Filed pursuant to Rule 424(b)(5)
Registration No. 333-286180

PROSPECTUS

Kyverna Therapeutics, Inc.
Up to $50,000,000
Common Stock

We have entered into an Open Market Sale Agreement℠, dated March 27, 2025, or the Sales Agreement, with Jefferies LLC, or Jefferies, relating to the sale of shares of our common stock, $0.00001 par value per share, offered by this prospectus. In accordance with the terms of the Sales Agreement, pursuant to this prospectus, we may offer and sell shares of our Common Stock having an aggregate offering price of up to $50,000,000 from time to time through or to Jefferies acting as sales agent.

Our common stock is listed on the Nasdaq Global Select Market under the symbol "KYTX." On March 26, 2025, the closing price of our common stock on the Nasdaq Global Select Market was $2.50 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, or the Securities Act. Jefferies is not required to sell any specific number or dollar amount of securities but will act as a sales agent using commercially reasonable efforts, consistent with its normal trading and sales practices, on mutually agreed terms between Jefferies and us. There is no arrangement for funds to be received in any escrow, trust or similar arrangement.

The compensation to Jefferies for sales of common stock sold pursuant to the Sales Agreement will be at a commission rate of 3.0% of the gross sales price per share sold under the Sales Agreement. In connection with the sale of common stock on our behalf, Jefferies will be deemed to be an "underwriter" within the meaning of the Securities Act and the compensation of Jefferies will be deemed to be underwriting commissions or discounts. See the section titled "*Plan of Distribution*" beginning on page 17 of this prospectus for additional information regarding the compensation to be paid to Jefferies. We have also agreed to provide indemnification and contribution to Jefferies with respect to certain liabilities, including liabilities under the Securities Act or the Securities Exchange Act of 1934, as amended, or the Exchange Act.

We are an "emerging growth company" and a "smaller reporting company," each as defined under the federal securities laws and, as such, we have elected to comply with certain reduced public company reporting requirements for this prospectus and future filings with the Securities and Exchange Commission. See "*Prospectus Summary – Implications of Being an Emerging Growth Company and a Smaller Reporting Company*".

Investing in our common stock involves a high degree of risk. See "*Risk Factors*" beginning on page 8 of this prospectus and under similar headings in the documents incorporated by reference into this prospectus for a discussion of certain risks and uncertainties you should consider before investing in shares of our common stock.

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

Jefferies

The date of this prospectus is April 15, 2025

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ABOUT THIS PROSPECTUS

This prospectus is part of a registration statement on Form S-3 that we filed with the U.S. Securities and Exchange Commission, or the SEC, using a "shelf" registration process. Under this shelf registration process, we may offer and sell shares of our common stock and preferred stock, depositary shares, various series of debt securities and warrants or rights to purchase any of such securities, either individually or in combination with other securities or in units, from time to time in one or more offerings, up to a total aggregate offering amount of $250,000,000. Under this prospectus, we may offer and sell shares of our common stock from time to time in one or more offerings, up to a total aggregate offering amount of $50,000,000 through or to Jefferies, acting as sales agent. These sales, if any, will be made pursuant to the terms of the Sales Agreement, which is filed as an exhibit to the registration statement of which this prospectus is a part. The $50,000,000 of shares of our common stock that may be sold under this prospectus are included in the $250,000,000 of our securities that may be sold under the registration statement of which this prospectus is a part.

We urge you to carefully read this prospectus, the documents incorporated by reference herein and therein and the additional information in the sections of this prospectus entitled "*Where You Can Find Additional Information*" and "*Incorporation of Certain Information by Reference*" before buying any of the securities being offered under this prospectus. These documents contain information you should consider when making your investment decision. To the extent that any statement that we make in this prospectus is inconsistent with statements made in any documents incorporated by reference, the statements made in this prospectus will be deemed to modify or supersede those made in such documents incorporated by reference; however, if any statement in one of these documents is inconsistent with a statement in another document having a later date and that is incorporated by reference herein, the statement in the document having the later date modifies or supersedes the earlier statement.

We have not, and Jefferies has not, authorized anyone to provide you with different information. If anyone provides you with different or inconsistent information, you should not rely on it. We are not, and Jefferies is not, making an offer to sell these securities in any jurisdiction where the offer or sale is not permitted.

You should not assume that the information contained or incorporated by reference in this prospectus is accurate on any date subsequent to the date set forth on the front cover of this prospectus or on any date subsequent to the date of the document incorporated by reference, as applicable. Our business, financial condition, results of operations and prospects may have changed since those dates.

