

PROSPECTUS



Up to \$50,000,000

Common Stock

We have entered into a Sales Agreement (the "Sales Agreement") with H.C. Wainwright & Co., LLC and JonesTrading Institutional Services LLC (each an "Agent" and together, the "Agents"), relating to shares of our common stock offered by this prospectus. In accordance with the terms of the Sales Agreement, we may offer and sell shares of our common stock from time to time through the Agents, having an aggregate offering price of up to \$50 million, pursuant to this prospectus. Of the shares of our common stock covered by the Sales Agreement and the related prospectus supplement, dated March 16, 2018, covering the issuance of up to \$50 million of shares of our common stock, as of January 18, 2021, we have issued and sold an aggregate of 1,265,614 shares of our common stock for gross proceeds of approximately \$22.0 million.

Our common stock is listed on the Nasdaq Capital Market under the symbol "ONVO." On January 28, 2021, the last reported sale price of our common stock on the Nasdaq Capital Market was \$13.13 per share.

Sales of our common stock, if any, under this prospectus may be made in sales deemed to be an "at the market offering" as defined in Rule 415(a) (4) promulgated under the Securities Act of 1933, as amended (the "Securities Act"). The Agents are not required to sell any specific number or dollar amounts of securities but will act as sales agents using their commercially reasonable efforts consistent with their respective normal trading and sales practices, on mutually agreed terms between the Agents and us. There is no arrangement for funds to be received in any escrow, trust or similar arrangement.

Each Agent will be entitled to compensation under the terms of the Sales Agreement at a commission rate of up to 3.0% of the gross sales price per share sold by such Agent. In connection with the sale of the common stock on our behalf, the Agents will each be deemed to be an "underwriter" within the meaning of the Securities Act and the compensation of the Agents will be deemed to be underwriting commissions or discounts. We have also agreed to provide indemnification and contribution to the Agents against certain civil liabilities, including liabilities under the Securities Act.

Investing in our common stock involves a high degree of risk. You should review carefully the risks and uncertainties described under the heading "[Risk Factors](#)" on page S-6 of this prospectus and in any applicable free writing prospectuses, and under similar headings in the documents that are incorporated by reference into this prospectus.

Neither the Securities and Exchange Commission nor any state securities commission has approved or disapproved of these securities, or passed upon the adequacy or accuracy of this prospectus. Any representation to the contrary is a criminal offense.

H.C. Wainwright & Co.

JonesTrading

The date of this prospectus is January 29, 2021.

TABLE OF CONTENTS

	<u>Page</u>
<u>ABOUT THIS PROSPECTUS</u>	S-i
<u>DISCLOSURES REGARDING FORWARD-LOOKING STATEMENTS</u>	S-ii
<u>PROSPECTUS SUMMARY</u>	S-1
<u>RISK FACTORS</u>	S-6
<u>USE OF PROCEEDS</u>	S-10
<u>DIVIDEND POLICY</u>	S-11
<u>DILUTION</u>	S-12
<u>PLAN OF DISTRIBUTION</u>	S-14
<u>LEGAL MATTERS</u>	S-15
<u>EXPERTS</u>	S-15
<u>WHERE YOU CAN FIND MORE INFORMATION</u>	S-15
<u>INCORPORATION OF DOCUMENTS BY REFERENCE</u>	S-16

ABOUT THIS PROSPECTUS

This prospectus relates to the offering of our common stock. Before buying any of the common stock that we are offering, we urge you to carefully read this prospectus together with the information incorporated by reference as described under the headings “Where You Can Find More Information” and “Incorporation of Documents by Reference” in this prospectus. These documents contain important information that you should consider when making your investment decision.

You should rely only on the information contained in, or incorporated by reference into this prospectus and in any free writing prospectus that we may authorize for use in connection with this offering. We have not, and the Agents have not, authorized any other person to provide you with different information. If anyone provides you with additional, different or inconsistent information, you should not rely on it. We are not, and the Agents are not, making an offer to sell or soliciting an offer to buy our common stock in any jurisdiction in which an offer or solicitation is not authorized or in which the person making that offer or solicitation is not qualified to do so or to anyone to whom it is unlawful to make an offer or solicitation. You should assume that the information appearing in this prospectus, the documents incorporated by reference into this prospectus and in any free writing prospectus that we may authorize for use in connection with this offering, is accurate only as of the date of those respective documents. Our business, financial condition, results of operations and prospects may have changed since those dates. You should read this prospectus, the documents incorporated by reference into this prospectus and any free writing prospectus that we may authorize for use in connection with this offering, in their entirety before making an investment decision. You should also read and consider the information in the documents to which we have referred you in the sections of this prospectus supplement entitled “Where You Can Find More Information” and “Incorporation of Documents by Reference.”

The distribution of this 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 must inform themselves about, and observe any restrictions relating to, the offering of the common stock and the distribution of this prospectus outside the United States. This prospectus does 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 by any person in any jurisdiction in which it is unlawful for such person to make such an offer or solicitation.

We own or have rights to use the trademarks and trade names that we use in conjunction with the operation of our business. Solely for convenience, our trademarks and trade names referred to in this prospectus may appear without the ® or ™ symbols, but those references are not intended to indicate, in any way, that we will not assert, to the fullest extent under applicable law, our rights or the right of the applicable licensor to these trademarks and trade names.

