

PROSPECTUS

13,876,032 Shares



Common Stock

This prospectus relates to the proposed resale from time to time by the selling stockholders named herein, together with any additional selling stockholders listed in a prospectus supplement (together with any of such stockholders' donees, pledgees, transferees or other successors-in-interest), of up to an aggregate of 13,876,032 shares of our common stock, par value \$0.0001 per share, or the Shares, held by the selling stockholders, all of which were issued by us at the closing of a private placement on December 18, 2025, or the Private Placement.

We are registering the offer and sale of the Shares from time to time by the selling stockholders to satisfy the registration rights they were granted in connection with the Private Placement. We will not receive any proceeds from the sale of the Shares by the selling stockholders. The selling stockholders may offer and sell or otherwise dispose of the Shares described in this prospectus from time to time through public or private transactions at prevailing market prices, at prices related to prevailing market prices or at privately negotiated prices. The selling stockholders will bear all underwriting fees, commissions and discounts, if any, attributable to the sales of Shares and any transfer taxes. We will bear all other costs, expenses and fees in connection with the registration of the Shares. SEE THE SECTION TITLED "PLAN OF DISTRIBUTION" ON PAGE 11 FOR MORE INFORMATION ABOUT HOW THE SELLING STOCKHOLDERS MAY SELL OR DISPOSE OF THEIR SHARES.

Our common stock is listed on The Nasdaq Global Select Market under the trading symbol "VOR." On February 4, 2026, the closing price of our common stock was \$12.40 per share.

Investing in shares of our common stock involves a high degree of risk. You should review carefully the risks and uncertainties described in the section titled "[Risk Factors](#)" on page 5 of this prospectus and any similar section contained in the applicable prospectus supplement and in any free writing prospectuses we have authorized for use in connection with a specific offering, 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 determined if this prospectus is truthful or complete. Any representation to the contrary is a criminal offense.

The date of this prospectus is February 4, 2026.

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ABOUT THIS PROSPECTUS

This prospectus is part of a registration statement on Form S-3 that we filed with the Securities and Exchange Commission, or the SEC, using a “shelf” registration process. Under this shelf process, the selling stockholders may from time to time sell the shares of common stock described in this prospectus in one or more offerings or otherwise as described under “Plan of Distribution.”

This prospectus may be supplemented from time to time by one or more prospectus supplements. Such prospectus supplement may also add, update or change information contained in this prospectus. If there is any inconsistency between the information in this prospectus and the applicable prospectus supplement, you must rely on the information in the prospectus supplement. You should carefully read both this prospectus and any applicable prospectus supplement together with additional information described under the heading “Where You Can Find Additional Information” before deciding to invest in any shares being offered.

Neither we nor the selling stockholders have authorized anyone to provide any information other than that contained or incorporated by reference in this prospectus or in any related prospectus supplement or any free writing prospectus that we have authorized. We take no responsibility for, and can provide no assurance as to the reliability of, any other information that others may give you. The shares are not being offered in any jurisdiction where the offer is not permitted. You should not assume that the information contained in or incorporated by reference in this prospectus is accurate as of any date other than the respective dates of such document. Our business, financial condition, results of operations and prospects may have changed since those dates.

Unless otherwise stated, all references in this prospectus to “Vor,” “Vor Biopharma,” “Vor Bio,” “we,” “us,” and “our” and similar designations, except where the context requires otherwise, refer collectively to Vor Biopharma Inc. and its consolidated subsidiary.

PROSPECTUS SUMMARY

This summary highlights selected information contained elsewhere in this prospectus and in the documents we incorporate by reference. This summary does not contain all of the information you should consider before investing in our common stock. You should read this entire prospectus carefully, especially the risks of investing in our common stock discussed in the section titled “Risk Factors” and under similar headings in our filings with the SEC which are incorporated by reference in this prospectus, along with our consolidated financial statements and notes to those consolidated financial statements and the other information incorporated by reference in this prospectus, before making an investment decision.

Company Overview

We are a clinical-stage biopharmaceutical company focused on developing a novel therapy in the treatment of autoimmune diseases. In June 2025, we in-licensed telitacicept from RemeGen Co., Ltd., or RemeGen. Telitacicept is approved in China for the treatment of generalized myasthenia gravis, or gMG, systemic lupus erythematosus and rheumatoid arthritis. RemeGen has also filed Biologics License Applications in China for the treatment of Sjögren’s disease and IgA nephropathy.

Telitacicept is a novel fusion protein for treating autoimmune diseases. It is constructed with the extracellular domain of the human transmembrane activator and calcium modulator and cyclophilin ligand interactor receptor and the fragment crystallizable domain of human immunoglobulin G. Telitacicept targets and acts on two cell signaling molecules critical for B lymphocyte development: B cell lymphocyte stimulator, also known as B cell activating factor, or BAFF, and a proliferation inducing ligand, or APRIL, which allows it to effectively reduce B cell mediated autoimmune responses that are implicated in several autoimmune diseases.

Pursuant to our license agreement with RemeGen, we were granted an exclusive license to develop and commercialize telitacicept outside of the Greater China region, which includes mainland China, Hong Kong, Macau and Taiwan. RemeGen retains development and commercialization rights in Greater China.