We are offering to sell, and seeking offers to buy, the securities described in this prospectus only in jurisdictions where offers and sales are permitted. The distribution of this prospectus and the offering of the securities 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 securities 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 further note that the representations, warranties and covenants made by us in any agreement that is filed as an exhibit to any document that is incorporated by reference into this prospectus were made solely for the benefit of the parties to such agreement, including, in some cases, for the purpose of allocating risk among the parties to such agreements, and should not be deemed to be a representation, warranty or covenant to you. Moreover, such representations, warranties or covenants were accurate only as of the date when made. Accordingly, such representations, warranties and covenants should not be relied on as accurately representing the current state of our affairs.

In this prospectus, unless otherwise indicated or required by the context, the terms "Kyverna," "we," "our," "us" and the "Company" refer to Kyverna Therapeutics, Inc. General information about us can be found on our website at *www.kyvernatx.com*. The inclusion of our website address in this prospectus is an inactive textual reference only. 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.

PROSPECTUS SUMMARY

This summary contains basic information about us and this offering. This summary highlights selected information contained elsewhere in, or incorporated by reference into, this prospectus. This summary is not complete and may not contain all of the information that may be important to you and that you should consider before deciding whether or not to invest in our securities. For a more complete understanding of Kyverna and this offering, you should carefully read this prospectus, including the information incorporated by reference into this prospectus, in its entirety. Investing in our securities involves risks that are described in the section of this prospectus entitled "Risk Factors," under the heading "Item 1A. Risk Factors" in our Annual Report on Form 10-K for the year ended December 31, 2024, as updated by our subsequent annual, quarterly and other reports and documents that are incorporated by reference into this prospectus, and in our other filings with the SEC.

The Company

Overview

We are a clinical-stage biopharmaceutical company focused on developing cell therapies for patients with autoimmune diseases. Our goal is to liberate patients from autoimmune diseases through the curative potential of cell therapy. Our approach is supported by our breadth of experience treating patients with our lead product candidate, KYV-101, across more than 15 autoimmune disease indications. This has been documented through the scientific publication of multiple autoimmune case studies, our proprietary dataset of patients treated through named patient forms of compassionate use, our experience in ongoing investigator-initiated trials at leading academic institutions, as well as early clinical data from our ongoing company-sponsored trials illustrating the potential of these therapies to deeply deplete B cells with the aim of achieving durable treatment-free remission. This validation provides us with a clear path to continue advancing KYV-101 through late-stage clinical development and commercialization across two broad areas of autoimmune disease: neuroinflammation and rheumatology.

Our lead program, KYV-101, is an autologous, fully human CD19 CAR T-cell product candidate incorporating highly potent CD28 co-stimulation. KYV-101 is made from an underlying chimeric antigen receptor, or CAR, licensed from the National Institutes of Health, or the NIH. We believe that this uniquely designed CAR in KYV-101 has the potential to deliver a differentiated therapeutic profile in autoimmune disease. In addition to a fully human scFv domain, the CAR in KYV-101 was also designed with a human CD8α hinge and transmembrane domain, a human CD28 costimulatory domain, and a human CD3ζ activation domain. This same underlying CAR in KYV-101 has completed a 20-patient Phase 1 trial in oncology conducted by the NIH, and the results from this Phase 1 trial published in *Nature Medicine* reported similar rates of durable antitumor responses while delivering improved tolerability in the clinic among adult oncology patients, as compared to the CAR used to create Yescarta®. We believe that these differentiated properties of the CAR in KYV-101 are critical for the potential success of CAR T cells as autoimmune disease therapies.

Our focused clinical development pipeline includes a pivotal Phase 2 trial of KYV-101 in stiff person syndrome, or SPS, a Phase 2 trial of KYV-101 in myasthenia gravis, or MG, and two multi-center Phase 1/2 trials for patients with lupus nephritis, or LN. We are also harnessing investigator-initiated trials and other Kyverna-sponsored clinical trials, or KYSA trials, including in multiple sclerosis and systemic sclerosis, to inform the next priority indications to advance into late-stage development. Additionally, our pipeline includes next-generation CAR T-cell therapies in both autologous and allogeneic formats, including efficiently expanding into broader autoimmune indications and increasing patient reach with KYV-102, an autologous CD19 CAR T-cell product candidate, using our proprietary whole blood rapid manufacturing process. We believe our cell therapy approach to autoimmune disease may present a significant advantage over current standard-of-care therapies by aiming for deep B cell depletion, an immune reset and long-term remission in autoimmune diseases.