DISCLOSURE REGARDING FORWARD-LOOKING STATEMENTS

This prospectus and the documents incorporated by reference into this prospectus may contain forward-looking statements within the meaning of Section 27A of the Securities Act of 1933, as amended (the “Securities Act”), and Section 21E of the Securities Exchange Act of 1934, as amended (the “Exchange Act”), about Organovo. These forward-looking statements are intended to be covered by the safe harbor for forward-looking statements provided by the Private Securities Litigation Reform Act of 1995. Forward-looking statements are not statements of historical fact, and can be identified by the use of forward-looking terminology such as “believes”, “expects”, “may”, “will”, “could”, “should”, “projects”, “plans”, “goal”, “targets”, “potential”, “estimates”, “pro forma”, “seeks”, “intends” or “anticipates” or the negative thereof or comparable terminology. Forward-looking statements include discussions of strategy, financial projections, guidance and estimates (including their underlying assumptions), statements regarding plans, objectives, expectations or consequences of various transactions, and statements about the future performance, operations, products and services of Organovo. We caution our stockholders and other readers not to place undue reliance on such statements.

You should read this prospectus and the documents incorporated by reference completely and with the understanding that our actual future results may be materially different from what we currently expect. Our business and operations are and will be subject to a variety of risks, uncertainties and other factors. Consequently, actual results and experience may materially differ from those contained in any forward-looking statements. Such risks, uncertainties and other factors that could cause actual results and experience to differ from those projected include, but are not limited to, the risk factors set forth in Part I-Item 1A, “Risk Factors”, in our Annual Report on Form 10-K for the fiscal year ended March 31, 2020, filed with the SEC on May 28, 2020, in our Quarterly Report on Form 10-Q for the quarterly period ended June 30, 2020, filed with the SEC on August 10, 2020, and in our Quarterly Report on Form 10-Q for the quarterly period ended September 30, 2020, filed with the SEC on November 5, 2020, and elsewhere in the other documents incorporated by reference into this prospectus.

You should assume that the information appearing in this prospectus, any related free writing prospectus and any document incorporated herein by reference is accurate as of its date only. Because the risk factors referred to above could cause actual results or outcomes to differ materially from those expressed in any forward-looking statements made by us or on our behalf, you should not place undue reliance on any forward-looking statements. Further, any forward-looking statement speaks only as of the date on which it is made. New factors emerge from time to time, and it is not possible for us to predict which factors will arise. In addition, we cannot assess the impact of each factor on our business or the extent to which any factor, or combination of factors, may cause actual results to differ materially from those contained in any forward-looking statements. All written or oral forward-looking statements attributable to us or any person acting on our behalf made after the date of this prospectus are expressly qualified in their entirety by the risk factors and cautionary statements contained in and incorporated by reference into this prospectus. Unless legally required, we do not undertake any obligation to release publicly any revisions to such forward-looking statements to reflect events or circumstances after the date of this prospectus or to reflect the occurrence of unanticipated events.

PROSPECTUS SUMMARY

This summary highlights certain information about us, this offering and selected information contained elsewhere in or incorporated by reference into this prospectus. 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, including the information incorporated by reference into this prospectus and the information included in any free writing prospectus that we have authorized for use in connection with this offering, including the information contained in and incorporated by reference under the heading “Risk Factors” beginning on page S-6 of this prospectus, and under similar headings in the other documents that are filed after the date hereof and incorporated by reference into this prospectus.

Overview

Organovo Holdings, Inc. (Nasdaq: ONVO), together with its wholly owned subsidiaries (collectively, “Organovo”, “we”, “us” and “our”), is an early-stage biotechnology company that is developing and utilizing highly customized 3D human tissues as dynamic models of healthy and diseased human biology for drug development. Our proprietary technology is being used to build functional 3D human tissues that mimic key aspects of native human tissue composition, architecture, function and disease. Our advances include cell type-specific compartments, prevalent intercellular tight junctions, and the formation of microvascular structures. We believe these attributes can enable critical complex, multicellular disease models that we will use to develop clinically effective drugs for selected therapeutic areas. Market opportunities may include externally-partnered or internally-directed drug discovery and the clinical development of new molecular entities or repurposed drugs in-licensed from other pharmaceutical companies. Our goal is to establish a pipeline of drug candidates in high-value disease areas, aiming to commence human clinical testing for at least one drug candidate within a three to five year timeframe.

Historical Operations and Strategic Alternatives Process

Prior to August 2019, we focused our efforts on developing our in vivo liver tissues to treat end-stage liver disease and a select group of life-threatening, orphan diseases, for which there are limited treatment options other than organ transplantation. We also explored the development of other potential pipeline in vivo tissue constructs in-house and through collaborations with academic and government researchers. In the past, we also explored the development of in vitro tissues, including proof of concept models of diseased tissues, for use in drug discovery and development.

In August 2019, after a rigorous assessment of our in vitro liver therapeutic tissue program, we concluded that the variability of biological performance and related duration of potential benefits no longer supported an attractive opportunity due to redevelopment challenges and lengthening timelines to compile sufficient data to support an Investigational New Drug (“IND”) filing. As a result, we suspended development of our lead program and all other related in-house pipeline development activities.

Our Board of Directors (our “Board”) also engaged a financial advisory firm to explore our available strategic alternatives, including evaluating a range of ways to generate value from our technology platform and intellectual property, our commercial and development capabilities, our listing on the Nasdaq Capital Market, and our remaining financial assets. These strategic alternatives included possible mergers and business combinations, sales of part or all of our assets, and licensing and partnering arrangements. We implemented various restructuring steps to manage our resources and extend our cash runway, including reducing commercial activities related to our liver tissues, except for sales of primary human cells out of inventory, negotiating an exit from our long-term facility lease, selling various assets, and reducing our workforce. Additionally, in November

2019, we sold certain inventory and equipment and related proprietary information held by our wholly-owned subsidiary, Samsara Sciences, Inc. (“Samsara”), and as a result of such sale, Samsara ceased its operations and has since been dissolved.