Telitacicept is currently being evaluated in a global Phase 3 clinical trial, for which we have assumed responsibility from RemeGen in connection with the license agreement, for the treatment of gMG. The trial is currently recruiting patients in North America, Europe, Latin America, and Asia to support potential approval in the United States, Europe, Japan and other countries. In July 2024, the clinical trial enrolled a patient in the United States, the first in the global clinical trial.

Our broader development plan includes exploring development of telitacicept in additional autoantibody-driven diseases where BAFF / APRIL signaling is a validated target, supported by prior clinical experience and mechanistic rationale. This includes Sjögren’s disease, one of the most common systemic autoimmune diseases globally. There are no approved disease-modifying systemic therapies for the treatment of Sjögren’s disease.

The Private Placement

On December 15, 2025, we entered into a securities purchase agreement with accredited investors, or the Investors, pursuant to which we, in a private placement, agreed to issue and sell to the Investors an aggregate of 13,876,032 shares of our common stock at a price per share of \$10.81, for gross proceeds of \$150 million. The closing of the Private Placement occurred on December 18, 2025.

The Registration Rights Agreement

In connection with the Private Placement, we also entered into a registration rights agreement, dated December 15, 2025, or the Registration Rights Agreement, with the Investors. Pursuant to the terms of the Registration Rights Agreement, we agreed to file a registration statement to register for resale the Shares within

45 days of the closing date of the Private Placement, and to use reasonable best efforts to have the registration statement declared effective at the earliest possible date but no later than the earlier of (a) the 75th calendar day following the initial filing date of the registration statement if the SEC notifies us that it will review the registration statement and (b) the fifth business day after the date the SEC notifies us that the registration statement will not be reviewed or be subject to further review. The registration statement of which this prospectus forms a part is being filed to satisfy the requirements of the Registration Rights Agreement.

Company Information

We were incorporated under the laws of the State of Delaware in December 2015. Our principal executive offices are located at 500 Boylston Street, Suite 1350, Boston, Massachusetts 02116. Our telephone number is (617) 655-6580. Our internet website address is www.vorbio.com. The information contained on our website is not incorporated by reference into this prospectus, and you should not consider any information contained on, or that can be accessed through, our website as part of this prospectus or in deciding whether to purchase our securities. The inclusion of our website address in this prospectus is only an inactive textual reference.

VOR BIOPHARMA, VOR BIO, VOR and our Vor Biopharma logo, and our other trademarks or service marks appearing in this prospectus, are our property. This prospectus and the information incorporated herein by reference contains additional trade names, trademarks and service marks of others, which are the property of their respective owners. Solely for convenience, the trademarks and trade names in this prospectus may be referred to without the ® and ™ symbols, but such references should not be construed as any indicator that their respective owners will not assert their rights thereto.

Implications of Being an Emerging Growth Company and a Smaller Reporting Company

We qualify as an “emerging growth company” as defined in the Jumpstart Our Business Startups Act of 2012, or the JOBS Act. For so long as we remain an emerging growth company, we may take advantage of relief from certain reporting requirements and other burdens that are otherwise applicable generally to public companies. These provisions include:

- reduced obligations with respect to financial data, including only being required to present two years of audited financial statements, in addition to any required unaudited interim financial statements with correspondingly reduced “Management’s Discussion and Analysis of Financial Condition and Results of Operations” disclosure;
- an exception from compliance with the auditor attestation requirements of Section 404 of the Sarbanes-Oxley Act of 2002, as amended;
- reduced disclosure about our executive compensation arrangements in our periodic reports, proxy statements and registration statements;
- exemptions from the requirements of holding non-binding advisory votes on executive compensation or golden parachute arrangements; and
- an exemption from compliance with the requirements of the Public Company Accounting Oversight Board regarding the communication of critical audit matters in the auditor’s report on financial statements.

We may take advantage of these provisions until we no longer qualify as an emerging growth company. We will cease to qualify as an emerging growth company on the date that is the earliest of: (i) December 31, 2026, (ii) the last day of the fiscal year in which we have more than \$1.235 billion in total annual gross revenues, (iii) the date on which we are deemed to be a “large accelerated filer” under the rules of the SEC, which means the market value of our common stock that is held by non-affiliates exceeds \$700 million as of the prior

June 30th, or (iv) the date on which we have issued more than \$1.0 billion of non-convertible debt over the prior three-year period. We may choose to take advantage of some but not all of these reduced reporting burdens. We have taken advantage of certain reduced reporting requirements in this prospectus. Accordingly, the information contained herein may be different than you might obtain from other public companies in which you hold equity interests.

In addition, under the JOBS Act, emerging growth companies can delay adopting new or revised accounting standards until such time as those standards apply to private companies. We have elected to take advantage of the extended transition period to comply with new or revised accounting standards and to adopt certain of the reduced disclosure requirements available to emerging growth companies. As a result of the accounting standards election, we will not be subject to the same implementation timing for new or revised accounting standards as other public companies that are not emerging growth companies, which may make comparison of our financials to those of other public companies more difficult. As a result of these elections, the information that we provide in this prospectus may be different than the information you may receive from other public companies in which you hold equity interests. In addition, it is possible that some investors will find our common stock less attractive as a result of these elections, which may result in a less active trading market for our common stock and higher volatility in our share price.

