comprised of one or more of the other securities, in one or more offerings up to a total dollar amount of \$100,000,000. We have provided to you in this prospectus a general description of the securities we may offer. Each time we sell securities under this shelf registration, we will, to the extent required by law, provide a prospectus supplement that will contain specific information about the terms of that offering. We may also authorize one or more free writing prospectuses to be provided to you that may contain material information relating to these offerings. The prospectus supplement and any related free writing prospectus that we may authorize to be provided to you may also add, update or change information contained in this prospectus or in any documents that we have incorporated by reference into this prospectus. To the extent there is a conflict between the information contained in this prospectus and the prospectus supplement or any related free writing prospectus, you should rely on the information in the prospectus supplement or the related free writing prospectus; provided that if any statement in one of these documents is inconsistent with a statement in another document having a later date—for example, a document incorporated by reference in this prospectus or any prospectus supplement or any related free writing prospectus—the statement in the document having the later date modifies or supersedes the earlier statement.

We have not authorized any dealer, agent or other person to give any information or to make any representation other than those contained or incorporated by reference in this prospectus, any accompanying prospectus supplement or any related free writing prospectus that we may authorize to be provided to you. You must not rely upon any information or representation not contained or incorporated by reference in this prospectus or an accompanying prospectus supplement, or any related free writing prospectus that we may authorize to be provided to you. This prospectus, the accompanying prospectus supplement and any related free writing prospectus, if any, do not constitute an offer to sell or the solicitation of an offer to buy any securities other than the registered securities to which they relate, nor do this prospectus, the accompanying prospectus supplement or any related free writing prospectus, if any, constitute an offer to sell or the solicitation of an offer to buy securities in any jurisdiction to any person to whom it is unlawful to make such offer or solicitation in such jurisdiction. You should not assume that the information contained in this prospectus, any applicable prospectus supplement or any related free writing prospectus is accurate on any date subsequent to the date set forth on the front of the document or that any information we have incorporated by reference is correct on any date subsequent to the date of the document incorporated by reference (as our business, financial condition, results of operations and prospects may have changed since that date), even though this prospectus, any applicable prospectus supplement or any related free writing prospectus is delivered or securities are sold on a later date.

As permitted by the rules and regulations of the SEC, the registration statement, of which this prospectus forms a part, includes additional information not contained in this prospectus. You may read the registration statement and the other reports we file with the SEC at the SEC's web site or at the SEC's offices described below under the heading **Where You Can Find Additional Information**.

Company References

In this prospectus, **Organovo**, **the Company**, **we**, **us**, and **our** refer to Organovo Holdings, Inc., a Delaware corporation, unless the context otherwise requires.

Table of Contents

SUMMARY

This summary highlights selected information from this prospectus and the documents incorporated herein by reference and does not contain all of the information that you need to consider in making your investment decision. You should carefully read the entire prospectus, including the section entitled Risk Factors on page 7, the information incorporated herein by reference, including our financial statements, and the exhibits to the registration statement of which this prospectus is a part.

About Organovo Holdings, Inc.

Overview

We are developing and commercializing functional human tissues that can be employed in drug discovery and development, biological research, and as therapeutic implants for the treatment of damaged or degenerating tissues and organs. We intend to introduce a paradigm shift in the approach to the generation of three-dimensional human tissues, by utilizing our platform technology to create human tissue constructs in 3D that have the potential to replicate native human biology. We can improve on previous technologies by moving away from monolayer 2D cell cultures and by enabling all or part of the tissues we create to be constructed solely of cells. We believe our demonstrated expertise in printing various fully cellular human tissues as disclosed in peer-reviewed scientific publications provides a strong foundation upon which other tissues can be built to replicate human biology and human disease. We believe that our broad and exclusive commercial rights to patented and patent-pending 3D bioprinting technology, combined with strengths in engineering and biology, put us in an ideal position to provide a wide array of products for use in research, drug discovery and regenerative medicine therapies.

Our foundational proprietary technology derives from research led by Dr. Gabor Forgacs, the George H. Vineyard Professor of Biological Physics at the University of Missouri. We have a broad portfolio of intellectual property rights covering principles, enabling instrumentation applications and methods of cell based printing, including exclusive licenses to certain patented and patent pending technologies from the University of Missouri-Columbia, Clemson University, and Becton Dickinson, and outright ownership of patents and pending patent applications See Intellectual Property . We believe that our portfolio of intellectual property rights provides a strong and defensible market position for our commercialization of 3D bioprinting technology.

We believe we have the potential to build and maintain a sustainable business by leveraging our core technology platform across a variety of applications. We have entered into multiple collaborative research agreements with pharmaceutical corporations and academic medical centers. We have also secured federal grants, including Small Business Innovation Research grants to support the development of our technology. The Company developed the NovoGen MMX Bioprinter (our first-generation 3D bioprinter) less than two years after commencing operations. We were selected by MIT's Technology Review magazine among the Most Innovative Companies of 2012 and by Inc. Magazine as one of the Most Audacious Companies in 2013. We believe these corporate achievements provide strong validation for the commercial viability of our technology.

Our Platform Technology

Our platform technology is centered around multiple 3D bioprinting technologies utilizing our bioprinting instrument, the NovoGen MMX Bioprinter . Our 3D bioprinting technologies enables a wide array of tissue compositions and architectures to be created, using combinations of cellular bio-ink (building blocks comprised solely of cells), hydrogel (building blocks comprised of biocompatible gels), or hybrid bio-ink (building blocks comprised of a mixture of cells and material such as hydrogel). A key distinguishing feature of our bioprinting platform is the ability to generate three-dimensional constructs that have all or some of their components

Table of Contents

comprised entirely of cells. The fully-cellular feature of our technology enables architecturally and compositionally defined functional human tissues to be generated for *in vitro* use in drug discovery and development to potentially replicate the functional biology of native human tissue. Furthermore, fully cellular constructs may offer specific advantages for regenerative medicine applications where bioactive cells are required and three-dimensional configuration is necessary, such as augmenting or replacing functional mass in tissues and organs that have sustained acute or chronic damage.

We intend to deliver the following products to the market:

Three-dimensional models of human tissue for utilization in traditional absorption, distribution, metabolism, excretion (ADME) / toxicology (TOX) / and drug metabolism and pharmacokinetics (DMPK) testing in drug development.

Specific models of human biology or pathophysiology, in the form of three-dimensional human tissues, for use in drug discovery and development.

Three-dimensional human tissues for use as therapeutic regenerative medicine products, such as blood vessels for bypass grafting, nerve grafts for nerve damage repair and regenerative patches for treatment of heart disease.

Our Market Opportunity

We believe that our bioprinting technology is uniquely positioned to provide functional human tissues for use in drug discovery and development as well as a broad array of tissues suitable for therapeutic use in regenerative medicine applications.

There are multiple addressable markets for our technology platform:

- 1) **Specialized Models for Drug Discovery and Development:** The NovoGen MMX Bioprinter can produce highly specialized functional human tissues that can be utilized to model specific tissue physiology or pathophysiology. Our bioprinting technology has demonstrated the ability to create human blood vessel constructs, and to create fully human tissue containing micro vascular structures. These capabilities are anticipated to broaden the scope and scale of 3D tissues that can be generated, and to facilitate the development of disease models in such areas as cardiovascular disease, oncology, and fibrosis.
- 2) **Biological Research Tools:** Absorption, distribution, metabolism, excretion (ADME) testing is used to determine which factors enhance or inhibit how a potential drug compound reaches the blood stream. Distribution of a compound can be affected by binding to plasma proteins; age, genetics, and other factors can influence metabolism of a compound; and the presence of certain disease states can have effects on excretion of a compound. Many companies perform ADME studies utilizing various cell-based assays or automated bioanalytical techniques. Drug metabolism and pharmacokinetics (DMPK) testing is a subset of ADME. Determining the DMPK properties of a drug helps the drug developer to understand its safety and efficacy. Toxicology (TOX) testing is a further requirement to determine the detrimental effects of a particular drug on specific tissues. We believe that the NovoGen MMX Bioprinter is positioned to deliver highly differentiated products for use in traditional cell-based ADME / TOX / DMPK studies. Products in this arena may replace or complement traditional cell based assays that typically employ primary hepatocytes, intestinal cell lines, renal epithelial cells and cell lines grown in a traditional two-dimensional format. Importantly, the combination of tissue-like three-dimensionality and human cellular components is believed to provide an advantage over non-human animal systems toward predicting *in vivo* human outcomes.

Table of Contents

- 3) **Regenerative Medicine:** The field of regenerative medicine is advancing via multiple strategic approaches in development and practice, including cell therapies and scaffold-based products (+/-cells). The architectural precision and flexibility of our technology may facilitate the optimization, development, and clinical use of three-dimensional tissue constructs. Importantly, our technology offers a next-generation strategy whereby three-dimensional structures can be generated without the use of scaffolding or biomaterial components. The ultimate goal is to enable fully cellular constructs to be generated in a configuration compatible with surgical modes of delivery, thereby enabling restoration of significant functional mass to a damaged tissue or organ.

We believe that our technology can capitalize, via strategic partnerships, on additional market opportunities in the provision of enabling tools for drug discovery and development as well as the discovery and development of therapeutic implants that augment or replace damaged tissues and organs. We believe there are multiple short- and long-term revenue opportunities for us in these areas, including direct sales of 3D human tissue constructs for drug screening and development, licensing fees for commercial access to our technology, and royalties from product enablement, particularly in the area of therapeutic products for regenerative medicine.

We have generated operating losses since we began operations, including \$4.0 million for the three months ended March 31, 2013 and \$9.3 million, \$2.3 million and \$1.2 million for the years ended December 31, 2012, 2011 and 2010, respectively. As of March 31, 2013, we had incurred cumulative operating losses of \$17.7 million and cumulative net losses totaling \$66.4 million. We expect to incur substantial additional operating losses over the next several years as our research, development, and commercial activities increase.