KYV-101 is currently being evaluated in company-sponsored KYSA trials and investigator-initiated trials in numerous B-cell mediated autoimmune diseases with a prioritized focus in SPS, MG and LN. We have aligned with the U.S. Food and Drug Administration, or the FDA, on a registrational Phase 2 trial design in SPS, KYSA-8. This KYSA-8 pivotal Phase 2 trial in SPS has enrolled 70% of study participants, with completion of enrollment expected in mid-2025. We also continue to progress our chemistry, manufacturing and controls, or CMC, readiness efforts in a capital-efficient manner in support of an anticipated biologics license application, or BLA, filing with the FDA in

2026. We expect to report topline data from our pivotal Phase 2 trial in SPS in the first half of 2026 and anticipate filing our first BLA with the FDA in 2026.

Our Phase 2 trial in MG, KYSA-6, has completed enrollment of patients in an initial six-patient cohort and we plan to report interim data from this cohort in the second half of 2025. We received Regenerative Medicine Advanced Therapy, or RMAT, designations and Orphan Drug Designations from the FDA for both SPS and MG as well as Orphan Drug Designation from the European Medicines Association in MG. We continue to engage in positive dialogue with the FDA and expect to provide an update on the registrational path for KYV-101 in MG in the first half of 2025.

We are also currently advancing two Phase 1/2 trials in LN, KYSA-1 and KYSA-3. We have completed the dose-escalation cohort of KYSA-1 and are now treating patients at the target dose. We expect to report Phase 1 data from both of these trials in the second half of 2025. In November 2024, we presented clinical data at ACR Convergence 2024 that demonstrated positive sustained efficacy and durability at >6-month follow-up observed in patients with severe LN treated with KYV-101 at the therapeutic dose.

Since our inception in June 2018, we have devoted substantially all of our resources to performing research and development, enabling manufacturing activities in support of our product development efforts, hiring personnel, acquiring and developing our technology and product candidates, performing business planning, developing and establishing our intellectual property portfolio, raising capital and providing general and administrative support for these activities. We do not have any products approved for sale and have not generated any revenue from product sales.

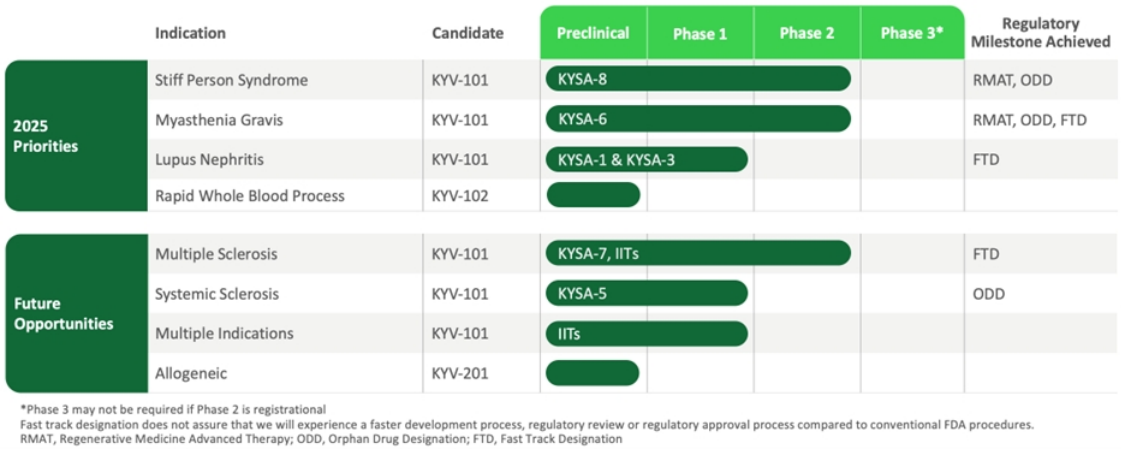
We do not currently own or operate any manufacturing facilities. We rely on contract manufacturing organizations, or CMOs, to produce our drug candidates in accordance with the FDA's current Good Manufacturing Practices regulations for use in our clinical studies. In March 2022, we entered into a master services agreement with WuXi ATU Advanced Therapies, Inc., or WuXi. WuXi's facility in Philadelphia, Pennsylvania, provides us with certain customized cell manufacturing, release and testing services for our KYV-101 product candidate. Under our Development and Manufacturing Services Agreement, dated July 2023, or the Elevate Agreement, with ElevateBio Base Camp, Inc., or Elevate, we engaged Elevate in November 2024 to provide us with cell manufacturing, release and testing services for our KYV-101 product candidate. Pursuant to our Licence and Supply Agreement with Oxford Biomedica (UK) Limited, or Oxford, dated September 2023, we engaged Oxford to undertake lentiviral vector process development services, with the intention for Oxford to ultimately manufacture and supply to us lentiviral vectors for research and development purposes and for use in connection with our clinical trials.