We are also a “smaller reporting company,” meaning that the market value of our shares held by non-affiliates is less than \$700 million and our annual revenue was less than \$100 million during the most recently completed fiscal year. We may continue to be a smaller reporting company if either (i) the market value of our shares held by non-affiliates is less than \$250 million or (ii) our annual revenue was less than \$100 million during the most recently completed fiscal year and the market value of our shares held by non-affiliates is less than \$700 million. If we are a smaller reporting company at the time we cease to be an emerging growth company, we may continue to rely on exemptions from certain disclosure requirements that are available to smaller reporting companies. Specifically, as a smaller reporting company, we may choose to present only the two most recent fiscal years of audited financial statements in our Annual Report on Form 10-K and, similar to emerging growth companies, smaller reporting companies have reduced disclosure obligations regarding executive compensation.

The Offering

Common Stock Offered by the Selling Stockholders 13,876,032 Shares.

Terms of the Offering Each selling stockholder will determine when and how it will sell the common stock offered in this prospectus, as described in “Plan of Distribution.”

Use of Proceeds We will not receive any of the proceeds from the sale of the Shares in this offering. The selling stockholders will receive all of the proceeds from the sale of the Shares hereunder.

Risk Factors An investment in our common stock involves a high degree of risk. See the information contained in or incorporated by reference in the section titled “Risk Factors” and under similar headings in the other documents that are incorporated by reference herein, as well as the other information included in or incorporated by reference in this prospectus.

Nasdaq Global Select Market Symbol Our common stock is listed on The Nasdaq Global Select Market under the symbol “VOR.”

RISK FACTORS

An investment in our common stock involves a high degree of risk. Prior to making a decision about investing in our common stock, you should consider carefully the specific risk factors discussed in the sections titled “Risk Factors” contained in our most recent Annual Report on Form 10-K and in our subsequently filed Quarterly Reports on Form 10-Q, as well as any amendments thereto reflected in subsequent filings with the SEC, which are incorporated by reference into this prospectus in their entirety, together with other information in this prospectus, the documents incorporated by reference, any prospectus supplement and any free writing prospectus that we may authorize. These risks and uncertainties are not the only risks and uncertainties we face. Additional risks and uncertainties not presently known to us, or that we currently view as immaterial, may also impair our business. If any of the risks or uncertainties described in our SEC filings or any additional risks and uncertainties actually occur, our business, financial condition, results of operations and cash flow could be materially and adversely affected. In that case, the trading price of our common stock could decline and you might lose all or part of your investment.

Risks Related to the Ownership of Our Common Stock

A substantial number of shares of our common stock may be sold in the market following the effective date of the registration statement of which this prospectus forms a part, which may depress the market price for our common stock.

Sales of a substantial number of shares of our common stock in the public market following the effective date of the registration statement of which this prospectus forms a part could cause the market price of our common stock to decline. A substantial majority of our outstanding common stock is freely tradable without restriction or further registration required under the Securities Act of 1933, as amended, or the Securities Act.

SPECIAL NOTE REGARDING FORWARD-LOOKING STATEMENTS

This prospectus and the documents we have filed with the SEC that are incorporated by reference contain “forward-looking statements” within the meaning of Section 27A of the Securities Act of 1933 and the Securities Exchange Act of 1934, as amended, or the Exchange Act. These statements relate to future events or to our future operating or financial performance and involve known and unknown risks, uncertainties and other factors which may cause our actual results, performance or achievements to be materially different from any future results, performances or achievements expressed or implied by the forward-looking statements. Forward-looking statements may include, but are not limited to, statements about:

- the timing, progress and results of our clinical trials of our product candidate and preclinical and clinical trials for any future products candidates, including statements regarding the timing and pace of initiation, enrollment and completion of studies or trials and related preparatory work, the period during which the results of the trials will become available and plans with respect to our research and development programs;
- the timing of any submission of filings for regulatory approval of, and our ability to obtain and maintain regulatory approvals for, our product candidate and any future product candidates for any indication;
- our ability to identify patients with the diseases treated by our product candidate and any future product candidates, and to enroll patients in clinical trials;
- our expectations regarding the market acceptance and opportunity for and clinical utility of our product candidate and any future product candidates, if approved for commercial use;
- our expectations regarding the scope of any approved indication for any product candidate;
- our ability to successfully commercialize our product candidate or any future product candidates;
- our estimates of our expenses, ongoing losses, future revenue and capital requirements and our need for or ability to obtain additional funding;
- our ability to establish or maintain collaborations or strategic relationships;
- our ability to identify, recruit and retain key personnel, including executive officers and members of management;
- our reliance upon intellectual property licensed from third parties and our ability to obtain such licenses on commercially reasonable terms or at all;
- our ability to protect and enforce our intellectual property position for our product candidate or any future product candidates, and the scope of such protection;
- our financial performance;
- the period over which we estimate our existing cash, cash equivalents and marketable securities will be sufficient to fund our future operating expenses and capital expenditure requirements;
- our competitive position and the development of and projections relating to our competition or our industry;
- the impact of laws and regulations; and
- our expectations regarding the time during which we will be an emerging growth company under the JOBS Act.