Corporate Background

Real Estate Restoration and Rental, Inc. (RERR), our predecessor company, was incorporated in 2007 in the state of Nevada. On December 28, 2011, RERR entered into an Agreement and Plan of Merger pursuant to which RERR merged with its newly formed, wholly owned subsidiary, Organovo Holdings, Inc. (Merger Sub), a Nevada corporation (the RERR Merger). Upon the consummation of the RERR Merger, the separate existence of Merger Sub ceased and RERR, the surviving corporation in the RERR Merger, became known as Organovo Holdings, Inc. (Holdings-Nevada).

As permitted by Chapter 92A.180 of Nevada Revised Statutes, the sole purpose of the RERR Merger was to effect a change of RERR s name. Upon the filing of Articles of Merger with the Secretary of State of Nevada on December 28, 2011 to effect the RERR Merger, RERR s articles of incorporation were deemed amended to reflect the change in RERR s corporate name.

On January 30, 2012, Holdings-Nevada entered into an Agreement and Plan of Merger pursuant to which Holdings-Nevada merged with and into its newly formed, wholly owned subsidiary, Organovo Holdings, Inc. (Holdings-Delaware or Pubco), a Delaware corporation (the Reincorporation Merger). Upon the consummation of the Reincorporation Merger, the separate existence of Holdings-Nevada ceased and Holdings-Delaware was the surviving corporation in the Reincorporation Merger. The sole purpose of the Reincorporation Merger was to change the domicile of Pubco from Nevada to Delaware.

On February 8, 2012, Organovo Acquisition Corp. (Acquisition Corp.), a wholly-owned subsidiary of Pubco, merged (the Merger) with and into Organovo, Inc., a Delaware corporation (Organovo). Organovo was the surviving corporation of that Merger. As a result of the Merger, Pubco acquired the business of Organovo, and will continue the existing business operations of Organovo.

On July 11, 2013, our common stock began trading on the NYSE MKT under the symbol ONVO and the quotation of our common stock on the OTCQX was terminated following the closing of trading on July 10, 2013.

Table of Contents

Our principal executive offices are located at 6275 Nancy Ridge Dr., San Diego, California 92121 and our phone number is (858) 550-9994. Our Internet address can be found at <http://www.organovo.com>. The information found on our Internet site is not part of this prospectus.

Change in Fiscal Year End

On March 31, 2013, our Board of Directors approved a change in our fiscal year end from December 31st to March 31st. As a result of this change, we filed a Transition Report on Form 10-K for the three-month transition period ended March 31, 2013. References to any of our previous fiscal years mean the fiscal years ending on December 31st.

The Securities We May Offer

We may offer shares of our common stock and preferred stock, various series of debt securities and warrants to purchase any of such securities, either individually or in units, with a total value of up to \$100,000,000 from time to time under this prospectus, together with any applicable prospectus supplement and related free writing prospectus, at prices and on terms to be determined by market conditions at the time of offering. If we issue any debt securities at a discount from their original stated principal amount, then, for purposes of calculating the total dollar amount of all securities issued under this prospectus, we will treat the initial offering price of the debt securities as the total original principal amount of the debt securities. Each time we offer securities under this prospectus, we will provide offerees with a prospectus supplement that will describe the specific amounts, prices and other important terms of the securities being offered, including, to the extent applicable:

designation or classification;

aggregate principal amount or aggregate offering price;

maturity, if applicable;

original issue discount, if any;

rates and times of payment of interest or dividends, if any;

redemption, conversion, exchange or sinking fund terms, if any;

conversion or exchange prices or rates, if any, and, if applicable, any provisions for changes to or adjustments in the conversion or exchange prices or rates and in the securities or other property receivable upon conversion or exchange;

ranking;

restrictive covenants, if any;

voting or other rights, if any; and

Edgar Filing: ORGANOVO HOLDINGS, INC. - Form 424B5

important United States federal income tax considerations.

A prospectus supplement and any related free writing prospectus that we may authorize to be provided to you may also add, update or change information contained in this prospectus or in documents we have incorporated by reference. However, no prospectus supplement or free writing prospectus will offer a security that is not registered and described in this prospectus at the time of the effectiveness of the registration statement of which this prospectus is a part.

We may sell the securities to or through underwriters, dealers or agents or directly to purchasers. We, as well as any agents acting on our behalf, reserve the sole right to accept and to reject in whole or in part any proposed

Table of Contents

purchase of securities. Each prospectus supplement will set forth the names of any underwriters, dealers or agents involved in the sale of securities described in that prospectus supplement and any applicable fee, commission or discount arrangements with them, details regarding any over-allotment option granted to them, and net proceeds to us. The following is a summary of the securities we may offer with this prospectus.

Common Stock

We currently have authorized 150,000,000 shares of common stock, par value \$0.001 per share. We may offer shares of our common stock either alone or underlying other registered securities convertible into or exercisable for our common stock. Holders of our common stock are entitled to such dividends as our Board of Directors may declare from time to time out of legally available funds, subject to the preferential rights of the holders of any shares of our preferred stock that are outstanding or that we may issue in the future. Currently, we do not pay any dividends on our common stock. Each holder of our common stock is entitled to one vote per share. In this prospectus, we provide a general description of, among other things, the rights and restrictions that apply to holders of our common stock.

Preferred Stock

We currently have authorized 25,000,000 shares of preferred stock, par value \$0.001 per share, none of which are outstanding. Any authorized and undesignated shares of preferred stock may be issued from time to time in one or more series pursuant to a resolution or resolutions providing for such issue duly adopted by our Board of Directors (authority to do so being hereby expressly vested in the Board of Directors). The Board of Directors is further authorized, subject to limitations prescribed by law, to fix by resolution or resolutions the designations, powers, preferences and rights, and the qualifications, limitations or restrictions thereof, of any wholly unissued series of preferred stock, including without limitation authority to fix by resolution or resolutions the dividend rights, dividend rate, conversion rights, voting rights, rights and terms of redemption (including sinking fund provisions), redemption price or prices, and liquidation preferences of any such series, and the number of shares constituting any such series and the designation thereof, or any of the foregoing.

The rights, preferences, privileges and restrictions granted to or imposed upon any series of preferred stock that we offer and sell under this prospectus and applicable prospectus supplements will be set forth in a certificate of designation relating to the series. We will incorporate by reference into the registration statement of which this prospectus is a part the form of any certificate of designation that describes the terms of the series of preferred stock we are offering before the issuance of shares of that series of preferred stock. You should read any prospectus supplement and any free writing prospectus that we may authorize to be provided to you related to the series of preferred stock being offered, as well as the complete certificate of designation that contains the terms of the applicable series of preferred stock.

Debt Securities

We may offer general debt obligations, which may be secured or unsecured, senior or subordinated and convertible into shares of our common stock. In this prospectus, we refer to the senior debt securities and the subordinated debt securities together as the debt securities. We may issue debt securities under a note purchase agreement or under an indenture to be entered between us and a trustee; forms of the senior and subordinated indentures are included as an exhibit to the registration statement of which this prospectus is a part. The indentures do not limit the amount of securities that may be issued under it and provides that debt securities may be issued in one or more series. The senior debt securities will have the same rank as all of our other indebtedness that is not subordinated. The subordinated debt securities will be subordinated to our senior debt on terms set forth in the applicable prospectus supplement. In addition, the subordinated debt securities will be effectively subordinated to creditors and preferred stockholders of our subsidiaries. Our Board of Directors will

Table of Contents

determine the terms of each series of debt securities being offered. This prospectus contains only general terms and provisions of the debt securities. The applicable prospectus supplement will describe the particular terms of the debt securities offered thereby. You should read any prospectus supplement and any free writing prospectus that we may authorize to be provided to you related to the series of debt securities being offered, as well as the complete note agreements and/or indentures that contain the terms of the debt securities. Forms of indentures have been filed as exhibits to the registration statement of which this prospectus is a part, and supplemental indentures and forms of debt securities containing the terms of debt securities being offered will be incorporated by reference into the registration statement of which this prospectus is a part from reports we file with the SEC.

Warrants

We may offer warrants for the purchase of shares of our common stock or preferred stock or of debt securities. We may issue the warrants by themselves or together with common stock, preferred stock or debt securities, and the warrants may be attached to or separate from any offered securities. Each series of warrants will be issued under a separate warrant agreement to be entered into between us and the investors or a warrant agent. Our Board of Directors will determine the terms of the warrants. This prospectus contains only general terms and provisions of the warrants. The applicable prospectus supplement will describe the particular terms of the warrants being offered thereby. You should read any prospectus supplement and any free writing prospectus that we may authorize to be provided to you related to the series of warrants being offered, as well as the complete warrant agreements that contain the terms of the warrants. Specific warrant agreements will contain additional important terms and provisions and will be incorporated by reference into the registration statement of which this prospectus is a part from reports we file with the SEC.

Units

We may offer units consisting of our common stock or preferred stock, debt securities and/or warrants to purchase any of these securities in one or more series. We may evidence each series of units by unit certificates that we will issue under a separate agreement. We may enter into unit agreements with a unit agent. Each unit agent will be a bank or trust company that we select. We will indicate the name and address of the unit agent in the applicable prospectus supplement relating to a particular series of units. This prospectus contains only a summary of certain general features of the units. The applicable prospectus supplement will describe the particular features of the units being offered thereby. You should read any prospectus supplement and any free writing prospectus that we may authorize to be provided to you related to the series of units being offered, as well as the complete unit agreements that contain the terms of the units. Specific unit agreements will contain additional important terms and provisions and will be incorporated by reference into the registration statement of which this prospectus is a part from reports we file with the SEC.