After conducting a diligent and extensive process of evaluating strategic alternatives and identifying and reviewing potential candidates for a strategic acquisition or other transaction, which included the receipt of more than 27 non-binding indications of interest from interested parties and careful evaluation and consideration of those proposals, and following extensive negotiation with Tarveda Therapeutics, Inc. (“Tarveda”), on December 13, 2019, we entered into a merger agreement with Tarveda (the “Merger Agreement”). Pursuant to the Merger Agreement, and subject to the satisfaction or waiver of the conditions set forth in the Merger Agreement, our wholly-owned merger subsidiary would merge with and into Tarveda (the “Merger”), with Tarveda becoming a wholly-owned subsidiary of Organovo and the surviving corporation of the Merger. The Merger Agreement included various conditions to the consummation of the Merger, including approval by our stockholders at a Special Meeting of Stockholders scheduled for April 7, 2020 (the “Special Meeting”).

At the Special Meeting, the Merger was not approved by our stockholders. As a result, we terminated the Merger Agreement with Tarveda. Pursuant to the terms of the Merger Agreement, we were obligated to reimburse certain of Tarveda’s merger-related expenses not to exceed \$300,000, which was offset by Tarveda’s portion of shared expenses incurred by Organovo in fiscal 2020.

The Cooperation Agreement and Advisory Nominees Proposal

Following the Special Meeting and the termination of the Merger Agreement, our Board continued to solicit stockholder feedback regarding our strategic alternatives and how to maximize stockholder value. In response to feedback from our largest stockholder regarding its desire for our Board to consider opportunities in the 3D bioprinting field and suggestion that our Board should speak with Keith Murphy, our founder, stockholder and former Chief Executive Officer and Chairman, for potential business ideas, our Board initiated discussions with Mr. Murphy. Based on these discussions, we entered into a Cooperation Agreement with Mr. Murphy on July 14, 2020 (the “Cooperation Agreement”). Under the terms of the Cooperation Agreement, our Board appointed Mr. Murphy and Adam K. Stern to our Board as Class III directors, and two of our existing directors, Richard Maroun and David Shapiro, resigned from our Board and the committees thereof. Our Board also agreed to nominate, recommend, support and solicit proxies for the re-election of Messrs. Murphy and Stern at our 2020 Annual Meeting of Stockholders (the “2020 Annual Meeting”). Our Board also agreed to nominate, recommend, support and solicit proxies for an advisory stockholder vote (the “Advisory Nominees Proposal”) at the 2020 Annual Meeting to appoint three individuals, Douglas Jay Cohen, David Gobel and Alison Tjosvold Milhous (collectively, the “Advisory Nominees”), to our Board. Mr. Murphy identified each of the Advisory Nominees. Our Board approved the appointment of the Advisory Nominees, to be automatically effective immediately following the final adjournment of the 2020 Annual Meeting if the final vote tabulation for the Advisory Nominees Proposal received more votes cast “FOR” than “AGAINST” its approval. In addition, each of our then-current directors (other than Messrs. Murphy and Stern) agreed to resign from our Board immediately following the appointment of the Advisory Nominees. At the 2020 Annual Meeting held on September 15, 2020, our stockholders approved the re-election of Messrs. Murphy and Stern to our Board as Class III directors to hold office until the 2023 Annual Meeting of Stockholders and the final vote tabulation for the Advisory Nominees Proposal received more votes cast “FOR” than “AGAINST” its approval and, accordingly, effective upon the final adjournment of the 2020 Annual Meeting, Ms. Milhous was appointed as a Class I director to hold office until the 2021 Annual Meeting of Stockholders and Messrs. Cohen and Gobel were appointed as Class II directors to hold office until the 2022 Annual Meeting (collectively, the “New Director Slate”) and Carolyn Beaver, Taylor Crouch, Mark Kessel and Kirk Malloy, Ph.D. each resigned as directors.

Current Drug Discovery Business

Following the election of the New Director Slate, we have recommenced operations and are now focusing our future efforts on developing highly customized 3D human tissues as living, dynamic models of healthy and diseased human biology for drug development. Our proprietary technology is being used to build functional 3D human tissues that mimic key aspects of native human tissue composition, architecture, function and disease. Our advances include cell type-specific compartments, prevalent intercellular tight junctions, and the formation of microvascular structures. We believe these attributes can enable critical complex, multicellular disease models that we will use to develop clinically effective drugs for selected therapeutic areas. Market opportunities may include externally-partnered or internally-directed drug discovery and the clinical development of new molecular entities or repurposed drugs in-licensed from other pharmaceutical companies. Our goal is to establish a pipeline of drug candidates in high-value disease areas, aiming to commence human clinical testing for at least one drug candidate within a three to five year timeframe.