We may not actually achieve the plans, intentions or expectations disclosed in our forward-looking statements, and you should not place undue reliance on our forward-looking statements. Actual results or events could differ materially from the plans, intentions and expectations disclosed in the forward-looking statements

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we make. We have included important factors in the cautionary statements included in this prospectus, particularly in the section titled “Risk Factors,” that we believe could cause actual results or events to differ materially from the forward-looking statements that we make. Our forward-looking statements do not reflect the potential impact of any future acquisitions, mergers, dispositions, joint ventures or investments we may make.

You should read this prospectus, together with the documents we have filed with the SEC that are incorporated by reference, any prospectus supplement and any free writing prospectus that we may authorize 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.

USE OF PROCEEDS

We will not receive any of the proceeds from the sale of the Shares in this offering. The selling stockholders will receive all of the proceeds from the sale of the Shares hereunder.

We will bear the out-of-pocket costs, expenses and fees incurred in connection with the registration of the Shares to be sold by the selling stockholders pursuant to this prospectus. Other than registration expenses, the selling stockholders will bear their own broker or similar commissions payable with respect to sales of the Shares.

SELLING STOCKHOLDERS

The shares of common stock being offered by the selling stockholders consist of the Shares issued to the Investors in the Private Placement. For additional information regarding the issuance of the Shares, see the section “Prospectus Summary—The Private Placement” above. We are registering the resale of the Shares in order to satisfy certain registration obligations that we granted the Investors in connection with the Registration Rights Agreement.

Beneficial ownership is determined in accordance with the rules of the SEC and includes voting or investment power with respect to our common stock. Generally, a person “beneficially owns” shares of our common stock if the person has or shares with others the right to vote those shares or to dispose of them, or if the person has the right to acquire voting or disposition rights within 60 days.

The table below lists the selling stockholders and other information regarding the beneficial ownership of the shares of common stock by each of the selling stockholders. This information has been obtained from the selling stockholders or in Schedules 13G or 13D and other public documents filed with the SEC. The second column lists the number of shares of common stock beneficially owned by each selling stockholder as of January 26, 2026. The third, fourth and fifth columns assume the sale of all of the shares offered by the selling stockholders pursuant to this prospectus. The percentage of shares beneficially owned after the offering in the fifth column is based on 41,519,840 shares of common stock outstanding as of January 26, 2026. The selling stockholders may sell all, some or none of their shares in this offering. See the section “Plan of Distribution.”

Pursuant to the Purchase Agreement with the Investors in the Private Placement, we agreed to appoint one individual designated by ForGrowth III PA B.V., or Forbion, and such designated appointee, the Forbion Appointed Director, to our board of directors, or the Board, as a Class III director, subject to approval by the Board upon the recommendation of the nominating & corporate governance committee of the Board, or the Nominating Committee, for so long as Forbion, together with its Affiliates (as such term is defined in Rule 13d-3 of the Exchange Act) continues to beneficially own at least 4.99% or more of our then issued and outstanding common stock. On December 18, 2025, the Board, upon recommendation of the Nominating Committee, appointed Wouter Joustra to the Board as the Forbion Appointed Director. Mr. Joustra is a General Partner at Forbion.

Pursuant to a securities purchase agreement we entered into with certain qualified institutional buyers on December 26, 2024, including RA Capital Healthcare Fund, L.P., or RACHF, we agreed to appoint one individual designated by RACHF, or the RA Capital Appointed Director, to the Board as a Class II director, subject to approval by the Board upon the recommendation of the Nominating Committee, for so long as RACHF, together with its Affiliates (as such term is defined in Rule 13d-3 of the Exchange Act) continues to beneficially own at least 4.99% or more of our then issued and outstanding common stock. Joshua Resnick, M.D., a member of the Board from February 2019 to August 2025, is a managing director at RA Capital Management, L.P., an affiliate of RACHF, and served as the initial RA Capital Appointed Director. Dr. Resnick resigned as a director on August 25, 2025, and on August 27, 2025, the Board appointed Sarah Reed to the Board as the RA Capital Appointed Director. Ms. Reed is the general counsel of RA Capital Management, L.P. Ms. Reed resigned as a director on December 17, 2025, and on December 18, 2025, the Board appointed Andrew Levin to the Board as the RA Capital Appointed Director. Mr. Levin is a Partner on the Investment Team at RA Capital Management, L.P.

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Except as otherwise disclosed herein, the selling stockholders do not have, and within the past three years have not had, any position, office or other material relationship with us.