Table of Contents

RISK FACTORS

Investing in our securities involves a high degree of risk. You should carefully consider the risk factors set forth under **Risk Factors** in Item 1A of our transition report on Form 10-KT for the three-month transition period ended March 31, 2013, which is incorporated by reference in this prospectus, together with all other information contained or incorporated by reference in this prospectus, as may be updated by our subsequent filings under the Securities Exchange Act of 1934, as amended (the **Exchange Act**), and the risk factors and other information contained in any applicable prospectus supplement and in any related free writing prospectus in connection with a specific offering, before deciding whether to purchase any of the securities being registered pursuant to the registration statement of which this prospectus is a part. Each of the risk factors could adversely affect our business, operating results and financial condition, as well as adversely affect the value of an investment in our securities, and the occurrence of any of these risks might cause you to lose all or part of your investment.

Table of Contents

SPECIAL NOTE REGARDING FORWARD-LOOKING STATEMENTS

This prospectus and the documents incorporated herein by reference contain, or will contain, certain forward-looking statements within the meaning of Section 27A of the Securities Act, and Section 21E of the Exchange Act. These statements relate to anticipated future events, future results of operations or future financial performance. These forward-looking statements include, but are not limited to, statements relating to our ability to raise sufficient capital to finance our planned operations, market acceptance of our technology and product offerings, our ability to attract and retain key personnel, our ability to protect our intellectual property, our ability to develop commercially viable products from our technology and estimates of our cash expenditures for the next 12 to 36 months. In some cases, you can identify forward-looking statements by terminology such as may, might, will, should, intends, expects, plans, goals, projects, anticipates, believes, estimates, continue or the negative of these terms or other comparable terminology.

These forward-looking statements are only predictions, are uncertain and involve substantial known and unknown risks, uncertainties and other factors which may cause our (or our industry's) actual results, levels of activity or performance to be materially different from any future results, levels of activity or performance expressed or implied by these forward-looking statements. The Risk Factors section of this prospectus and any prospectus supplements sets forth detailed risks, uncertainties and cautionary statements regarding our business and these forward-looking statements. You should consider these Risk Factors, Risk Factors set forth in any prospectus supplement, as well as any Risk Factors that we include in any of our future filings with the SEC pursuant to Sections 13(a), 13(c), 14 or 15(d) of the Securities Exchange Act of 1934, as amended, incorporated by reference into this prospectus before making an investment decision. Any of the risks, as well as additional risks and uncertainties not currently known to us or that we currently deem immaterial, could materially and adversely affect our results of operations or financial condition.

We cannot guarantee future results, levels of activity or performance. You should not place undue reliance on these forward-looking statements, which speak only as of the date that they were made. These cautionary statements should be considered with any written or oral forward-looking statements that we may issue in the future. Except as required by applicable law, including the securities laws of the United States, we do not intend to update any of the forward-looking statements to conform these statements to reflect actual results, later events or circumstances or to reflect the occurrence of unanticipated events.

Table of Contents**STATEMENT OF COMPUTATION OF RATIOS**

The following table sets forth our ratios of earnings to fixed charges and to combined fixed charges and preferred stock dividends on a historical basis for each of the periods presented. Our net losses were insufficient to cover fixed charges in each of the periods presented. Because of these deficiencies, the ratio information is not applicable for those periods. The extent to which earnings were insufficient to cover fixed charge for those periods is shown below. Amounts shown are in millions, except for ratios.

	Transition Period Ended March 31 2013	2012	2011	Year Ended December 31		
				2010	2009	2008
Ratio of earnings to fixed charges ⁽¹⁾⁽²⁾ :	\$	\$	\$	\$	\$	\$
Ratio of earnings to combined fixed charges and preferred stock dividends ⁽¹⁾⁽³⁾ :	\$	\$	\$	\$	\$	\$

- (1) For the transition period ended March 31, 2013 and each of the fiscal years ended December 31, 2012, 2011, 2010, 2009 and 2008, we had no earnings and are therefore unable to calculate the ratio of combined fixed charges and preference dividends to earnings. Our earnings for those periods were insufficient to cover fixed charges by \$4.1 million, \$10.6 million, \$4.4 million, \$1.3 million, \$0.9 million and \$0.1 million, respectively.
- (2) For purposes of computing the ratio of earnings to fixed charges, earnings consist of net loss plus fixed charges and fixed charges consist of interest expense and an estimate of interest within rent expense. In each of the periods presented, earnings were insufficient to cover fixed charges.
- (3) For purposes of computing the ratio of earnings to combined fixed charges and preferred stock dividends, earnings consist of net loss plus fixed charges. Combined fixed charges and preferred stock dividends consist of interest expense, an estimate of interest within rent expense and preferred stock dividends. For the periods presented, we had no shares of preferred stock outstanding and consequently, our ratio of earnings to combined fixed charges and preferred stock dividends is the same as the ratio of earnings to fixed charges.

Table of Contents

USE OF PROCEEDS

Except as described in any prospectus supplement and any free writing prospectus in connection with a specific offering, we currently intend to use the net proceeds from the sale of the securities offered under this prospectus for general corporate purposes, including research and development, the development and commercialization of our products, general administrative expenses, license or technology acquisitions, and working capital and capital expenditures. We may also use the net proceeds to repay any debts and/or invest in or acquire complementary businesses, products or technologies, although we have no current commitments or agreements with respect to any such investments or acquisitions as of the date of this prospectus. We have not determined the amount of net proceeds to be used specifically for the foregoing purposes. As a result, our management will have broad discretion in the allocation of the net proceeds and investors will be relying on the judgment of our management regarding the application of the proceeds of any sale of the securities. Pending use of the net proceeds, we intend to invest the proceeds in short-term, investment-grade, interest-bearing instruments.

Each time we offer securities under this prospectus, we will describe the intended use of the net proceeds from that offering in the applicable prospectus supplement. The actual amount of net proceeds we spend on a particular use will depend on many factors, including, our future capital expenditures, the amount of cash required by our operations, and our future revenue growth, if any. Therefore, we will retain broad discretion in the use of the net proceeds.

Table of Contents

SECURITIES WE MAY OFFER

We may offer shares of common stock, shares of preferred stock, debt securities or warrants to purchase common stock, preferred stock or debt securities, or any combination of the foregoing, either individually or as units comprised of one or more of the other securities. We may offer up to \$100,000,000 of securities under this prospectus. If securities are offered as units, we will describe the terms of the units in a prospectus supplement.

Table of Contents

DESCRIPTION OF CAPITAL STOCK

The following description of our capital stock, together with any additional information we include in any applicable prospectus supplement or any related free writing prospectus, summarizes the material terms and provisions of our common stock and the preferred stock that we may offer under this prospectus. While the terms we have summarized below will apply generally to any future common stock or preferred stock that we may offer, we will describe the particular terms of any class or series of these securities in more detail in the applicable prospectus supplement. For the complete terms of our common stock and preferred stock, please refer to our certificate of incorporation and our bylaws that are incorporated by reference into the registration statement of which this prospectus is a part or may be incorporated by reference in this prospectus or any applicable prospectus supplement. The terms of these securities may also be affected by Delaware General Corporation Law. The summary below and that contained in any applicable prospectus supplement or any related free writing prospectus are qualified in their entirety by reference to our amended and restated certificate of incorporation and our amended and restated bylaws.

Common Stock

The holders of common stock are entitled to one vote per share on all matters submitted to a vote of the stockholders, including the election of directors. Generally, all matters to be voted on by stockholders must be approved by a majority (or, in the case of election of directors, by a plurality) of the votes entitled to be cast by all shares of common stock that are present in person or represented by proxy. Except as otherwise provided by law, amendments to the certificate of incorporation generally must be approved by a majority of the votes entitled to be cast by all outstanding shares of common stock. The certificate of incorporation does not provide for cumulative voting in the election of directors. The common stock holders will be entitled to such cash dividends as may be declared from time to time by the Board from funds available. Upon our liquidation, dissolution or winding up, the common stock holders will be entitled to receive pro rata all assets available for distribution to such holders.

All of the outstanding shares of our Common stock are fully paid and non-assessable. The shares of common stock offered by this prospectus or upon the conversion of any preferred stock or debt securities or exercise of any warrants offered pursuant to this prospectus, when issued and paid for, will also be, fully paid and non-assessable.

Securities Exchange Listing

Our common stock is listed on the NYSE MKT under the symbol ONVO.

Transfer Agent and Registrar

The transfer agent and registrar for our common stock is VStock Transfer, LLC.

Preferred Stock

Our preferred stock, par value \$0.001 per share, may be issued from time to time in one or more series pursuant to a resolution or resolutions providing for such issue duly adopted by our Board of Directors (authority to do so being hereby expressly vested in the Board of Directors). The Board of Directors is further authorized, subject to limitations prescribed by law, to fix by resolution or resolutions the designations, powers, preferences and rights, and the qualifications, limitations or restrictions thereof, of any wholly unissued series of preferred stock, including without limitation authority to fix by resolution or resolutions the dividend rights, dividend rate, conversion rights, voting rights, rights and terms of redemption (including sinking fund provisions), redemption price or prices, and liquidation preferences of any such series, and the number of shares constituting any such series and the designation thereof, or any of the foregoing.

Table of Contents

The particular terms of each class or series of preferred stock that we may offer under this prospectus, including redemption privileges, liquidation preferences, voting rights, dividend rights and/or conversion rights, will be more fully described in the applicable prospectus supplement relating to the preferred stock offered thereby. The rights, preferences, privileges and restrictions of the preferred stock of each series will be fixed by the certificate of designation relating to each series. We will incorporate by reference into the registration statement of which this prospectus is a part the form of any certificate of designation that describes the terms of the series of preferred stock we are offering before the issuance of the related series of preferred stock. The applicable prospectus supplement will specify the terms of the series of preferred stock we may offer, including, but not limited to:

the distinctive designation and the maximum number of shares in the series;

the number of shares we are offering and purchase price per share;

the liquidation preference, if any;

the terms on which dividends, if any, will be paid;

the voting rights, if any, on the shares of the series;

the terms and conditions, if any, on which the shares of the series shall be convertible into, or exchangeable for, shares of any other class or classes of capital stock;

the terms on which the shares may be redeemed, if at all;

any listing of the preferred stock on any securities exchange or market;

a discussion of any material or special United States federal income tax considerations applicable to the preferred stock; and

any or all other preferences, rights, restrictions, including restrictions on transferability, and qualifications of shares of the series. The issuance of preferred stock may delay, deter or prevent a change in control.