We have a significant opportunity to change the classic model of drug discovery using 3D bioprinted human tissues and other 3D models (sometimes known as “organoids” or “organs on a chip”). Our new paradigm will involve augmenting or replacing available animal disease models in the discovery process with more relevant human disease models utilizing 3D human tissues developed by us. Our 3D human tissues may enable us to study the treatment of human disease by replicating key aspects of human biology in areas where this is currently a challenge with existing models. Rather than offering contract research services (as we have done in the past), we will focus on identifying and developing our own drug candidates, including from unique compounds or repurposed drugs in-licensed from other pharmaceutical companies. After identifying a drug candidate, we may out-license the drug candidate or may elect to develop the drug candidate internally. In addition to drug discovery, we will continue to evaluate opportunities to monetize our intellectual property and technologies along the way as a means to generate funds to support our primary business. We will continue to identify and work with partners and collaborators, including leading academic research sites, to develop new enabling applications which can support our discovery and development mission.

To restart our research operations, we have commenced hiring a team of research and development professionals with drug discovery and 3D tissue development experience. This team will leverage 3D models of disease to discover and develop new drugs with improved clinical efficacy.

We expect our research and development staff to grow to ten to fifteen employees. We also expect to maintain or grow a general and administrative staff of five or more employees, along with consultants, to support our operations and reporting requirements as a public company.

We expect to lease sufficient office and laboratory space to support our requirements. On November 23, 2020, we entered into two lease agreements, pursuant to which we will temporarily lease approximately 3,212 square feet of office space (the “Temporary Lease”) in San Diego and permanently lease approximately 8,051 square feet of office space (the “Permanent Lease”) in San Diego once certain tenant improvements for our permanent premises have been completed and it is ready for occupancy. The Temporary Lease commenced on November 27, 2020 and is intended to serve as temporary premises for approximately seven months. The Permanent Lease is projected to commence on July 1, 2021 and is intended to serve as our permanent premises for approximately sixty-two months.

For a complete description of our business, financial condition, results of operations and other important information, we refer you to our filings with the SEC that are incorporated by reference in this prospectus, including our [Annual Report on Form 10-K for the year ended March 31, 2020](#), our [Quarterly Report on Form 10-Q for the quarter ended June 30, 2020](#) and our [Quarterly Report on Form 10-Q for the quarter ended September 30, 2020](#). For instructions on how to find copies of these documents, see the section of this prospectus entitled “Where You Can Find More Information”.

See the section entitled “Risk Factors” in this prospectus for a discussion of some of the risks relating to the execution of our business strategy.

Corporate Information

We were incorporated in Delaware under the name Organovo Holdings, Inc. in January 2012. We are operating the business of our subsidiaries, including Organovo, Inc., our wholly-owned subsidiary, which we acquired in February 2012. Organovo, Inc. was incorporated in Delaware in April 2007. Our common stock has traded on the Nasdaq Capital Market under the symbol “ONVO” since December 27, 2019. Prior to that time, it had traded on the Nasdaq Global Market under the symbol “ONVO” since August 8, 2016 and prior to that it traded on the NYSE MKT under the symbol “ONVO”.

Our principal executive offices are located at 440 Stevens Ave, Suite 200, Solana Beach, CA 92075, and our telephone number is (858) 224-1000. Our website address is www.organovo.com. Any information contained on, or that can be accessed through, our website is not incorporated by reference into, nor is it in any way part of this prospectus and should not be relied upon in connection with making any decision with respect to an investment in our securities. We are required to file annual, quarterly and current reports, proxy statements and other information with the SEC. You may obtain any of the documents filed by us with the SEC at no cost from the SEC’s website at <http://www.sec.gov>.

We are a “smaller reporting company” as defined in Rule 12b-2 of the Exchange Act and have elected to take advantage of certain of the scaled disclosure available for smaller reporting companies in this prospectus as well as our filings under the Exchange Act.

THE OFFERING

Common stock offered by us	Shares of our common stock having an aggregate offering price of up to \$50 million.
Common stock to be outstanding after this offering	Up to \$50 million of shares, assuming, for illustrative purposes, the sale of 3,579,098 shares at a price of \$13.97 per share, which was the closing price of our common stock on the Nasdaq Capital Market on January 15, 2021. The actual number of shares issued will vary depending on the sales prices under this offering.
Plan of Distribution	“At the market offering” that may be made from time to time through the Agents. See “Plan of Distribution” on page S-14.
Use of Proceeds	We currently intend to use the net proceeds from the sale of the securities offered hereby for operating costs, research and development and for general corporate purposes, including working capital. We may also use a portion of the net proceeds to invest in or acquire businesses or technologies that we believe are complementary to our own, although we have no current plans, commitments or agreements with respect to any acquisitions as of the date of this prospectus. See “Use of Proceeds” on page S-10 of this prospectus.
Risk Factors	Investing in our common stock involves a high degree of risk. Please read the information contained in and incorporated by reference under the heading “Risk Factors” on page S-6 of this prospectus supplement, and under similar headings in the other documents that are filed after the date hereof and incorporated by reference into this prospectus supplement.
The Nasdaq Capital Market symbol	ONVO

The number of shares of common stock that will be outstanding after this offering as shown above is based on 6,732,090 shares of common stock outstanding as of September 30, 2020 and excludes the following, all as of September 30, 2020:

- 842,255 shares of common stock issuable upon the vesting and exercise of stock options outstanding at a weighted average exercise price of approximately \$22.96 per share;
- 1,739 shares of common stock issuable upon the vesting and settlement of outstanding restricted stock units;
- 12,229 shares of common stock issuable upon the vesting and settlement of outstanding performance-based restricted stock units;
- 251,026 shares of common stock available for issuance pursuant to the Organovo Holdings, Inc. Amended and Restated 2012 Equity Incentive Plan (the “2012 Equity Incentive Plan”); and
- 59,435 shares of common stock available for issuance pursuant to the Organovo Holdings, Inc. 2016 Employee Stock Purchase Plan (the “2016 Employee Stock Purchase Plan”).