Name of Selling Stockholder	Shares of Common Stock Beneficially Owned Prior to This Offering	Number of Shares Being Offered in This Offering	Beneficial Ownership After This Offering	
			Number of Shares	Percent of Shares
RA Capital Healthcare Fund, L.P. ⁽¹⁾	5,411,688	4,625,346	4,520,915	9.99%
ForGrowth III PA B.V. ⁽²⁾	4,206,708	3,237,742	4,566,057	9.99%
Frazier Life Sciences XI, L.P. ⁽³⁾	21,114	21,114	—	—
Frazier Life Sciences XII, L.P. ⁽⁴⁾	264,824	264,824	—	—
Frazier Life Sciences Public Fund, L.P. ⁽⁵⁾	2,258,001	2,258,001	—	—
Silver Lion International Limited ⁽⁶⁾	925,069	925,069	—	—
Logos Global Master Fund LP ⁽⁷⁾	975,069	925,069	50,000	*
Caligan Partners LP ⁽⁸⁾	1,925,066	925,067	999,999	2.35%
Entities associated with Venrock Healthcare Capital Partners ⁽⁹⁾	4,392,456	693,800	4,469,459	9.99%

* Less than 1%

- (1) Consists of (i) 5,404,998 shares of common stock held by RACHF, including 4,625,346 Shares issued in the Private Placement, (ii) 6,190 shares of common stock issuable upon exercise of stock options held by Joshua Resnick, a former member of our board of directors, for the benefit of RA Capital Management, L.P. ("RA Capital"), (iii) 250 shares of common stock issuable upon exercise of stock options held by Sarah Reed, a former member of our board of directors, for the benefit of RA Capital and (iv) 250 shares of common stock issuable upon exercise of stock options vested or vesting within 60 days of January 26, 2026 held by Andrew Levin, a member of our board of directors, for the benefit of RA Capital. Excludes 11,056,072 shares of common stock issuable upon exercise of outstanding warrants to purchase common stock held by RACHF, which are subject to a beneficial ownership limitation that prohibits the holder from exercising such warrants to the extent that such exercise would result in the holder, together with its affiliates, beneficially owning more than 9.99% of our outstanding shares of common stock. RA Capital Healthcare Fund GP, LLC is the general partner of RACHF. The general partner of RA Capital is RA Capital Management GP, LLC, of which Dr. Peter Kolchinsky and Mr. Rajeev Shah are the controlling persons. RA Capital serves as investment adviser for RACHF and may be deemed a beneficial owner, for purposes of Section 13(d) of the Exchange Act, of any of our securities held by RACHF. RACHF has delegated to RA Capital the sole power to vote and the sole power to dispose of all securities held in RACHF's portfolio, including the shares of common stock offered hereby. Because RACHF has divested itself of voting and investment power over the reported securities it holds and may not revoke that delegation on less than 61 days' notice, RACHF disclaims beneficial ownership of the securities it holds for purposes of Section 13(d) of the Exchange Act and therefore disclaims any obligation to report ownership of such securities under Section 13(d) of the Exchange Act. As managers of RA Capital, Dr. Kolchinsky and Mr. Shah may be deemed beneficial owners, for purposes of Section 13(d) of the Exchange Act, of any of our securities beneficially owned by RA Capital. RA Capital, Dr. Kolchinsky and Mr. Shah disclaim beneficial ownership of any of our securities beneficially owned by RA Capital other than for the purpose of determining their obligations under Section 13(d) of the Exchange Act. The principal business address of the persons and entities referenced in this footnote is 200 Berkeley Street, 18th Floor, Boston, MA 02116.
- (2) Consists of (i) 3,617,354 shares of common stock held by ForGrowth III PA B.V. ("ForGrowth III"), including 3,237,742 Shares issued in the Private Placement and (ii) 589,354 shares of common stock issuable upon exercise of outstanding warrants to purchase common stock held by ForGrowth III. Excludes 6,031,006 shares of common stock issuable upon exercise of outstanding warrants to purchase common stock held by ForGrowth III, which are subject to a beneficial ownership limitation that prohibits the holder from exercising such warrants to the extent that such exercise would result in the holder, together with its

affiliates, beneficially owning more than 9.99% of our outstanding shares of common stock. Forbion Growth Opportunities Fund III Cooperatief U.A. (“Forbion Growth III COOP”), the sole shareholder of ForGrowth III, and Forbion Growth III Management B.V. (“Forbion Growth III”), as director of each of ForGrowth III and Forbion Growth III COOP, may be deemed to have voting and investment power over the securities held directly by ForGrowth III. The principal business address of each of the entities referenced in this footnote is c/o Forbion Capital Partners, Gooimeer 2-35, 1411 DC Naarden, The Netherlands.