The description of preferred stock above and the description of the terms of a particular series of preferred stock in any applicable prospectus supplement are not complete. You should refer to any applicable certificate of designation for complete information.

The General Corporate Law of the State of Delaware, the state of our incorporation, provides that the holders of preferred stock will have the right to vote separately as a class on any proposal involving fundamental changes in the rights of holders of that preferred stock. This right is in addition to any voting rights that may be provided for in the applicable certificate of designation.

Anti-Takeover Effects of Provisions of our Charter Documents and Delaware Law

Anti-takeover provisions of Delaware law and in our certificate of incorporation and our bylaws may discourage, delay or prevent a change in control of our company, even if a change in control would be beneficial to our stockholders. In addition, these provisions may frustrate or prevent any attempts by our stockholders to replace or remove our current management by making it more difficult for stockholders to replace

members of our Board of Directors.

Classified Board. Our certificate of incorporation and our bylaws provide that our Board of Directors is divided into three classes, consisting of one Class I director, two Class II directors and two Class III directors. The directors designated as Class II directors have a term expiring at our annual meeting of stockholders in 2013. The directors designated as Class III directors have a term expiring at our annual meeting of stockholders in 2014, and the director designated as a Class I director has a term expiring at our annual meeting of stockholders in

Table of Contents

2015. Directors for each class will be elected at the annual meeting of stockholders held in the year in which the term for that class expires and thereafter will serve for a term of three years. At any meeting of stockholders for the election of directors at which a quorum is present, the election will be determined by a plurality of the votes cast by the stockholders entitled to vote at the election. Under the classified board provisions, it will take at least two elections of directors for any individual or group to gain control of our board. Accordingly, these provisions could discourage a third party from initiating a proxy contest, making a tender offer or otherwise attempting to gain control of us.

Preferred Stock. In particular, under our certificate of incorporation our Board of Directors may issue up to 25,000,000 shares of preferred stock with rights and privileges that might be senior to our common stock, without the consent of the holders of the common stock. Moreover, without any further vote or action on the part of the stockholders, the Board of Directors would have the authority to determine the price, rights, preferences, privileges, and restrictions of the preferred stock. This preferred stock, if it is ever issued, may have preference over, and harm the rights of, the holders of common stock. Although the issuance of this preferred stock would provide us with flexibility in connection with possible acquisitions and other corporate purposes, this issuance may make it more difficult for a third party to acquire a majority of our outstanding voting stock.

The issuance of preferred stock may:

delay, defer or prevent a change in control;

discourage bids for our common stock at a premium over the market price of our common stock;

adversely affect the voting and other rights of the holders of our common stock; and

discourage acquisition proposals or tender offers for our shares and, as a consequence, inhibit fluctuations in the market price of our shares that could result from actual or rumored takeover attempts.

Advance Notice Requirement. Stockholder nominations of individuals for election to our Board of Directors and stockholder proposals of other matters to be brought before an annual meeting of our stockholders must comply with the advance notice procedures set forth in our bylaws. Generally, to be timely, such notice must be received at our principal executive offices no later than the date specified in our proxy statement released to stockholders in connection with the preceding year's annual meeting of stockholders, which date shall be not earlier than the 120th day, nor later than the close of business on the 90th day, prior to the first anniversary of the date of the preceding year's annual meeting of stockholders.

Special Meeting Requirements. Our bylaws provide that special meetings of our stockholders may only be called at the request of our Board of Directors, chairperson of the Board of Directors, chief executive officer or president (in the absence of a chief executive officer). Only such business shall be considered at a special meeting as shall have been stated in the notice for such meeting.

No Cumulative Voting. Our certificate of incorporation does not include a provision for cumulative voting for directors.

Indemnification. Our certificate of incorporation and our bylaws provide that we will indemnify our officers and directors against losses as they incur in investigations and legal proceedings resulting from their services to us, which may include service in connection with takeover defense measures.

Removal of Directors. Our certificate of incorporation and bylaws provide that the holders of our voting stock may only remove our directors for cause.

Size of Board and Vacancies. Our bylaws provide that the number of directors on our Board of Directors is fixed exclusively by our Board of Directors. Vacancies and newly created directorships resulting from any increase in our authorized number of directors will be filled by a majority of our Board of Directors then in office, although less than a quorum, or by a sole remaining director.

Table of Contents

Authorized but Unissued Shares. Our authorized but unissued shares of common stock and preferred stock will be available for future issuance without stockholder approval. We may use additional shares for a variety of purposes, including future public offerings to raise additional capital, to fund acquisitions and as employee compensation. The existence of authorized but unissued shares of common stock and preferred stock could render more difficult or discourage an attempt to obtain control of us by means of a proxy contest, tender offer, merger or otherwise.

Delaware Anti-Takeover Statute. We are subject to Section 203 of the Delaware General Corporation Law, an anti-takeover law. In general, Section 203 prohibits, with some exceptions, a publicly held Delaware corporation from engaging in a business combination with any interested stockholder for a period of three years following the date that stockholder became an interested stockholder, unless:

prior to that date, the Board of Directors of the corporation approved either the business combination or the transaction that resulted in the stockholder becoming an interested stockholder;

upon consummation of the transaction that resulted in the stockholder becoming an interested stockholder, the interested stockholder owned at least 85% of the voting stock of the corporation outstanding at the time the transaction commenced, excluding for purposes of determining the number of shares of voting stock outstanding (but not the voting stock owned by the interested stockholder) those shares owned by persons who are directors and officers and by excluding employee stock plans in which employee participants do not have the right to determine whether shares held subject to the plan will be tendered in a tender or exchange offer; or

on or subsequent to that date, the business combination is approved by the Board of Directors of the corporation and authorized at an annual or special meeting of stockholders, and not by written consent, by the affirmative vote of at least 66-2/3% of the outstanding voting stock that is not owned by the interested stockholder.

Section 203 defines business combination to include any of the following:

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

any sale, transfer, pledge or other disposition of 10% or more of the assets of the corporation involving the interested stockholder;

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

any transaction involving the corporation that has the effect of increasing the proportionate share of the stock of any class or series of the corporation beneficially owned by the interested stockholder; or

the receipt by the interested stockholder of the benefit of any loans, advances, guarantees, pledges or other financial benefits provided by or through the corporation.

In general, Section 203 defines an interested stockholder as any person who, together with the person's affiliates and associates, beneficially owns, or within three years prior to the determination of interested stockholder status did beneficially own, 15% or more of the outstanding voting stock of the corporation.

The above provisions may deter a hostile takeover or delay a change in control of management or us.

Table of Contents

DESCRIPTION OF DEBT SECURITIES

General

The debt securities that we may issue may constitute debentures, notes, bonds or other evidences of indebtedness of Organovo Holdings, Inc., to be issued in one or more series, which may include senior debt securities, subordinated debt securities and senior subordinated debt securities. The particular terms of any series of debt securities we may offer, including the extent to which the general terms set forth below may be applicable to a particular series, will be described in a prospectus supplement relating to such series.

Debt securities that we may issue may be issued under a senior indenture between us and a trustee, or a subordinated indenture between us and a trustee (collectively, the indentures). We have filed forms of the indentures as exhibits to the registration statement of which this prospectus is a part. Supplemental indentures and forms of debt securities containing the terms of the debt securities being offered will be filed as exhibits to the registration statement of which this prospectus is a part or will be incorporated by reference from reports that we file with the SEC.

THE FOLLOWING DESCRIPTION IS A SUMMARY OF THE MATERIAL PROVISIONS OF THE INDENTURES. IT DOES NOT RESTATE THE INDENTURES IN THEIR ENTIRETY. THE INDENTURES ARE GOVERNED BY THE TRUST INDENTURE ACT OF 1939. THE TERMS OF THE DEBT SECURITIES INCLUDE THOSE STATED IN THE INDENTURES AND THOSE MADE PART OF THE INDENTURES BY REFERENCE TO THE TRUST INDENTURE ACT. WE URGE YOU TO READ THE INDENTURES BECAUSE THEY, AND NOT THIS DESCRIPTION, DEFINE YOUR RIGHTS AS A HOLDER OF THE DEBT SECURITIES. EXCEPT AS WE MAY OTHERWISE INDICATE, THE TERMS OF THE SENIOR INDENTURE AND THE SUBORDINATED INDENTURE ARE IDENTICAL.

The indentures contain no covenant or provision which affords debt holders protection in the event of a highly leveraged transaction.