We are also developing Ingenui-T, a manufacturing process designed to improve patient experience and manufacturing capabilities through partnerships with world-class organizations in cell therapy manufacturing. Under the Elevate Agreement, Elevate is undertaking process development services for the development of a rapid whole blood manufacturing process for our CAR T-cell products, including KYV-102.

Given our stage of development, we do not yet have a marketing or sales organization or commercial infrastructure. Accordingly, if we obtain regulatory approval for any of our product candidates, we also expect to incur significant commercialization expenses related to product sales, marketing, manufacturing and distribution.

Our pipeline and programs

Our portfolio of product candidates for the treatment of autoimmune diseases is summarized in the figure below:



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

We qualify as an "emerging growth company" as that term is defined in the JOBS Act. For as long as we continue to be an emerging growth company, we intend to take advantage of exemptions from various reporting requirements applicable to other public companies but not to "emerging growth companies," including:

- not being required to have our independent registered public accounting firm audit our internal control over financial reporting under Section 404 of the Sarbanes-Oxley Act of 2002, as amended;
- permission to delay adopting new or revised accounting standards until such time as those standards apply to private companies;
- reduced disclosure obligations regarding executive compensation in our periodic reports and Annual Reports on Form 10-K; and
- exemptions from the requirements of holding non-binding advisory votes on executive compensation and stockholder approval of any golden parachute payments not previously approved.

Under the JOBS Act, we will remain an emerging growth company until the earliest of:

- the last day of the fiscal year during which we have total annual gross revenues of $1.235 billion or more;
- the last day of the fiscal year following the fifth anniversary of the Initial Public Offering, or December 31, 2029;
- the date on which we have issued, during the previous three-year period, more than $1.0 billion in non-convertible debt securities; and
- the date on which we are deemed to be a "large accelerated filer" under the Exchange Act (i.e., the first day of the fiscal year after we have (1) more than $700.0 million in outstanding common equity held by our non-affiliates, measured each year on the last day of our second fiscal quarter, (2) been public for at

least 12 months, and (3) are not eligible to be deemed a "smaller reporting company" because we do not meet the revenue test of the definition of "smaller reporting company", which includes an initial determination that our annual revenues are more than $100.0 million for the most recently completed fiscal year).

We are also a "smaller reporting company," meaning that the market value of our common stock held by non-affiliates is less than $700.0 million and our annual revenue is less than $100.0 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 common stock held by non-affiliates is less than $250.0 million or (ii) our annual revenue is less than $100.0 million during the most recently completed fiscal year and the market value of our common stock held by non-affiliates is less than $700.0 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.

We have elected to take advantage of certain of the reduced disclosure obligations regarding executive compensation in this prospectus and may elect to take advantage of other reduced reporting requirements in future filings with the SEC. As a result, the information that we provide to our stockholders may be different from the information you receive from other public reporting companies.

Corporate Information

We were incorporated in Delaware in June 2018 under the name BAIT Therapeutics, Inc., and changed our name to Kyverna Therapeutics, Inc. in October 2019. Our principal executive offices are located at 5980 Horton St., STE 550, Emeryville, CA 94608, and our telephone number is (510) 925-2492. Our website address is *www.kyvernatx.com*. The inclusion of our website address in this prospectus is an inactive textual reference only. 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*.

THE OFFERING

Common stock offered by us	Up to an aggregate of $50,000,000 of shares of our common stock.
Common stock to be outstanding immediately after this offering	Up to 64,954,048 shares (as more fully described in the notes following this table), assuming sales of 21,739,130 shares of our common stock in this offering at an assumed offering price of $2.30 per share, the last reported sale price of our common stock on the Nasdaq Global Select Market on March 25, 2025. The actual number of shares of common stock issued will vary depending on the sales price under this offering.
Manner of offering	"At the market offering" made from time to time through or to Jefferies acting as sales agent. See the section of this prospectus entitled "*Plan of Distribution*" beginning on page 17 of this prospectus for additional detail.
Use of proceeds	We currently intend to use the net proceeds of this offering for general corporate purposes, which may include funding research and development, capital expenditures, working capital and general and administrative expenses. See the section of this prospectus entitled "*Use of Proceeds*" beginning on page 14 of this prospectus for additional detail.
Trading symbol	Our common stock is listed on the Nasdaq Global Select Market under the symbol "KYTX."
Risk factors	Investing in our securities involves a high degree of risk. See "*Risk Factors*" beginning on page 8 of this prospectus and other information included or incorporated by reference in this prospectus for a discussion of factors you should carefully consider before investing in our securities.