- (3) Consists of 21,114 Shares issued in the Private Placement held by Frazier Life Sciences XI, L.P. (“FLS XI”). The general partner of FLS XI is FHMLS XI, L.P., and its general partner is FHMLS XI, L.L.C., which is managed by an investment committee of three that acts by majority vote; accordingly, no members of such committee are attributed beneficial ownership of the securities directly held by FLS XI. The business address of each of the entities referenced in this footnote is 1001 Page Mill Road, Building 4, Suite B, Palo Alto, California 94304.
- (4) Consists of 264,824 Shares issued in the Private Placement held by Frazier Life Sciences XII, L.P. (“FLS XII”). The general partner of FLS XII is FHMLS XII, L.P., and its general partner is FHMLS XII, L.L.C., which is managed by an investment committee of three that acts by majority vote; accordingly, no members of such committee are attributed beneficial ownership of the securities directly held by FLS XII. The business address of each of the entities referenced in this footnote is 1001 Page Mill Road, Building 4, Suite B, Palo Alto, California 94304.
- (5) Consists of 2,258,001 Shares issued in the Private Placement held by Frazier Life Sciences Public Fund, L.P. (“FLSPF”). The general partner of FLSPF is FHMLSP, L.P., and its general partner is FHMLSP, L.L.C., which is managed by an investment committee of four that acts by majority vote; accordingly, no members of such committee are attributed beneficial ownership of the securities directly held by FLSPF. The business address of each of the entities referenced in this footnote is 1001 Page Mill Road, Building 4, Suite B, Palo Alto, California 94304.
- (6) Consists of 925,069 Shares issued in the Private Placement held by Silver Lion International Limited (“Silver Lion”). Billy Sung is the director of Silver Lion, and as such has voting and investment power over the securities held by Silver Lion and may be deemed the beneficial owner of the securities directly held by Silver Lion. The principal business address of the entity and individual referenced in this footnote is 77FL, The Center, No. 99 Queen’s Road Central, HK.
- (7) Consists of 975,069 shares of common stock held by Logos Global Master Fund LP (“Global Fund”), including 925,069 Shares issued in the Private Placement. Logos Global Management LP (“Logos Global”) is the investment adviser to Global Fund. Logos Global Management GP LLC (“Logos Global GP”) is the general partner of Logos Global. Arsani William is a control person of Logos Global and Global GP. The address for the entities and individual referenced in this footnote is One Letterman Drive, Building C, Suite C3-350, San Francisco, California 94129.
- (8) Consists of (A)(i) 676,672 Shares issued in the Private Placement and (ii) 666,666 shares of common stock issuable upon exercise of outstanding warrants to purchase common stock held by Caligan Partners Master Fund LP (“Caligan Fund”); (B)(i) 152,342 Shares issued in the Private Placement and (ii) 233,333 shares of common stock issuable upon exercise of outstanding warrants to purchase common stock held by Caligan Partners LP (“Caligan”) as the investment manager to a managed account; (C)(i) 70,027 Shares issued in the Private Placement and (ii) 100,000 shares of common stock issuable upon exercise of outstanding warrants to purchase common stock held by Caligan as the investment manager to a separate managed account; and (D) 26,026 Shares issued in the Private Placement held by Caligan as the investment manager to a separate managed account. Caligan serves indirectly as the investment manager to Caligan Fund. David Johnson is the Managing Partner of Caligan and Managing Member of Caligan Partners GP LLC, the general partner of Caligan, and may be deemed to have voting and investment power over the securities held by Caligan and Caligan Fund. The principal business address for each of the entities and the individual referenced in this footnote is c/o Caligan Partners LP, 780 Third Avenue, 30th Floor, New York, New York 10017.
- (9) Consists of (A)(i) 1,519,036 shares of common stock, including 569,611 Shares issued in the Private Placement, and (ii) 1,294,890 shares of common stock issuable upon exercise of outstanding warrants to purchase common stock held by Venrock Healthcare Capital Partners EG, L.P. (“VHCP EG”);

(B)(i) 386,098 shares of common stock, including 112,881 Shares issued in the Private Placement, and (ii) 1,048,950 shares of common stock issuable upon exercise of outstanding warrants to purchase common stock held by Venrock Healthcare Capital Partners III, L.P. (“VHCP III”); and (C)(i) 38,632 shares of common stock, including 11,308 Shares issued in the Private Placement, and (ii) 104,850 shares of common stock issuable upon exercise of outstanding warrants to purchase common stock held by VHCP Co-Investment Holdings III, LLC (“VHCP Co-Investment III”). Excludes 2,051,310 shares of common stock issuable upon exercise of outstanding warrants to purchase common stock held by VHCP EG, which are subject to a beneficial ownership limitation that prohibits the holder from exercising such warrants to the extent that such exercise would result in the holder, together with its affiliates, beneficially owning more than 9.99% of our outstanding shares of common stock. VHCP Management III, LLC is the general partner of VHCP III and the manager of VHCP Co-Investment III. VHCP Management EG, LLC is the general partner of VHCP EG. Nimish Shah and Bong Y. Koh are the voting members of VHCP Management III, LLC and VHCP Management EG, LLC and may be deemed to share voting and investment power over the securities held directly by VHCP III, VHCP Co-Investment III and VHCP EG. The principal business address of the entities and individuals referenced in this footnote is 7 Bryant Park, 23rd Floor, New York, NY 10018.

PLAN OF DISTRIBUTION

The selling stockholders, which as used herein includes donees, pledgees, transferees or other successors-in-interest selling shares of common stock or interests in shares of common stock received after the date of this prospectus from a selling stockholder as a gift, pledge, partnership distribution or other transfer, may, from time to time, sell, transfer or otherwise dispose of any or all of their shares of common stock or interests in shares of common stock on any stock exchange, market or trading facility on which the shares are traded or in private transactions. These dispositions may be at fixed prices, at prevailing market prices at the time of sale, at prices related to the prevailing market price, at varying prices determined at the time of sale, or at negotiated prices.