Unless otherwise indicated, all information in this prospectus assumes no exercise of outstanding stock options or the issuance of shares of common stock pursuant to vesting and settlement of restricted stock units after September 30, 2020.

RISK FACTORS

An investment in our common stock involves a high degree of risk. You should carefully consider the risks described under “Risk Factors” in our most recent Annual Report on Form 10-K and Quarterly Reports on Form 10-Q, as updated by our subsequent filings under the Exchange Act, and all of the other information contained in this prospectus supplement and the accompanying prospectus, and incorporated by reference into this prospectus supplement and the accompanying prospectus, including our financial statements and related notes, before investing in our common stock. If any of the possible events described below or in those sections actually occur, our business, business prospects, cash flow, results of operations or financial condition could be harmed, the trading price of our common stock could decline, and you might lose all or part of your investment in our common stock. Additional risks and uncertainties not presently known to us or that we currently deem immaterial may also impair our operations and results.

Risks Related to this Offering of our Common Stock

Resales of our common stock in the public market during this offering by our stockholders may cause the market price of our common stock to fall.

We may issue common stock from time to time in connection with this offering. This issuance from time to time of these new shares of our common stock, or our ability to issue these shares of common stock in this offering, could result in resales of our common stock by our current stockholders concerned about the potential dilution of their holdings. In turn, these resales could have the effect of depressing the market price for our common stock.

Our common stock prices may be volatile which could cause the value of our common stock to decline.

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, including new product and service offerings;
- regulatory actions regarding our products or services;
- 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;
- degree of coverage of securities analysts and reports and recommendations issued by securities analysts regarding our business;
- volume fluctuations in the trading of our common stock; 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.

Our common stock is subject to trading risks created by the influence of third party investor websites.

Our common stock is widely traded and held by retail investors, and these investors are subject to the influence of information provided by third party investor websites and independent authors distributing information on the internet. This information has become influential because it is widely distributed and links to it appear as top company headlines on commonly used stock quote and finance websites, or through services such as Google alerts. These emerging information distribution models are a consequence of the emergence of the internet. Some information and content distribution is by individuals through platforms that mainly serve as hosts seeking advertising revenue. As such, we believe an incentive exists for these sites to increase advertising revenue by increasing page views, and for them to post or allow to be posted inflammatory information to achieve this end. It has been our experience that a significant portion of the information on these websites or distributed by independent authors about our Company is false or misleading, and occasionally, we believe, purposefully misleading. These sites and internet distribution strategies also create opportunity for individuals to pursue both “pump and dump” and “short and distort” strategies. We believe that many of these websites have little or no requirements for authors to have professional qualifications. While these sites sometimes require disclosure of stock positions by authors, as far as we are aware these sites do not audit the accuracy of such conflict of interest disclosures. We believe that many of these websites have few or lax editorial standards, and thin or non-existent editorial staffs. Despite our best efforts, we have not and may not be able in the future to obtain corrections to information provided on these websites about our Company, including both positive and negative information, and any corrections that are obtained may not be achieved prior to the majority of audience impressions being formed for a given article. These conditions create volatility and risk for holders of our common stock and should be considered by investors. We can make no guarantees that regulatory authorities will take action on these types of activities, and we cannot guarantee that legislators will act responsively, or ever act at all, to appropriately restrict the activities of these websites and authors.

You will experience immediate and substantial dilution.

The offering price per share in this offering may exceed the net tangible book value per share of our common stock outstanding prior to this offering. For illustrative purposes only, assuming that an aggregate of \$50 million of shares of our common stock are sold at the assumed offering price of \$13.97 per share (the last reported sale price of our common stock on the Nasdaq Capital Market on January 15, 2021), and after deducting commissions and estimated aggregate offering expenses payable by us, you will experience immediate dilution of \$7.62 per share, representing the difference between our as adjusted net tangible book value per share as of September 30, 2020 after giving effect to this offering and the assumed offering price. In addition, we are not restricted from issuing additional securities in the future, including shares of common stock, securities that are convertible into or exchangeable for, or that represent the right to receive, common stock or substantially similar securities. The issuance of these securities may cause further dilution to our stockholders. The exercise of outstanding stock options and the vesting of outstanding restricted stock units may also result in further dilution of your investment. See the section entitled “Dilution” on page S-12 below for a more detailed illustration of the dilution you may incur if you participate in this offering.

Our management will have broad discretion over the actual amounts and timing of the expenditures of the proceeds we receive in this offering and might not apply the proceeds in ways that enhance our operating results or increase the value of your investment.

Our management will have broad discretion as to the actual amounts and timing of the expenditures of the net proceeds from this offering, and you will be relying on the judgment of our management regarding the application of these proceeds. Our management might not apply the net proceeds of this offering in ways that enhance our operating results or increase the value of your investment. Additionally, until the net proceeds we receive are used, they may be placed in investments that do not produce income or that lose value.

The actual number of shares we will issue under the Sales Agreement with the Agents, and the prices at which the shares are sold, at any one time or in total, is uncertain.

Subject to certain limitations in the Sales Agreement with the Agents and compliance with applicable law, we have the discretion to deliver placement notices to the Agents at any time throughout the term of the Sales Agreements. The number of shares that are sold by the Agents after delivering a placement notice, and the prices at which shares are sold, will fluctuate based on the market price of the common stock during the sales period and limits we set with the Agents.