The number of shares of our common stock that will be outstanding immediately after this offering is based on 43,214,918 shares of common stock outstanding as of December 31, 2024, but excludes:

- 7,595,922 shares of common stock issuable upon the exercise of stock options outstanding under our equity incentive plans as of December 31, 2024, with a weighted-average exercise price of $5.83 per share;
- 549,001 shares of our common stock issuable upon the vesting of restricted stock units outstanding under our equity incentive plans as of December 31, 2024;

- up to 2,491,968 shares of common stock available for future issuance under the Kyverna Therapeutics, Inc. 2024 Equity Incentive Plan as of December 31, 2024, which contains provisions that may increase its share reserve each year, and pursuant to which 2,160,745 shares of common stock were added to the reserve on January 1, 2025;

- up to 422,000 shares of common stock available for future issuance under the Kyverna Therapeutics, Inc. 2024 Employee Stock Purchase Plan as of December 31, 2024, which contains provisions that may increase its share reserve each year, and pursuant to which 422,000 shares of common stock were added to the reserve on January 1, 2025; and

- up to 1,070,741 shares of common stock available for future issuance under the Kyverna Therapeutics, Inc. 2024 Inducement Equity Incentive Plan as of December 31, 2024, of which 425,000 shares are subject to an option granted to Naji H. Gehchan, M.D., our Chief Medical and Development Officer, on January 22, 2025 as an inducement material to Dr. Gehchan's employment with us, per the terms of our offer letter with Dr. Gehchan dated January 3, 2025.

RISK FACTORS

Investing in our securities involves a high degree of risk. Before deciding whether to invest in our securities, you should consider carefully the risks and uncertainties described below. You should also consider the risks, uncertainties and assumptions discussed under the section entitled "Risk Factors" contained in our most recent Annual Report on Form 10-K, which is on file with the SEC, and is incorporated herein by reference, and which may be amended, supplemented or superseded from time to time by other reports we file with the SEC in the future. There may be other unknown or unpredictable economic, business, competitive, regulatory or other factors that could have material adverse effects on our future results. If any of these risks actually occur, our business, financial condition, results of operations, cash flow and future growth prospects could be seriously harmed. This could cause the market price of our securities to decline, resulting in a loss of all or part of your investment. Please also carefully read the section below entitled "Special Note Regarding Forward-Looking Statements."

Risks Related to this Offering

We will have broad discretion in the use of the net proceeds from this offering and may not use them effectively.

We currently intend to use the net proceeds of this offering for general corporate purposes, which may include funding research and development, capital expenditures, working capital and general and administrative expenses, as further described in the section of this prospectus entitled "*Use of Proceeds*". We will have broad discretion in the application of the net proceeds in the category of other working capital and general corporate purposes and investors will be relying on the judgment of our management regarding the application of the proceeds of this offering.

The precise amount and timing of the application of these proceeds will depend upon a number of factors, such as the timing and progress of our research and development efforts, our funding requirements and the availability and costs of other funds. As of the date of this prospectus, we cannot specify with certainty all of the particular uses for the net proceeds to us from this offering. Depending on the outcome of our efforts and other unforeseen events, our plans and priorities may change and we may apply the net proceeds of this offering in different manners than we currently anticipate.

The failure by our management to apply these funds effectively could harm our business, financial condition and results of operations. Pending their use, we may invest the net proceeds from this offering in available-for-sale, investment-grade, interest-bearing marketable securities. These investments may not yield a favorable return to our stockholders.

You may experience immediate and substantial dilution.

The shares of our common stock sold in this offering, if any, will be sold from time to time at various prices. If you purchase shares in this offering at a price that is higher than the net tangible book value per share of our common stock, you would suffer immediate, and potentially substantial, dilution. The exercise of outstanding stock options, and the vesting of outstanding restricted stock units, may result in further dilution of your investment. The last reported sale price of our common stock on the Nasdaq Global Select Market on March 25, 2025 was $2.30 per share, which is less than our net tangible book value per share as of December 31, 2024. For a more detailed discussion regarding the foregoing and the accretion to new investors assuming that an aggregate of 21,739,130 shares of our common stock are sold at such price for aggregate gross proceeds of approximately $50,000,000, please see the section of this prospectus entitled "*Dilution*".

The shares of common stock will be sold in "at the market" offerings, and investors who buy shares at different times will likely pay different prices.