Information You Will Find in the Prospectus Supplement

The indentures provide that we may issue debt securities from time to time in one or more series by resolution of our Board of Directors or by means of a supplemental indenture, and that we may denominate the debt securities and make them payable in foreign currencies. The indentures do not limit the aggregate principal amount of debt securities that can be issued thereunder. We may specify a maximum aggregate principal amount for the debt securities of any series. We will describe in the applicable prospectus supplement the terms of the series of debt securities being offered, including:

the title;

the principal amount being offered, and if a series, the total amount authorized and the total amount outstanding;

any limit on the amount that may be issued;

whether or not we will issue the series of debt securities in global form, and, if so, the terms and who the depository will be;

the maturity date;

whether and under what circumstances, if any, we will pay additional amounts on any debt securities held by a person who is not a United States person for tax purposes, and whether we can redeem the debt securities if we have to pay such additional amounts;

the annual interest rate, which may be fixed or variable, or the method for determining the rate and the date interest will begin to accrue, the dates interest will be payable and the regular record dates for interest payment dates or the method for determining such dates;

Table of Contents

whether or not the debt securities will be secured or unsecured, and the terms of any secured debt;

the terms of the subordination of any series of subordinated debt;

the place where payments will be payable;

restrictions on transfer, sale or other assignment, if any;

our right, if any, to defer payment of interest and the maximum length of any such deferral period;

the date, if any, after which, and the price at which, we may, at our option, redeem the series of debt securities pursuant to any optional or provisional redemption provisions and the terms of those redemption provisions;

the date, if any, on which, and the price at which we are obligated, pursuant to any mandatory sinking fund or analogous fund provisions or otherwise, to redeem, or at the holder's option, to purchase, the series of debt securities and the currency or currency unit in which the debt securities are payable;

whether the indenture will restrict our ability or the ability of our subsidiaries to:

incur additional indebtedness;

issue additional securities;

create liens;

pay dividends or make distributions in respect of our capital stock or the capital stock of our subsidiaries, or redeem capital stock;

place restrictions on our subsidiaries' ability to pay dividends, make distributions or transfer assets;

make investments or other restricted payments;

sell or otherwise dispose of assets;

enter into sale-leaseback transactions;

engage in transactions with stockholders or affiliates;

issue or sell stock of our subsidiaries;

effect a consolidation or merger;

whether the indenture will require us to maintain any interest coverage, fixed charge, cash flow-based, asset-based or other financial ratios;

a discussion of certain material or special United States federal income tax considerations applicable to the debt securities;

information describing any book-entry features;

provisions for a sinking fund purchase or other analogous fund, if any;

the applicability of the provisions in the indenture on discharge;

whether the debt securities are to be offered at a price such that they will be deemed to be offered at an original issue discount as defined in paragraph (a) of Section 1273 of the Internal Revenue Code of 1986, as amended;

the denominations in which we will issue the series of debt securities, if other than denominations of \$1,000 and any integral multiple thereof;

the currency of payment of debt securities if other than U.S. dollars and the manner of determining the equivalent amount in U.S. dollars; and

any other specific terms, preferences, rights or limitations of, or restrictions on, the debt securities, including any additional events of default or covenants provided with respect to the debt securities, and any terms that may be required by us or advisable under applicable laws or regulations.

Table of Contents

Conversion or Exchange Rights

We will set forth in the applicable prospectus supplement the terms on which a series of debt securities may be convertible into or exchangeable for our common stock, our preferred stock or other securities (including securities of a third-party). We will include provisions as to whether conversion or exchange is mandatory, at the option of the holder or at our option. We may include provisions pursuant to which the number of shares of our common stock, our preferred stock or other securities (including securities of a third-party) that the holders of the series of debt securities receive would be subject to adjustment.

Consolidation, Merger or Sale

Unless we provide otherwise in the prospectus supplement applicable to a particular series of debt securities, the indentures will not contain any covenant that restricts our ability to merge or consolidate, or sell, convey, transfer or otherwise dispose of all or substantially all of our assets. However, any successor to or acquirer of such assets must assume all of our obligations under the indentures or the debt securities, as appropriate. If the debt securities are convertible into or exchangeable for our other securities or securities of other entities, the person with whom we consolidate or merge or to whom we sell all of our property must make provisions for the conversion of the debt securities into securities that the holders of the debt securities would have received if they had converted the debt securities before the consolidation, merger or sale.

Events of Default under the Indentures

Unless otherwise indicated in the applicable prospectus supplement, the following will be events of default under the indentures with respect to each series of debt securities issued under the indenture:

if we fail to pay interest when due and payable and our failure continues for 90 days and the time for payment has not been extended;

if we fail to pay the principal, premium or sinking fund payment, if any, when due and payable at maturity, upon redemption or repurchase or otherwise, and the time for payment has not been extended;

if we fail to observe or perform any other covenant contained in the debt securities or the indentures, other than a covenant specifically relating to another series of debt securities, and our failure continues for 90 days after we receive notice from the trustee or we and the trustee receive notice from the holders of at least 25% in aggregate principal amount of the outstanding debt securities of the applicable series; and

if specified events of bankruptcy, insolvency or reorganization occur.

We will describe in each applicable prospectus supplement any additional events of default relating to the relevant series of debt securities.

If an event of default with respect to debt securities of any series occurs and is continuing, other than an event of default specified in the last bullet point above, the trustee or the holders of at least 25% in aggregate principal amount of the outstanding debt securities of that series, by notice to us in writing, and to the trustee if notice is given by such holders, may declare the unpaid principal, premium, if any, and accrued interest, if any, due and payable immediately. If an event of default specified in the last bullet point above occurs with respect to us, the unpaid principal, premium, if any, and accrued interest, if any, of each issue of debt securities then outstanding shall be due and payable without any notice or other action on the part of the trustee or any holder.

The holders of a majority in principal amount of the outstanding debt securities of an affected series may waive any default or event of default with respect to the series and its consequences, except defaults or events of default regarding payment of principal, premium, if any, or interest, unless we have cured the default or event of default in accordance with the indenture. Any waiver shall cure the default or event of default.

Table of Contents

Subject to the terms of the indentures, if an event of default under an indenture shall occur and be continuing, the trustee will be under no obligation to exercise any of its rights or powers under such indenture at the request or direction of any of the holders of the applicable series of debt securities, unless such holders have offered the trustee reasonable indemnity or security satisfactory to it against any loss, liability or expense. The holders of a majority in principal amount of the outstanding debt securities of any series will have the right to direct the time, method and place of conducting any proceeding for any remedy available to the trustee, or exercising any trust or power conferred on the trustee, with respect to the debt securities of that series, provided that:

the direction so given by the holder is not in conflict with any law or the applicable indenture; and

subject to its duties under the Trust Indenture Act, the trustee need not take any action that might involve it in personal liability or might be unduly prejudicial to the holders not involved in the proceeding.

The indentures provide that if an event of default has occurred and is continuing, the trustee will be required in the exercise of its powers to use the degree of care that a prudent person would use in the conduct of its own affairs. The trustee, however, may refuse to follow any direction that conflicts with law or the indenture, or that the trustee determines is unduly prejudicial to the rights of any other holder of the relevant series of debt securities, or that would involve the trustee in personal liability. Prior to taking any action under the indentures, the trustee will be entitled to indemnification against all costs, expenses and liabilities that would be incurred by taking or not taking such action.

A holder of the debt securities of any series will have the right to institute a proceeding under the indentures or to appoint a receiver or trustee, or to seek other remedies only if:

the holder has given written notice to the trustee of a continuing event of default with respect to that series;

the holders of at least 25% in aggregate principal amount of the outstanding debt securities of that series have made written request, and such holders have offered reasonable indemnity to the trustee or security satisfactory to it against any loss, liability or expense or to be incurred in compliance with instituting the proceeding as trustee; and

the trustee does not institute the proceeding, and does not receive from the holders of a majority in aggregate principal amount of the outstanding debt securities of that series other conflicting directions within 90 days after the notice, request and offer.

These limitations do not apply to a suit instituted by a holder of debt securities if we default in the payment of the principal, premium, if any, or interest on, the debt securities, or other defaults that may be specified in the applicable prospectus supplement.

We will periodically file statements with the trustee regarding our compliance with specified covenants in the indentures.

The indentures provide that if a default occurs and is continuing and is actually known to a responsible officer of the trustee, the trustee must mail to each holder notice of the default within the earlier of 90 days after it occurs and 30 days after it is known by a responsible officer of the trustee or written notice of it is received by the trustee, unless such default has been cured or waived. Except in the case of a default in the payment of principal or premium of or interest on any debt security or certain other defaults specified in an indenture, the trustee shall be protected in withholding such notice if and so long as the Board of Directors, the executive committee or a trust committee of directors, or responsible officers of the trustee, in good faith determine that withholding notice is in the best interests of holders of the relevant series of debt securities.

Table of Contents

Modification of Indenture; Waiver

Subject to the terms of the indenture for any series of debt securities that we may issue, we and the trustee may change an indenture without the consent of any holders with respect to the following specific matters:

to fix any ambiguity, defect or inconsistency in the indenture;

to comply with the provisions described above under Description of Debt Securities Consolidation, Merger or Sale ;

to comply with any requirements of the SEC in connection with the qualification of any indenture under the Trust Indenture Act;

to add to, delete from or revise the conditions, limitations, and restrictions on the authorized amount, terms, or purposes of issue, authentication and delivery of debt securities, as set forth in the indenture;

to provide for the issuance of and establish the form and terms and conditions of the debt securities of any series as provided under Description of Debt Securities General, to establish the form of any certifications required to be furnished pursuant to the terms of the indenture or any series of debt securities, or to add to the rights of the holders of any series of debt securities;

to evidence and provide for the acceptance of appointment hereunder by a successor trustee;

to provide for uncertificated debt securities and to make all appropriate changes for such purpose;

to add to our covenants such new covenants, restrictions, conditions or provisions for the benefit of the holders, to make the occurrence, or the occurrence and the continuance, of a default in any such additional covenants, restrictions, conditions or provisions an event of default or to surrender any right or power conferred to us in the indenture; or

to change anything that does not adversely affect the interests of any holder of debt securities of any series in any material respect. In addition, under the indentures, the rights of holders of a series of debt securities may be changed by us and the trustee with the written consent of the holders of at least a majority in aggregate principal amount of the outstanding debt securities of each series that is affected. However, subject to the terms of the indenture for any series of debt securities that we may issue or otherwise provided in the prospectus supplement applicable to a particular series of debt securities, we and the trustee may only make the following changes with the consent of each holder of any outstanding debt securities affected:

extending the stated maturity of the series of debt securities;

reducing the principal amount, reducing the rate of or extending the time of payment of interest, or reducing any premium payable upon the redemption or repurchase of any debt securities; or

reducing the percentage of debt securities, the holders of which are required to consent to any amendment, supplement, modification or waiver.