Certain anti-takeover defenses and applicable law may limit the ability of a third party to acquire control of us.

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;
- provide that each director may be removed by the stockholders only for cause;
- 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 have elected to be subject to Section 203 of the General Corporation Law of the State of Delaware (the “DGCL”) by provision of our charter. In general, Section 203 of the DGCL prevents an “interested stockholder” (as defined in the DGCL) from engaging in a “business combination” (as defined in the DGCL) with us for three years following the date that person becomes an interested stockholder unless one or more of the following occurs:

- Before that person became an interested stockholder, our Board of Directors approved the transaction in which the interested stockholder became an interested stockholder or approved the business combination;
- Upon consummation of the transaction that resulted in the interested stockholder becoming an interested stockholder, the interested stockholder owned at least 85% of our voting stock outstanding at the time the transaction commenced, excluding for purposes of determining the voting stock outstanding (but not the outstanding voting stock owned by the interested stockholder) stock held by directors who are also officers of our Company and by employee stock plans that do not provide employees with the right to determine confidentially whether shares held under the plan will be tendered in a tender or exchange offer; or
- Following the transaction in which that person became an interested stockholder, the business combination is approved by our Board of Directors and authorized at a meeting of stockholders by the affirmative vote of the holders of at least 66 2/3% of our outstanding voting stock not owned by the interested stockholder.

The DGCL generally defines “interested stockholder” as any person who, together with affiliates and associates, is the owner of 15% or more of our outstanding voting stock or is our affiliate or associate and was the owner of 15% or more of our outstanding voting stock at any time within the three-year period immediately before the date of determination. As a result, our election to be subject to Section 203 of the DGCL could limit the ability of a third party to acquire control of us.

We do not intend to pay dividends on our common stock 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.

Future sales of our common stock, or preferred stock, or of other securities convertible into our common stock or preferred stock, could cause the market value of our common stock to decline and could result in dilution of your shares.

We are authorized to issue 200,000,000 shares of common stock and 25,000,000 shares of preferred stock. As of September 30, 2020, there were an aggregate of 7,898,774 shares of our common stock issued and outstanding on a fully diluted basis and no shares of preferred stock outstanding. That total for our common stock includes 1,107,249 shares of our common stock that may be issued upon the exercise of outstanding stock options or upon the settlement of outstanding restricted stock units or is available for issuance under our equity incentive plans and 59,435 shares of common stock that may be issued through our Employee Stock Purchase Plan (“ESPP”).

In the future, we may issue additional authorized but previously unissued equity securities to raise funds to support our continued operations and to implement our business plan. We may also issue additional shares of our capital stock or other securities that are convertible into or exercisable for our capital stock in connection with hiring or retaining employees, future acquisitions, or for other business purposes. If we raise additional funds from the issuance of equity securities, substantial dilution to our existing stockholders may result. In addition, the future issuance of any such additional shares of capital 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 Nasdaq Capital Market. Moreover, depending on market conditions, we cannot be sure that additional financing will be available when needed or that, if available, financing will be obtained on terms favorable to us or to our stockholders.

Additional funds may not be available when we need them on terms that are acceptable to us, or at all. If adequate funds are not available to us on a timely basis, we may be required to curtail or cease our operations.

Given our failure to obtain stockholder approval for the proposed merger with Tarveda Therapeutics, Inc., raising additional funding through debt or equity financing will be difficult or not successful at all, would be dilutive and may cause the market price of our common stock to decline further. Raising additional funding through debt or equity financing is likely to be difficult or unavailable altogether given the early stage of our therapeutic candidates. Furthermore, the issuance of additional securities, whether equity or debt, by us, or the possibility of such issuance, may cause the market price of our common stock to decline further and existing stockholders may not agree with our financing plans or the terms of such financings.

USE OF PROCEEDS

We will retain broad discretion over the use of the net proceeds from the sale of our securities offered hereby. Except as described in any free writing prospectus that we may authorize to be provided to you, we currently intend to use the net proceeds from the sale of the securities offered hereby for operating costs, research and development and for general corporate purposes, including working capital. We may also use a portion of the net proceeds to invest in or acquire businesses or technologies that we believe are complementary to our own, although we have no current plans, commitments or agreements with respect to any acquisitions as of the date of this prospectus supplement.

The timing and amount of our actual expenditures will be based on many factors, including cash flows from operations and the anticipated growth of our business. As a result, our management will have broad discretion to allocate the net proceeds of the offerings. Pending their ultimate use, we intend to invest the net proceeds in short-term, investment-grade, interest-bearing instruments.

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.

DILUTION

If you invest in this offering, your ownership interest will be diluted to the extent of the difference between the public offering price per share and the as adjusted net tangible book value per share after giving effect to this offering. We calculate net tangible book value per share by dividing the net tangible book value, which is tangible assets less total liabilities, by the number of outstanding shares of our common stock. Dilution represents the difference between the portion of the amount per share paid by purchasers of shares in this offering and the as adjusted net tangible book value per share of our common stock immediately after giving effect to this offering. Our net tangible book value as of September 30, 2020 was approximately \$17.039 million, or \$2.53 per share.