Investors who purchase shares in this offering at different times will likely pay different prices, and so may experience different outcomes in their investment results. We will have discretion, subject to market demand, to vary the timing, prices, and number of shares sold, and there is no minimum or maximum sales price. Investors may experience a decline in the value of their shares as a result of share sales made at prices lower than the prices they paid.

The actual number of shares we will issue under the Sales Agreement with Jefferies, at any one time or in total, is uncertain.

Subject to certain limitations in the Sales Agreement with Jefferies and compliance with applicable law, we have the discretion to deliver issuance notices to Jefferies at any time throughout the term of the Sales Agreement. The number of shares that are sold by Jefferies after delivering an issuance notice will fluctuate based on the market price of the common stock during the sales period and limits we set with Jefferies. Because the price per share of each share sold will fluctuate based on the market price of our common stock during the sales period, it is not possible at this stage to predict the number of shares or the gross proceeds to be raised in connection with those sales, if any, that will be ultimately issued.

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

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

Because there are no current plans to pay cash dividends on our common stock for the foreseeable future, you may not receive any return on investment unless you sell shares of our common stock for a price greater than that which you paid for it.

We may retain future earnings, if any, for future operations, expansion and debt repayment and have no current plans to pay any cash dividends for the foreseeable future. Any decision to declare and pay dividends as a public company in the future will be made at the discretion of our board of directors and will depend on, among other things, our results of operations, financial condition, cash requirements, contractual restrictions and other factors that our board of directors may deem relevant. In addition, our ability to pay dividends may be limited by covenants of any existing and future outstanding indebtedness we may incur. As a result, you may not receive any return on an investment in our common stock unless you sell your shares of our common stock for a price greater than that which you paid for it.

Sales of a significant number of shares of common stock in the public markets, or the perception that such sales could occur, could depress the market price of our common stock.

Sales of a substantial number of shares in the public markets, or the perception that such sales could occur, could depress the market price of our common stock and impair our ability to raise capital through the sale of additional equity securities. We have agreed, without the prior written consent of Jefferies, and subject to certain exceptions set forth in the Sales Agreement, not to sell or otherwise dispose of any common stock or securities convertible into or exchangeable for shares of common stock, warrants or any rights to purchase or acquire common stock during the period beginning on the third trading day immediately prior to the delivery of any issuance notice delivered by us to Jefferies and ending on the earlier of (a) the third trading day immediately following the final settlement date with respect to the shares sold pursuant to such issuance notice and (b) the date such issuance notice is cancelled if no shares have been sold pursuant to such issuance notice. We have further agreed, subject to certain exceptions set forth in the Sales Agreement, not to sell or otherwise dispose of any common stock or securities convertible into or exchangeable for shares of common stock, warrants or any rights to purchase or acquire common stock in any other “at the market offering” or continuous equity transaction prior to the termination of the Sales Agreement with Jefferies. Therefore, it is possible that we could issue and sell additional shares of our common stock in the public markets. We cannot predict the effect that future sales of our common stock would have on the market price of our common stock.

SPECIAL NOTE REGARDING FORWARD-LOOKING STATEMENTS

This prospectus, including the documents incorporated by reference herein, contains forward-looking statements about us and our industry within the meaning of the federal securities laws, which statements involve substantial risks and uncertainties. Forward-looking statements generally relate to future events or our future financial or operating performance. All statements other than statements of historical facts contained in this prospectus, including statements regarding our future results of operations and financial position, business strategy, drug candidates, planned preclinical studies and clinical trials, results of preclinical studies, clinical trials, research and development costs, plans for manufacturing, regulatory approvals, timing and likelihood of success, as well as plans and objectives of management for future operations, are forward-looking statements. In some cases, you can identify forward-looking statements because they contain words such as "may," "will," "should," "expects," "plans," "anticipates," "could," "intends," "target," "projects," "contemplates," "believes," "estimates," "predicts," "potential" or "continue" or the negative of these words or other similar terms or expressions that concern our expectations, strategy, plans or intentions. Forward-looking statements contained in this prospectus and the documents incorporated by reference herein may include, for example, but are not limited to, statements about:

- the initiation, timing, progress and results of our preclinical studies, clinical trials, and research programs for our product candidates;
- our ability to demonstrate, and the timing of, preclinical proof-of-concept in vivo for our product candidates;
- our ability to successfully complete our clinical trials;
- our ability to quickly leverage our initial product candidates and to progress additional candidates;
- the prevalence of certain diseases and conditions we intend to treat and the size of the market opportunity for our product candidates;
- estimates of the number of patients with certain diseases and conditions we intend to treat and the number of patients that we will enroll in our clinical trials;
- the likelihood of our clinical trials demonstrating safety and efficacy of our product candidates;
- the beneficial characteristics, safety, efficacy, therapeutic effects and potential advantages of our product candidates;
- the timing or likelihood of regulatory filings and approval for our product candidates;
- our ability to meet future regulatory standards with respect to our product candidates, if approved;
- our plans relating to the further development and manufacturing of our product candidates, including additional indications for which we may pursue;
- our ability to identify additional products, product candidates or technologies with significant commercial potential that are consistent with our commercial objectives;
- the rate and degree of market acceptance and therapeutic benefits of our product candidates, if approved;
- the implementation of our strategic plans for our business, product candidates, research programs and technologies;

- the scope of protection we are able to establish and maintain for intellectual property rights covering our product candidates and gene-editing technology;
- anticipated developments related to our competitors and our industry;
- our competitive position and ability to leverage the clinical, regulatory and manufacturing advancements to accelerate our clinical trials and regulatory approval of product candidates;
- the success of competing therapies that are or may become available;
- our ability to identify and enter into future license agreements and collaborations;
- the expected potential benefits of strategic collaborations with third parties and our ability to attract collaborators with development, regulatory, manufacturing or commercialization expertise;
- our ability to prosecute, grow and defend our intellectual property portfolio against infringement claims;
- our reliance on third parties to conduct clinical trials of our product candidates;
- our reliance on third parties for the manufacture of our product candidates;
- our plans relating to sales strategy, manufacturing and commercializing our product candidates, if approved;
- our ability to attract and retain sales personnel, or to contract with a sales organization, if our product candidates are approved;
- anticipated regulatory developments in the United States and foreign countries in which we may seek regulatory approval for our product candidates in the future;
- our ability to expand internationally;
- our ability to attract and retain key scientific and management personnel;
- our financial performance;
- the sufficiency of our existing capital resources to fund our future operating expenses and capital expenditure requirements;
- our expectations regarding the period during which we will qualify as an emerging growth company under the JOBS Act or a smaller reporting company; and
- estimates of our expenses, capital requirements and needs for additional financing.

We caution you that the foregoing list may not contain all the forward-looking statements made in this prospectus or in the documents incorporated by reference in this prospectus.

These forward-looking statements are based on current expectations and beliefs concerning future developments and their potential effects. There can be no assurance that future developments affecting us will be those that we have anticipated. These forward-looking statements involve a number of risks, uncertainties (some of which are beyond our control) or other assumptions that may cause actual results or performance to be materially different from those expressed or implied by these forward-looking statements. These risks and uncertainties include, but are not limited to, those factors described under the heading "Risk Factors" in this prospectus, in our Annual Report on Form 10-K for the year ended December 31, 2024, as filed with the SEC on March 27, 2025, as updated by

our subsequent annual, quarterly and other reports and documents that are incorporated by reference into this prospectus, and elsewhere in the documents incorporated by reference into this prospectus. Should one or more of these risks or uncertainties materialize, or should any of our assumptions prove incorrect, actual results may vary in material respects from those projected in these forward-looking statements. There may be additional risks that we consider immaterial or which are unknown. It is not possible to predict or identify all such risks. Readers are cautioned not to place undue reliance on forward-looking statements because of the risks and uncertainties related to them and to the risk factors. We do not undertake any obligation to update or revise any forward-looking statements, whether as a result of new information, future events or otherwise after the date of this prospectus, except as may be required under applicable securities laws. Our forward-looking statements do not reflect the potential impact of any future acquisitions, mergers, dispositions, joint ventures, other strategic transactions or investments we may make or enter into.

In addition, statements that "we believe" and similar statements reflect our beliefs and opinions on the relevant subject. These statements are based upon information available to us as of the date of the statement is made, and while we believe such information forms a reasonable basis for such statements, such information may be limited or incomplete, and such statements should not be read to indicate that we have conducted an exhaustive inquiry into, or review of, all potentially available relevant information. These statements are inherently uncertain and investors are cautioned not to unduly rely upon these statements.