Discharge

Each indenture provides that, subject to the terms of the indenture and any limitation otherwise provided in the prospectus supplement applicable to a particular series of debt securities, we can elect to be discharged from our obligations with respect to one or more series of debt securities, except for specified obligations, including obligations to:

register the transfer or exchange of debt securities of the series;

replace stolen, lost or mutilated debt securities of the series;

maintain paying agencies;

Table of Contents

hold monies for payment in trust;

recover excess money held by the trustee;

compensate and indemnify the trustee; and

appoint any successor trustee.

In order to exercise our rights to be discharged, we must deposit with the trustee money or government obligations sufficient to pay all the principal of, any premium and interest on, the debt securities of the series on the dates payments are due.

Form, Exchange and Transfer

We will issue the debt securities of each series only in fully registered form without coupons and, unless we otherwise specify in the applicable prospectus supplement, in denominations of \$1,000 and any integral multiple thereof. The indentures provide that we may issue debt securities of a series in temporary or permanent global form and as book-entry securities that will be deposited with, or on behalf of, The Depository Trust Company or another depository named by us and identified in a prospectus supplement with respect to that series. See Legal Ownership of Securities below for a further description of the terms relating to any book-entry securities.

At the option of the holder, subject to the terms of the indentures and the limitations applicable to global securities described in the applicable prospectus supplement, the holder of the debt securities of any series can exchange the debt securities for other debt securities of the same series, in any authorized denomination and of like tenor and aggregate principal amount.

Subject to the terms of the indentures and the limitations applicable to global securities set forth in the applicable prospectus supplement, holders of the debt securities may present the debt securities for exchange or for registration of transfer, duly endorsed or with the form of transfer endorsed thereon duly executed if so required by us or the security registrar, at the office of the security registrar or at the office of any transfer agent designated by us for this purpose. Unless otherwise provided in the debt securities that the holder presents for transfer or exchange, we will make no service charge for any registration of transfer or exchange, but we may require payment of any taxes or other governmental charges.

We will name in the applicable prospectus supplement the security registrar, and any transfer agent in addition to the security registrar, that we initially designate for any debt securities. We may at any time designate additional transfer agents or rescind the designation of any transfer agent or approve a change in the office through which any transfer agent acts, except that we will be required to maintain a transfer agent in each place of payment for the debt securities of each series.

If we elect to redeem the debt securities of any series, we will not be required to:

issue, register the transfer of, or exchange any debt securities of that series during a period beginning at the opening of business 15 days before the day of mailing of a notice of redemption of any debt securities that may be selected for redemption and ending at the close of business on the day of the mailing; or

register the transfer of or exchange any debt securities so selected for redemption, in whole or in part, except the unredeemed portion of any debt securities we are redeeming in part.

Information Concerning the Trustee

The trustee, other than during the occurrence and continuance of an event of default under an indenture, undertakes to perform only those duties as are specifically set forth in the applicable indenture and is under no

Table of Contents

obligation to exercise any of the powers given it by the indentures at the request of any holder of debt securities unless it is offered reasonable security and indemnity against the costs, expenses and liabilities that it might incur. However, upon an event of default under an indenture, the trustee must use the same degree of care as a prudent person would exercise or use in the conduct of his or her own affairs.

Payment and Paying Agents

Unless we otherwise indicate in the applicable prospectus supplement, we will make payment of the interest on any debt securities on any interest payment date to the person in whose name the debt securities, or one or more predecessor securities, are registered at the close of business on the regular record date for the interest payment.

We will pay principal of and any premium and interest on the debt securities of a particular series at the office of the paying agents designated by us, except that unless we otherwise indicate in the applicable prospectus supplement, we will make interest payments by check that we will mail to the holder or by wire transfer to certain holders. Unless we otherwise indicate in the applicable prospectus supplement, we will designate the corporate trust office of the trustee as our sole paying agent for payments with respect to debt securities of each series. We will name in the applicable prospectus supplement any other paying agents that we initially designate for the debt securities of a particular series. We will maintain a paying agent in each place of payment for the debt securities of a particular series.

All money we pay to a paying agent or the trustee for the payment of the principal of or any premium or interest on any debt securities that remains unclaimed at the end of two years after such principal, premium or interest has become due and payable will be repaid to us, and the holder of the debt security thereafter may look only to us for payment thereof.

Governing Law

The indentures and the debt securities will be governed by and construed in accordance with the laws of the State of New York, except to the extent that the Trust Indenture Act is applicable.

Ranking Debt Securities

The subordinated debt securities will be unsecured and will be subordinate and junior in priority of payment to certain other indebtedness to the extent described in a prospectus supplement. The subordinated indenture does not limit the amount of subordinated debt securities that we may issue. It also does not limit us from issuing any other secured or unsecured debt.

The senior debt securities will be unsecured and will rank equally in right of payment to all our other senior unsecured debt. The senior indenture does not limit the amount of senior debt securities that we may issue. It also does not limit us from issuing any other secured or unsecured debt.

Existing Debt

As of June 30, 2013 the Company had no existing subordinated debt and no secured debt.

Table of Contents

DESCRIPTION OF WARRANTS

We may issue warrants for the purchase of common stock, preferred stock or debt securities. Warrants may be offered independently or together with common stock, preferred stock or debt securities offered by any prospectus supplement and may be attached to or separate from those securities. While the terms we have summarized below will apply generally to any warrants that we may offer under this prospectus, we will describe in particular the terms of any series of warrants that we may offer in more detail in the applicable prospectus supplement and any applicable free writing prospectus. The terms of any warrants offered under a prospectus supplement may differ from the terms described below.

We will file as exhibits to the registration statement of which this prospectus is a part, or will incorporate by reference from another report that we file with the SEC, the form of warrant agreement, which may include a form of warrant certificate, that describes the terms of the of the particular series of warrants we are offering before the issuance of the related series of warrants. We may issue the warrants under a warrant agreement that we will enter into with a warrant agent to be selected by us. The warrant agent will act solely as our agent in connection with the warrants and will not assume any obligation or relationship of agency or trust for or with any registered holders of warrants or beneficial owners of warrants. The following summary of material provisions of the warrants and warrant agreements are subject to, and qualified in their entirety by reference to, all the provisions of the warrant agreement and warrant certificate applicable to a particular series of warrants. We urge you to read the applicable prospectus supplement and any applicable free writing prospectus related to the particular series of warrants that we sell under this prospectus, as well as the complete warrant agreements and warrant certificates that contain the terms of the warrants.

The particular terms of any issue of warrants will be described in the prospectus supplement relating to the issue. Those terms may include:

the title of such warrants;

the aggregate number of such warrants;

the price or prices at which such warrants will be issued;

the currency or currencies (including composite currencies) in which the price of such warrants may be payable;

the terms of the securities purchasable upon exercise of such warrants and the procedures and conditions relating to the exercise of such warrants;

the price at which the securities purchasable upon exercise of such warrants may be purchased;

the date on which the right to exercise such warrants will commence and the date on which such right shall expire;

any provisions for adjustment of the number or amount of securities receivable upon exercise of the warrants or the exercise price of the warrants;

if applicable, the minimum or maximum amount of such warrants that may be exercised at any one time;

if applicable, the designation and terms of the securities with which such warrants are issued and the number of such warrants issued with each such security;

if applicable, the date on and after which such warrants and the related securities will be separately transferable;

information with respect to book-entry procedures, if any;

the terms of any rights to redeem or call the warrants;

Table of Contents

United States federal income tax consequences of holding or exercising the warrants, if material; and

any other terms of such warrants, including terms, procedures and limitations relating to the exchange or exercise of such warrants. Each warrant will entitle its holder to purchase the principal amount of debt securities or the number of shares of preferred stock or common stock at the exercise price set forth in, or calculable as set forth in, the applicable prospectus supplement. Unless we otherwise specify in the applicable prospectus supplement, holders of the warrants may exercise the warrants at any time up to the specified time on the expiration date that we set forth in the applicable prospectus supplement. After the close of business on the expiration date, unexercised warrants will become void.

We will specify the place or places where, and the manner in which, warrants may be exercised in the warrant agreement or warrant certificate and applicable prospectus supplement. Upon receipt of payment and the warrant certificate properly completed and duly executed at the corporate trust office of the warrant agent or any other office indicated in the applicable prospectus supplement, we will, as soon as practicable, issue and deliver the purchased securities. If less than all of the warrants represented by the warrant certificate are exercised, a new warrant certificate will be issued for the remaining amount of warrants. If we so indicate in the applicable prospectus supplement, holders of the warrants may surrender securities as all or part of the exercise price for warrants.

Prior to the exercise of any warrants to purchase common stock, preferred stock or debt securities, holders of the warrants will not have any of the rights of holders of the common stock, preferred stock or debt securities purchasable upon exercise, including (i) in the case of warrants for the purchase of common stock or preferred stock, the right to vote or to receive any payments of dividends or payments upon our liquidation, dissolution or winding up on the common stock or preferred stock purchasable upon exercise, if any; or (ii) in the case of warrants for the purchase of debt securities, the right to receive payments of principal of, any premium or interest on the debt securities purchasable upon exercise or to enforce covenants in the applicable indenture.

Table of Contents

DESCRIPTION OF UNITS

The following description, together with the additional information we may include in any applicable prospectus supplement, summarizes the material terms and provisions of the units that we may offer under this prospectus. While the terms we have summarized below will apply generally to any units that we may offer under this prospectus, we will describe the particular terms of any series of units in more detail in the applicable prospectus supplement. The terms of any units offered under a prospectus supplement may differ from the terms described below. However, no prospectus supplement will fundamentally change the terms that are set forth in this prospectus or offer a security that is not registered and described in this prospectus at the time of its effectiveness.