For illustrative purposes, after giving effect to the sale of our common stock during the term of the Sales Agreement with the Agents in the aggregate amount of \$50 million at an assumed offering price of \$13.97 per share, the last reported sale price of our common stock on the Nasdaq Capital Market on January 15, 2021, and after deducting commissions and estimated aggregate offering expenses payable by us, our net tangible book value as of September 30, 2020 would have been approximately \$65.4 million, or approximately \$6.35 per share of common stock. This represents an immediate increase in the net tangible book value of approximately \$3.82 per share to our existing stockholders and an immediate dilution in net tangible book value of approximately \$7.62 per share to new investors.

Assumed public offering price per share	\$13.97
Net tangible book value per share as September 30, 2020	\$2.53
Increase per share attributable to investors purchasing our common stock in this offering	\$3.82
As adjusted net tangible book value per share as of September 30, 2020, after giving effect to this offering	\$ 6.35
Dilution in net tangible book value per share to investors purchasing our common stock in this offering	\$ 7.62

* Per share numbers may not add due to rounding

The table above assumes for illustrative purposes that an aggregate of 3,579,098 shares of our common stock are sold during the term of the Sales Agreement with the Agents at a price of \$13.97 per share, the last reported sale price of our common stock on the Nasdaq Capital Market on January 15, 2021, for aggregate gross proceeds of \$50 million. The shares sold in this offering, if any, will be sold from time to time at various prices. An increase of \$1.00 per share in the price at which the shares are sold from the assumed offering price of \$13.97 per share shown in the table above, assuming all of our common stock in the aggregate amount of \$50 million is sold at that price, would increase our adjusted net tangible book value per share after the offering from \$6.35 per share to \$6.50 per share and would increase the dilution in net tangible book value per share to new investors in this offering to \$8.47 per share, after deducting commissions and estimated offering expenses payable by us. A decrease of \$1.00 per share in the price at which the shares are sold from the assumed offering price of \$13.97 per share shown in the table above, assuming all of our common stock in the gross aggregate amount of \$50 million is sold at that price, would decrease our adjusted net tangible book value per share after the offering from \$6.35 per share to \$6.18 per share and would decrease the dilution in net tangible book value per share to new investors in this offering to \$6.79 per share, after deducting commissions and estimated offering expenses payable by us. This information is supplied for illustrative purposes only.

The information and table above are based on based on 6,732,090 shares of common stock outstanding as of September 30, 2020 and excludes the following, all as of September 30, 2020.

- 842,255 shares of common stock issuable upon the vesting and exercise of stock options outstanding at a weighted average exercise price of approximately \$22.96 per share;
- 1,739 shares of common stock issuable upon the vesting and settlement of outstanding restricted stock units;

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- 12,229 shares of common stock issuable upon the vesting and settlement of outstanding performance-based restricted stock units;
 - 251,026 shares of common stock available for issuance pursuant to the Organovo Holdings, Inc. Amended and Restated 2012 Equity Incentive Plan (the “2012 Equity Incentive Plan”); and
 - 59,435 shares of common stock available for issuance pursuant to the Organovo Holdings, Inc. 2016 Employee Stock Purchase Plan (the “2016 Employee Stock Purchase Plan”).

In addition, subsequent to September 30, 2020, we effected certain issuances and actions that are not reflected in the information above, including the issuance and sale of 379,655 shares of our common stock pursuant to the Sales Agreement with the Agents, at a weighted average price of \$8.4988 per share.

To the extent options, restricted units or warrants outstanding as of September 30, 2020 are additionally exercised or settled or other shares are 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.

PLAN OF DISTRIBUTION

We have entered into a Sales Agreement (the “Sales Agreement”) with H.C. Wainwright & Co., LLC and JonesTrading Institutional Services LLC (each an “Agent” and together, the “Agents”) under which we may offer and sell shares of our common stock from time to time through the Agents. The Sales Agreement has been filed as an exhibit to a Current Report on Form 8-K and incorporated by reference into this prospectus.

Upon delivery of a placement notice and subject to the terms and conditions of the Sales Agreement, the Agents may sell shares of our common stock, if any, under this prospectus, may be made in sales deemed to be an “at the market offering” as defined in Rule 415(a)(4) promulgated under the Securities Act. We or the Agents may suspend the offering of our common stock upon notice and subject to other conditions.

We will pay the Agents commissions, in cash, for their services in acting as agents in the sale of our common stock. The Agents will be entitled to compensation under the terms of the Sales Agreements at a commission rate of up to 3.0% of the gross sales price per share sold. Because there is no minimum offering amount required as a condition to close this offering, the actual total public offering amount, commissions and proceeds to us, if any, are not determinable at this time. We also previously reimbursed each of the Agents for certain specified expenses, including \$50,000 in fees and disbursements of their legal counsel. We estimate that the total expenses for the offering, excluding compensation and reimbursements payable to the Agents under the terms of the Sales Agreement, will be approximately \$100,000.

Settlement for sales of common stock will occur on the second business day following the date on which any sales are made, or on some other date that is agreed upon by us and the applicable Agent in connection with a particular transaction or as otherwise required by law, in return for payment of the net proceeds to us. Sales of our common stock as contemplated in this prospectus will be settled through the facilities of The Depository Trust Company or by such other means as we and the Agents may agree upon. There is no arrangement for funds to be received in an escrow, trust or similar arrangement.

The Agents will use their respective commercially reasonable efforts, consistent with their respective sales and trading practices, to solicit offers to purchase the common stock shares under the terms and subject to the conditions set forth in the Sales Agreement. In connection with the sale of the common stock on our behalf, each Agent will be deemed to be an “underwriter” within the meaning of the Securities Act and the compensation of the Agents will be deemed to be underwriting commissions or discounts. We have agreed to provide indemnification and contribution to the Agents against certain civil liabilities, including liabilities under the Securities Act.