The selling stockholders may use any one or more of the following methods when disposing of shares or interests therein:

- distributions to members, partners, stockholders or other equityholders of the selling stockholders;
- ordinary brokerage transactions and transactions in which the broker-dealer solicits purchasers;
- block trades in which the broker-dealer will attempt to sell the shares as agent, but may position and resell a portion of the block as principal to facilitate the transaction;
- purchases by a broker-dealer as principal and resale by the broker-dealer for its account;
- an exchange distribution in accordance with the rules of the applicable exchange;
- privately negotiated transactions;
- short sales and settlement of short sales entered into after the effective date of the registration statement of which this prospectus is a part;
- through the writing or settlement of options or other hedging transactions, whether through an options exchange or otherwise;
- through broker-dealers that agree with the selling stockholders to sell a specified number of such shares at a stipulated price per share;
- a combination of any such methods of sale; and
- any other method permitted pursuant to applicable law.

The selling stockholders may, from time to time, pledge or grant a security interest in some or all of the shares of common stock owned by them and, if they default in the performance of their secured obligations, the pledgees or secured parties may offer and sell the shares of common stock, from time to time, under this prospectus, or under an amendment to this prospectus under Rule 424(b)(3) or other applicable provision of the Securities Act, amending the list of selling stockholders to include the pledgees, transferees or other successors-in-interest as selling stockholders under this prospectus. The selling stockholders also may transfer the shares of common stock in other circumstances, in which case the donees, transferees, pledgees or other successors-in-interest will be the selling stockholders for purposes of this prospectus.

In connection with the sale of our common stock or interests therein, the selling stockholders may enter into hedging transactions with broker-dealers or other financial institutions, which may in turn engage in short sales of the common stock in the course of hedging the positions they assume. The selling stockholders may also sell shares of our common stock short and deliver these securities to close out their short positions, or loan or pledge the common stock to broker-dealers that in turn may sell these securities. The selling stockholders may also enter into option or other transactions with broker-dealers or other financial institutions or create one or more derivative securities which require the delivery to such broker-dealer or other financial institution of shares offered by this prospectus, which shares such broker-dealer or other financial institution may resell pursuant to this prospectus (as supplemented or amended to reflect such transaction).

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The aggregate proceeds to the selling stockholders from the sale of the common stock offered by them will be the purchase price of the common stock less discounts or commissions, if any. Each of the selling stockholders reserves the right to accept and, together with their agents from time to time, to reject, in whole or in part, any proposed purchase of common stock to be made directly or through agents. We will not receive any of the proceeds from this offering. The selling stockholders also may resell all or a portion of the shares in open market transactions in reliance upon Rule 144 under the Securities Act, provided that they meet the criteria and conform to the requirements of that rule, or another available exemption from the registration requirements under the Securities Act.

The selling stockholders and any underwriters, broker-dealers or agents that participate in the sale of the common stock or interests therein may be “underwriters” within the meaning of Section 2(a)(11) of the Securities Act (it being understood that the selling stockholders shall not be deemed to be underwriters solely as a result of their participation in this offering). Any discounts, commissions, concessions or profit they earn on any resale of the shares may be underwriting discounts and commissions under the Securities Act. Selling stockholders who are “underwriters” within the meaning of Section 2(a)(11) of the Securities Act will be subject to the prospectus delivery requirements of the Securities Act.

To the extent required, the shares of our common stock to be sold, the names of the selling stockholders, the respective purchase prices and public offering prices, the names of any agent, dealer or underwriter, and any applicable commissions or discounts with respect to a particular offer will be set forth in an accompanying prospectus supplement or, if appropriate, a post-effective amendment to the registration statement that includes this prospectus.

In order to comply with the securities laws of some states, if applicable, the common stock may be sold in these jurisdictions only through registered or licensed brokers or dealers. In addition, in some states the common stock may not be sold unless it has been registered or qualified for sale or an exemption from registration or qualification requirements is available and is complied with.

We have advised the selling stockholders that the anti-manipulation rules of Regulation M under the Exchange Act may apply to sales of shares in the market and to the activities of the selling stockholders and their affiliates. In addition, to the extent applicable, we will make copies of this prospectus (as it may be supplemented or amended from time to time) available to the selling stockholders for the purpose of satisfying the prospectus delivery requirements of the Securities Act. The selling stockholders may indemnify any broker-dealer that participates in transactions involving the sale of the shares against certain liabilities, including liabilities arising under the Securities Act.

We have agreed to indemnify the selling stockholders against liabilities, including liabilities under the Securities Act and state securities laws, relating to the registration of the shares offered by this prospectus.