We will file with the SEC, the form of unit agreement that describes the terms of the series of units we are offering, and any supplemental agreements, before the issuance of the related series of units. The following summaries of material terms and provisions of the units are subject to, and qualified in their entirety by reference to, all the provisions of the unit agreement and any supplemental agreements applicable to a particular series of units. We urge you to read the applicable prospectus supplements related to the particular series of units that we sell under this prospectus, as well as the complete unit agreement and any supplemental agreements that contain the terms of the units.

General

We may issue units comprised of one or more debt securities, shares of common stock, shares of preferred stock and warrants in any combination. Each unit will be issued so that the holder of the unit is also the holder of each security included in the unit. Thus, the holder of a unit will have the rights and obligations of a holder of each included security. The unit agreement under which a unit is issued may provide that the securities included in the unit may not be held or transferred separately, at any time or at any time before a specified date.

We will describe in the applicable prospectus supplement the terms of the series of units, including, but not limited to:

the designation and terms of the units and of the securities comprising the units, including whether and under what circumstances those securities may be held or transferred separately;

any provisions of the governing unit agreement that differ from those described below; and

any provisions for the issuance, payment, settlement, transfer or exchange of the units or of the securities comprising the units. The provisions described in this section, as well as those described under Description of Capital Stock, Description of Debt Securities and Description of Warrants will apply to each unit and to any common stock, preferred stock, debt security or warrant included in each unit, respectively.

Issuance in Series

We may issue units in such amounts and in numerous distinct series as we determine.

Enforceability of Rights by Holders of Units

Each unit agent will act solely as our agent under the applicable unit agreement and will not assume any obligation or relationship of agency or trust with any holder of any unit. A single bank or trust company may act as unit agent for more than one series of units. A unit agent will have no duty or responsibility in case of any default by us under the applicable unit agreement or unit, including any duty or responsibility to initiate any proceedings at law or otherwise, or to make any demand upon us. Any holder of a unit may, without the consent of the related unit agent or the holder of any other unit, enforce by appropriate legal action its rights as holder under any security included in the unit.

We, the unit agents and any of their agents may treat the registered holder of any unit certificate as an absolute owner of the units evidenced by that certificate for any purpose and as the person entitled to exercise the rights attaching to the units so requested, despite any notice to the contrary.

Table of Contents

LEGAL OWNERSHIP OF SECURITIES

We can issue securities in registered form or in the form of one or more global securities. We describe global securities in greater detail below. We refer to those persons who have securities registered in their own names on the books that we or any applicable trustee or depositary or warrant agent maintain for this purpose as the **holders** of those securities. These persons are the legal holders of the securities. We refer to those persons who, indirectly through others, own beneficial interests in securities that are not registered in their own names, as **indirect holders** of those securities. As we discuss below, indirect holders are not legal holders, and investors in securities issued in book-entry form or in street name will be indirect holders

Book-Entry Holders

We may issue securities in book-entry form only, as we will specify in the applicable prospectus supplement. This means securities may be represented by one or more global securities registered in the name of a financial institution that holds them as depositary on behalf of other financial institutions that participate in the depositary's book-entry system. These participating institutions, which are referred to as participants, in turn, hold beneficial interests in the securities on behalf of themselves or their customers.

Only the person in whose name a security is registered is recognized as the holder of that security. Global securities will be registered in the name of the depositary or its participants. Consequently, for global securities, we will recognize only the depositary as the holder of the securities, and we will make all payments on the securities to the depositary. The depositary passes along the payments it receives to its participants, which in turn pass the payments along to their customers who are the beneficial owners. The depositary and its participants do so under agreements they have made with one another or with their customers; they are not obligated to do so under the terms of the securities.

As a result, investors in a global security will not own securities directly. Instead, they will own beneficial interests in a global security, through a bank, broker or other financial institution that participates in the depositary's book-entry system or holds an interest through a participant. As long as the securities are issued in global form, investors will be indirect holders, and not legal holders, of the securities.

Street Name Holders

We may terminate a global security or issue securities that are not issued in global form. In these cases, investors may choose to hold their securities in their own names or in **street name**. Securities held by an investor in street name would be registered in the name of a bank, broker or other financial institution that the investor chooses, and the investor would hold only a beneficial interest in those securities through an account he or she maintains at that institution.

For securities held in street name, we or any applicable trustee or depositary will recognize only the intermediary banks, brokers and other financial institutions in whose names the securities are registered as the holders of those securities, and we or any such trustee or depositary will make all payments on those securities to them. These institutions pass along the payments they receive to their customers who are the beneficial owners, but only because they agree to do so in their customer agreements or because they are legally required to do so. Investors who hold securities in street name will be indirect holders, not holders, of those securities.

Legal Holders

Our obligations, as well as the obligations of any applicable trustee or third party employed by us or a trustee, run only to the legal holders of the securities. We do not have obligations to investors who hold beneficial interests in global securities, in street name or by any other indirect means. This will be the case whether an investor chooses to be an indirect holder of a security or has no choice because we are issuing the securities only in global form.

Table of Contents

For example, once we make a payment or give a notice to the holder, we have no further responsibility for the payment or notice even if that holder is required, under agreements with its participants or customers or by law, to pass it along to the indirect holders but does not do so. Similarly, we may want to obtain the approval of the holders to amend an indenture, to relieve us of the consequences of a default or of our obligation to comply with a particular provision of an indenture, or for other purposes. In such an event, we would seek approval only from the legal holders, and not the indirect holders, of the securities. Whether and how the holders contact the indirect holders is up to the legal holders.

Special Considerations for Indirect Holders

If you hold securities through a bank, broker or other financial institution, either in book-entry form because the securities are represented by one or more global securities or in street name, you should check with your own institution to determine:

how it handles securities payments and notices;

whether it imposes fees or charges;

how it would handle a request for the holders' consent, if ever required;

whether and how you can instruct it to send you securities registered in your own name so you can be a holder, if that is permitted in the future;

how it would exercise rights under the securities if there were a default or other event triggering the need for holders to act to protect their interests; and

if the securities are in book-entry form, how the depository's rules and procedures will affect these matters.

Global Securities

A global security is a security that represents one or any other number of individual securities held by a depository. Generally, all securities represented by the same global securities will have the same terms.

Each security issued in book-entry form will be represented by a global security that we issue to, deposit with and register in the name of a financial institution or its nominee that we select. The financial institution that we select for this purpose is called the depository. Unless we specify otherwise in the applicable prospectus supplement, The Depository Trust Company, New York, New York, known as DTC, will be the depository for all securities issued in book-entry form.

A global security may not be transferred to or registered in the name of anyone other than the depository, its nominee or a successor depository, unless special termination situations arise. We describe those situations below under **Special Situations When A Global Security Will Be Terminated**. As a result of these arrangements, the depository, or its nominee, will be the sole registered owner and legal holder of all securities represented by a global security, and investors will be permitted to own only beneficial interests in a global security. Beneficial interests must be held by means of an account with a broker, bank or other financial institution that in turn has an account with the depository or with another institution that does. Thus, an investor whose security is represented by a global security will not be a legal holder of the security, but only an indirect holder of a beneficial interest in the global security.

If the prospectus supplement for a particular security indicates that the security will be issued as a global security, then the security will be represented by a global security at all times unless and until the global security is terminated. If termination occurs, we may issue the securities through another book-entry clearing system or decide that the securities may no longer be held through any book-entry clearing system.

Table of Contents

Special Considerations For Global Securities

As an indirect holder, an investor's rights relating to a global security will be governed by the account rules of the investor's financial institution and of the depositary, as well as general laws relating to securities transfers. We do not recognize an indirect holder as a holder of securities and instead deal only with the depositary that holds the global security.

If securities are issued only as global securities, an investor should be aware of the following:

an investor cannot cause the securities to be registered in his or her name, and cannot obtain non-global certificates for his or her interest in the securities, except in the special situations we describe below;

an investor will be an indirect holder and must look to his or her own bank or broker for payments on the securities and protection of his or her legal rights relating to the securities, as we describe above;

an investor may not be able to sell interests in the securities to some insurance companies and to other institutions that are required by law to own their securities in non-book-entry form;

an investor may not be able to pledge his or her interest in the global security in circumstances where certificates representing the securities must be delivered to the lender or other beneficiary of the pledge in order for the pledge to be effective;

the depositary's policies, which may change from time to time, will govern payments, transfers, exchanges and other matters relating to an investor's interest in the global security. We and any applicable trustee have no responsibility for any aspect of the depositary's actions or for its records of ownership interests in the global security. We and the trustee also do not supervise the depositary in any way;

the depositary may, and we understand that DTC will, require that those who purchase and sell interests in the global security within its book-entry system use immediately available funds, and your broker or bank may require you to do so as well; and

financial institutions that participate in the depositary's book-entry system, and through which an investor holds its interest in the global security, may also have their own policies affecting payments, notices and other matters relating to the securities. There may be more than one financial intermediary in the chain of ownership for an investor. We do not monitor and are not responsible for the actions of any of those intermediaries.

Special Situations When A Global Security Will Be Terminated

In a few special situations described below, a global security will terminate and interests in it will be exchanged for physical certificates representing those interests. After that exchange, the choice of whether to hold securities directly or in street name will be up to the investor. Investors must consult their own banks or brokers to find out how to have their interests in securities transferred to their own names, so that they will be direct holders. We have described the rights of holders and street name investors above.