The offering of our common stock pursuant to the Sales Agreement will terminate upon the termination of the Sales Agreement as permitted therein. We and the Agents may each terminate the Sales Agreement at any time upon five days’ prior notice.

The Agents and their respective affiliates may in the future provide various investment banking, commercial banking and other financial services for us and our affiliates, for which services they may in the future receive customary fees. To the extent required by Regulation M, the Agents will not engage in any market making activities involving our common stock while the offering is ongoing under this prospectus.

This prospectus in electronic format may be made available on websites maintained by the respective Agents, and the Agents may distribute this prospectus electronically.

LEGAL MATTERS

The validity of the shares of common stock being offered by this prospectus will be passed upon for us by Paul Hastings LLP, Palo Alto, California. H.C. Wainwright & Co., LLC and JonesTrading Institutional Services LLC are being represented in connection with this offering by Duane Morris LLP, New York, New York.

EXPERTS

Mayer Hoffman McCann P.C., independent registered public accounting firm, has audited Organovo's consolidated financial statements included in its Annual Report on Form 10-K as of March 31, 2020 and 2019 and for the two years in the period ended March 31, 2020, as set forth in their report, which includes an explanatory paragraph related to the change in the method of accounting for leases and is incorporated by reference in this prospectus and in the registration statement. Our financial statements are incorporated by reference in reliance upon the report of Mayer Hoffman McCann P.C., upon the authority of said firm as experts in accounting and auditing, in giving said report.

WHERE YOU CAN FIND MORE INFORMATION

We are a reporting company and file annual, quarterly and current reports, proxy statements and other information with the Securities and Exchange Commission (the "SEC"). We have filed with the SEC a registration statement on [Form S-3](#) under the Securities Act with respect to the securities being offered under this prospectus. This prospectus does not contain all of the information set forth in the registration statement and the exhibits to the registration statement. For further information with respect to us and the securities being offered under this prospectus, we refer you to the registration statement and the exhibits and schedules filed as a part of the registration statement. The SEC maintains an Internet site that contains reports, proxy and information statements, and other information regarding issuers that file electronically with the SEC, including Organovo Holdings, Inc. The SEC's Internet site can be found at <http://www.sec.gov>.

INCORPORATION OF DOCUMENTS BY REFERENCE

The SEC allows us to “incorporate by reference” information into this prospectus, which means that we can disclose important information to you by referring you to another document filed separately with the SEC. The documents incorporated by reference into this prospectus contain important information that you should read about us.

The following documents are incorporated by reference into this prospectus:

- Our Annual Report on [Form 10-K](#) for the fiscal year ended March 31, 2020, filed with the SEC on May 28, 2020;
- Our Annual Report on [Form 10-K/A](#) for the fiscal year ended March 31, 2020, filed with the SEC on July 29, 2020;
- Our Quarterly Report on [Form 10-Q](#) for the quarterly period ended June 30, 2020, filed with the SEC on August 10, 2020;
- Our Quarterly Report on [Form 10-Q](#) for the quarterly period ended September 30, 2020, filed with the SEC on November 5, 2020;
- the information specifically incorporated by reference into our Annual Report on Form 10-K for the fiscal year ended March 31, 2020 from our definitive proxy statement on [Schedule 14A](#), filed with the SEC on August 6, 2020;
- Our Current Reports on Form 8-K filed with the SEC on [April 1, 2020](#), [April 8, 2020](#), [May 20, 2020](#), [July 15, 2020](#), [August 17, 2020](#), [September 3, 2020](#), [September 17, 2020](#), [November 25, 2020](#), and [December 31, 2020](#);
- Our Current Report on Form 8-K/A filed with the SEC on [September 21, 2020](#); and
- The description of our common stock set forth in our Registration Statement on [Form 8-A](#) (File No. 001-35996), filed with the SEC on July 26, 2016, including any amendments or reports filed for the purpose of updating such description.

We also incorporate by reference any future filings (other than current reports furnished under Item 2.02 or Item 7.01 of Form 8-K and exhibits filed on such form that are related to such items unless such Form 8-K expressly provides to the contrary) made with the SEC pursuant to Sections 13(a), 13(c), 14 or 15(d) of the Exchange Act, including those made after the date of the initial filing of the registration statement of which this prospectus is a part and prior to effectiveness of such registration statement, until we file a post-effective amendment that indicates the termination of the offering of the securities made by this prospectus and such future filings and will become a part of this prospectus from the respective dates that such documents are filed with the SEC. Any statement contained herein or in a document incorporated or deemed to be incorporated by reference herein shall be deemed to be modified or superseded for purposes hereof or of the related prospectus supplement to the extent that a statement contained herein or in any other subsequently filed document which is also incorporated or deemed to be incorporated by reference herein modifies or supersedes such statement. Any such statement so modified or superseded shall not be deemed, except as so modified or superseded, to constitute a part of this prospectus.

Documents incorporated by reference are available from us, without charge. You may obtain documents incorporated by reference in this prospectus by requesting them in writing or by telephone at the following address:

Organovo Holdings, Inc.
440 Stevens Ave, Suite 200
Solana Beach, CA 92075
Attn: Corporate Secretary
Phone: (858) 224-1000



Up to \$50,000,000

Common Stock

PROSPECTUS

H.C. Wainwright & Co.

JonesTrading

January 29, 2021