We have agreed with the selling stockholders to use reasonable best efforts to cause the registration statement of which this prospectus constitutes a part to become effective and to remain continuously effective until the earlier of: (i) the date on which the selling stockholders shall have resold or otherwise disposed of all the shares covered by this prospectus and (ii) the date on which the shares covered by this prospectus may be resold by the selling stockholders without registration and without regard to any volume or manner-of-sale limitations and without current public information pursuant to Rule 144 under the Securities Act or any other rule of similar effect.

LEGAL MATTERS

Cooley LLP, New York, New York, will pass upon the validity of the shares of common stock offered hereby. As of the date of this prospectus, GC&H Investments, LLC and GC&H Investments, a California partnership, which are entities beneficially owned by current and former partners and associates of Cooley LLP, beneficially hold an aggregate of 1,767 shares of our common stock.

EXPERTS

Ernst & Young LLP, independent registered public accounting firm, has audited our consolidated financial statements included in our Annual Report on Form 10-K for the year ended December 31, 2024, as set forth in their report (which contains an explanatory paragraph describing conditions that raise substantial doubt about the Company's ability to continue as a going concern as described in Note 1 to the consolidated financial statements), which is incorporated by reference in this prospectus and elsewhere in the registration statement. Our financial statements are incorporated by reference in reliance on Ernst & Young LLP's report, given on their authority as experts in accounting and auditing.

WHERE YOU CAN FIND ADDITIONAL INFORMATION

This prospectus is part of a registration statement we filed with the SEC. 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 we are offering under this prospectus, we refer you to the registration statement and the exhibits and schedules filed as a part of the registration statement. You should rely only on the information contained in this prospectus or incorporated by reference in this prospectus. We have not authorized anyone else to provide you with different information. We are not making an offer of these securities in any state where the offer is not permitted. You should not assume that the information in this prospectus is accurate as of any date other than the date on the front page of this prospectus, regardless of the time of delivery of this prospectus or any sale of the securities offered by this prospectus.

We file annual, quarterly and current reports, proxy statements and other information with the SEC. The SEC maintains a website that contains reports, proxy statements and other information regarding issuers that file electronically with the SEC, including Vor. The address of the SEC website is www.sec.gov.

We maintain a website at www.vorbio.com. Information contained in or accessible through our website does not constitute a part of this prospectus and is not incorporated by reference in this prospectus. We have included our website address as an inactive textual reference only.

INCORPORATION OF CERTAIN INFORMATION BY REFERENCE

The SEC allows us to “incorporate by reference” information from other documents that we file with it, which means that we can disclose important information to you by referring you to those documents. The information incorporated by reference is considered to be part of this prospectus. Information in this prospectus supersedes information incorporated by reference that we filed with the SEC prior to the date of this prospectus, while information that we file later with the SEC will automatically update and supersede the information in this prospectus. We incorporate by reference into this prospectus and the registration statement of which this prospectus is a part the information or documents listed below that we have filed with the SEC (Commission File No. 001-39979):

- our Annual Report on [Form 10-K](#) for the year ended December 31, 2024, filed with the SEC on March 20, 2025;
- our Quarterly Reports on Form 10-Q for the quarters ended March 31, 2025, June 30, 2025 and September 30, 2025 filed with the SEC on [May 14, 2025](#), [August 12, 2025](#), and [November 13, 2025](#), respectively;
- our Current Reports on Form 8-K filed with the SEC on [January 8, 2025](#); [February 6, 2025](#); [April 3, 2025](#); [April 25, 2025](#); [May 8, 2025](#); [May 20, 2025](#); [May 23, 2025](#); [June 26, 2025](#); [July 10, 2025](#); [July 22, 2025](#); [August 27, 2025](#); [August 27, 2025](#); [September 17, 2025](#); [November 3, 2025](#); [November 12, 2025](#); [December 9, 2025](#); [December 18, 2025](#); and [January 2, 2026](#) (to the extent the information in such reports is filed and not furnished);
- our Revised Definitive Proxy Statement on [Schedule 14A](#) filed with the SEC on April 30, 2025 (to the extent the information therein is filed and not furnished);
- our Definitive Proxy Statement on [Schedule 14A](#) filed with the SEC on August 8, 2025 (to the extent the information therein is filed and not furnished); and
- the description of our common stock as described in [Exhibit 4.3](#) to our Annual Report on Form 10-K filed with the SEC on March 20, 2025, including any amendments or reports filed for the purposes of updating this 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 shares of our common stock made by this prospectus and will become a part of this prospectus from the date that such documents are filed with the SEC. Information in such future filings updates and supplements the information provided in this prospectus. Any statements in any such future filings will automatically be deemed to modify and supersede any information in any document we previously filed with the SEC that is incorporated or deemed to be incorporated herein by reference to the extent that statements in the later filed document modify or replace such earlier statements.

We will provide to each person, including any beneficial owner, to whom a prospectus is delivered, without charge upon written or oral request, a copy of any or all of the documents that are incorporated by reference into this prospectus but not delivered with the prospectus, including exhibits that are specifically incorporated by reference into such documents. You should direct any requests for documents to:

Vor Biopharma Inc.
Attn: Investor Relations
500 Boylston Street, Suite 1350
Boston, Massachusetts 02116
(617) 655-6580

13,876,032 Shares



Common Stock

PROSPECTUS