A global security will terminate when the following special situations occur:

if the depositary notifies us that it is unwilling, unable or no longer qualified to continue as depositary for that global security and we do not appoint another institution to act as depositary within 90 days;

if we notify any applicable trustee that we wish to terminate that global security; or

if an event of default has occurred with regard to securities represented by that global security and has not been cured or waived. The applicable prospectus supplement may also list additional situations for terminating a global security that would apply only to the particular series of securities covered by the prospectus supplement. When a global security terminates, the depositary, and neither we nor any applicable trustee, is responsible for deciding the names of the institutions that will be the initial direct holders.

Table of Contents

PLAN OF DISTRIBUTION

We may sell the securities to or through underwriters or dealers, through agents, or directly to one or more purchasers. A prospectus supplement or supplements (and any related free writing prospectus that we may authorize to be provided to you) will describe the terms of the offering of the securities, including, to the extent applicable:

the name or names of any agents or underwriters;

the purchase price of the securities being offered and the proceeds we will receive from the sale;

any over-allotment options under which underwriters may purchase additional securities from us;

any agency fees or underwriting discounts and other items constituting agents' or underwriters' compensation;

any public offering price;

any discounts or concessions allowed or reallocated or paid to dealers; and

any securities exchanges or markets on which such securities may be listed.

We may distribute the securities from time to time in one or more transactions at:

fixed price or prices, which may be changed from time to time;

market prices prevailing at the time of sale;

prices related to such prevailing market prices; or

negotiated prices.

Agents

We may designate agents who agree to use their reasonable efforts to solicit purchases of our securities for the period of their appointment or to sell our securities on a continuing basis. We will name any agent involved in the offering and sale of securities and we will describe any commissions we will pay the agent in the applicable prospectus supplement.

Underwriters

If we use underwriters for a sale of securities, the underwriters will acquire the securities for their own account. The underwriters may resell the securities in one or more transactions, including negotiated transactions, at a fixed public offering price or at varying prices determined at the time of sale. The obligations of the underwriters to purchase the securities will be subject to the conditions set forth in the applicable

underwriting agreement. Subject to certain conditions, the underwriters will be obligated to purchase all the securities of the series offered if they purchase any of the securities of that series. We may change from time to time any public offering price and any discounts or concessions the underwriters allow or reallow or pay to dealers. We may use underwriters with whom we have a material relationship. We will describe the nature of any such relationship in any applicable prospectus supplement naming any such underwriter. Only underwriters we name in the prospectus supplement are underwriters of the securities offered by the prospectus supplement.

We may provide agents and underwriters with indemnification against civil liabilities related to offerings under this prospectus, including liabilities under the Securities Act, or contribution with respect to payments that the agents or underwriters may make with respect to these liabilities.

We may engage in at the market offerings into an existing trading market in accordance with Rule 415(a)(4) under the Securities Act. Underwriters and dealers who may participate in any at-the-market offerings will be described in the prospectus supplement relating thereto.

Table of Contents

Direct Sales

We may also sell securities directly to one or more purchasers without using underwriters or agents. Underwriters, dealers and agents that participate in the distribution of the securities may be underwriters as defined in the Securities Act, and any discounts or commissions they receive from us and any profit on their resale of the securities may be treated as underwriting discounts and commissions under the Securities Act. We will identify in the applicable prospectus supplement any underwriters, dealers or agents and will describe their compensation. Underwriters, dealers and agents may engage in transactions with or perform services for us in the ordinary course of their businesses.

Trading Markets and Listing of Securities

Unless otherwise specified in the applicable prospectus supplement, each class or series of securities will be a new issue with no established trading market, other than our common stock, which is currently listed on the NYSE Amex. We may elect to list any other class or series of securities on any exchange or market, but we are not obligated to do so. It is possible that one or more underwriters may make a market in a class or series of securities, but the underwriters will not be obligated to do so and may discontinue any market making at any time without notice. We cannot give any assurance as to the liquidity of the trading market for any of the securities.

Stabilization Activities

Any underwriter may engage in overallotment, stabilizing transactions, short covering transactions and penalty bids in accordance with Regulation M under the Exchange Act. Overallotment involves sales in excess of the offering size, which create a short position. Stabilizing transactions permit bids to purchase the underlying security so long as the stabilizing bids do not exceed a specified maximum. Short covering transactions involve purchases of the securities in the open market after the distribution is completed to cover short positions. Penalty bids permit the underwriters to reclaim a selling concession from a dealer when the securities originally sold by the dealer are purchased in a covering transaction to cover short positions. Those activities may cause the price of the securities to be higher than it would otherwise be. If commenced, the underwriters may discontinue any of these activities at any time.

Passive Market Making

Any underwriters who are qualified market makers on the NYSE MKT may engage in passive market making transactions in the securities on the NYSE MKT in accordance with Rule 103 of Regulation M, during the business day prior to the pricing of the offering, before the commencement of offers or sales of the securities. Passive market makers must comply with applicable volume and price limitations and must be identified as passive market makers. In general, a passive market maker must display its bid at a price not in excess of the highest independent bid for such security. If all independent bids are lowered below the passive market maker's bid, however, the passive market maker's bid must then be lowered when certain purchase limits are exceeded.

Compensation Cap

In compliance with the guidelines of the Financial Regulatory Authority, or FINRA, the maximum aggregate value of all compensation to be received by any FINRA member or independent broker-dealer will not exceed 8% of the gross proceeds from the sale of securities pursuant to this prospectus and any applicable prospectus supplement.

Table of Contents

LEGAL MATTERS

The validity of the securities being offered by this prospectus will be passed upon for us by DLA Piper LLP (US), San Diego, California. If the validity of any securities is also passed upon by counsel for any underwriters, dealers or agents, that counsel will be named in the prospectus supplement relating to that specific offering.

EXPERTS

The consolidated financial statements incorporated in this prospectus by reference to our Transition Report on Form 10-KT and our Annual Report on Form 10-K have been audited by Mayer Hoffman McCann P.C., an independent registered public accounting firm, as stated in their reports, which are incorporated herein by reference. Such financial statements have been so incorporated in reliance upon the reports of such firm given upon their authority as experts in accounting and auditing.

WHERE YOU CAN FIND MORE INFORMATION

We file annual, quarterly and current reports, proxy statements and other information electronically with the SEC. You may read and copy these reports, proxy statements and other information at the SEC's public reference room at 100 F Street, N.E., Washington, D.C. 20549. Please call the SEC at 1-800-SEC-0330 for more information about the operation of the public reference room. You can request copies of these documents by writing to the SEC and paying a fee for the copying costs. The SEC also maintains an Internet site that contains reports, proxy and information statements, and other information regarding issuers that file electronically with the SEC, including us. The SEC's Internet site can be found at <http://www.sec.gov>. In addition, we make available on or through our Internet site copies of these reports as soon as reasonably practicable after we electronically file or furnish them to the SEC. Our Internet site can be found at <http://www.organovo.com>.

Table of Contents

INCORPORATION OF CERTAIN INFORMATION BY REFERENCE

We are allowed to incorporate by reference information contained in documents that we file with the SEC. This means that we can disclose important information to you by referring you to those documents and that the information in this prospectus is not complete. You should read the information incorporated by reference for more detail. We incorporate by reference in two ways. First, we list below certain documents that we have already filed with the SEC. The information in these documents is considered part of this prospectus. Second, the information in documents that we file in the future will update and supersede the information currently in, and be incorporated by reference in, this prospectus.

We incorporate by reference into this prospectus the documents listed below, any filings we make with the SEC pursuant to Section 13(a), 13(c), 14 or 15(d) of the Exchange Act after the date of the initial registration statement of which this prospectus is a part and prior to the effectiveness of the registration statement, and any filings we make with the SEC pursuant to Section 13(a), 13(c), 14 or 15(d) of the Exchange Act from the date of this prospectus until the termination of this offering (in each case, except for the information furnished under Item 2.02 or Item 7.01 in any current report on Form 8-K and Form 8-K/A):

our transition report on Form 10-KT for the three months ended March 31, 2013 filed with the SEC on May 24, 2013 (File No. 001-54621-13872067);

our annual report on Form 10-K for the year ended December 31, 2012 filed with the SEC on March 15, 2013 (File No. 001-54621-13695277);

our current reports on Form 8-K filed with the SEC on February 5, 2013, March 19, 2013, April 3, 2013, June 10, 2013 and July 9, 2013 (File Nos. 001-54621-13575105, 001-54621-3702598, 001-54621-13737571, 001-54621-13902546 and 001-54621-13958670, respectively);

our definitive proxy statement filed pursuant to Section 14 of the Exchange Act in connection with our 2013 Annual Meeting of Stockholders filed with the SEC on July 12, 2013 (File No. 001-35996-13965363); and

the description of our common stock contained in our registration statement on Form 8-A filed with the SEC on July 9, 2013 (File No. 001-54621-13958682).

We will provide each person, including any beneficial owner, to whom a prospectus is delivered, a copy of any or all of the information that has been incorporated by reference into this prospectus but not delivered with this prospectus upon written or oral request at no cost to the requester. Requests should be directed to: Organovo Holdings, Inc., 6275 Nancy Ridge Dr., San Diego, California, Attn: Investor Relations, telephone: (858) 550-9994.

This prospectus is part of a registration statement on Form S-3 that we filed with the SEC. That registration statement contains more information than this prospectus regarding us and our securities, including certain exhibits and schedules. You can obtain a copy of the registration statement from the SEC at the address listed above or from the SEC's Internet website.

You should rely only on the information provided in and incorporated by reference into this prospectus, any prospectus supplement or any related free writing prospectus that we may authorize to be provided to you. We have not authorized anyone else to provide you with different information. You should not assume that the information in this prospectus, any prospectus supplement or any related free writing prospectus that we may authorize to be provided to you is accurate as of any date other than the date on the front cover of such documents.

Table of Contents

9,000,000 Shares

Common Stock

Prospectus Supplement

Joint Book-Runners

Lazard Capital Markets

Oppenheimer & Co.

Co-Managers

JMP Securities LLC

Maxim Group LLC

August 2, 2013