MARKET, INDUSTRY AND OTHER DATA

Unless otherwise indicated, information contained in this prospectus concerning our industry and the markets in which we operate, including our general expectations about our product candidates, market position, market opportunity, market size, competitive position and the incidence of certain medical conditions, is based on or derived from publicly available information released by industry analysts and third-party sources, independent market research, industry and general publications and surveys, governmental agencies, our internal research and our industry experience. Our estimates of the potential market opportunities for our product candidates include a number of key assumptions based on our industry knowledge and industry publications, the latter of which may be based on small sample sizes and fail to accurately reflect such information, and you are cautioned not to give undue weight to such estimates. While we believe that our internal assumptions are reasonable, no independent source has verified such assumptions. Industry publications and third-party research often indicate that their information has been obtained from sources believed to be reliable, although they do not guarantee the accuracy or completeness of such information and such information is inherently imprecise. In some cases, we do not expressly refer to the sources from which this data is derived. In that regard, when we refer to one or more sources of this type of data in any paragraph, you should assume that other data of this type appearing in the same paragraph is derived from the same sources, unless otherwise expressly stated or the context otherwise requires. In addition, projections, assumptions and estimates of our future performance and the future performance of the industry in which we operate is necessarily subject to a high degree of uncertainty and risk due to a variety of factors, including those described in "Risk Factors" and elsewhere in this prospectus. These and other factors could cause results to differ materially from those expressed in the estimates made by independent third parties and by us.

USE OF PROCEEDS

We may issue and sell shares of our common stock having aggregate sales proceeds of up to $50,000,000 from time to time under this prospectus. 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. There can be no assurance that, in the future, we will sell any shares under or fully utilize the Sales Agreement with Jefferies as a source of financing. We currently intend to use the net proceeds of this offering for general corporate purposes, which may include funding research and development, capital expenditures, working capital and general and administrative expenses. We may also use a portion of the net proceeds to in-license, acquire, or invest in complementary businesses, technology platforms, products, services, technologies or other assets. However, we do not have any agreements or commitments to enter into any material acquisitions or investments at this time.

The amounts of and timing of our use of the net proceeds from the sale of securities under this prospectus will depend on a number of factors. As of the date of this prospectus, we cannot specify with certainty all of the particular uses for the net proceeds to us from the sale of securities under this prospectus. Accordingly, we will retain broad discretion over the use of such proceeds. Pending application of the net proceeds as described above, we intend to invest the net proceeds from the offering that are not used as described above in available-for-sale, investment-grade, interest-bearing marketable securities.

DILUTION

If you purchase our common stock in this offering, your interest will be diluted to the extent of the difference between the public offering price per share of common stock and the net tangible book value per share of common stock immediately after this offering.

Our net tangible book value as of December 31, 2024 was approximately $266.6 million, or $6.17 per share of common stock. Net tangible book value per share is determined by dividing the net of total tangible assets less total liabilities, by the aggregate number of shares of our common stock outstanding as of December 31, 2024.

After giving effect to the sale of our common stock pursuant to this prospectus in the aggregate amount of $50,000,000 at an assumed offering price of $2.30 per share, the last reported sale price of our common stock on the Nasdaq Global Select Market on March 25, 2025, and after deducting commissions and estimated aggregate offering expenses payable by us, our as adjusted net tangible book value as of December 31, 2024 would have been approximately $314.7 million, or $4.85 per share of common stock. This represents an immediate decrease in the net tangible book value of $1.32 per share to our existing stockholders and an immediate accretion in net tangible book value of $2.55 per share to new investors. While you will experience immediate accretion under the assumed public offering price of $2.30 per share, if you purchase shares at a price that is above our net tangible book value per share, you will experience immediate dilution.

The following table illustrates this per share accretion:

Assumed public offering price per share of common stock		$ 2.30
Net tangible book value per share as of December 31, 2024	6.17	
Decrease in net tangible book value per share attributable to this offering	1.32	
As adjusted net tangible book value per share after this offering		4.85
Accretion in net tangible book value per share to investors participating in this offering		$ 2.55

The table above assumes for illustrative purposes that an aggregate of 21,739,130 shares of our common stock are sold pursuant to this prospectus at a price of $2.30 per share, the last reported sale price of our common stock on the Nasdaq Global Select Market on March 25, 2025, for aggregate net proceeds of approximately $50,000,000, after deducting commissions and estimated aggregate offering expenses payable by us. The as adjusted information is illustrative only and will adjust based on the actual price to the public, the actual number of shares sold and other terms of the offering determined at the time shares of our common stock are sold pursuant to this prospectus. The shares sold in this offering, if any, will be sold from time to time at various prices.

The above discussion and table are based on 43,214,918 shares of common stock outstanding as of December 31, 2024, but excludes:

- 7,595,922 shares of common stock issuable upon the exercise of stock options outstanding under our equity incentive plans as of December 31, 2024, with a weighted-average exercise price of $5.83 per share;
- 549,001 shares of our common stock issuable upon the vesting of restricted stock units outstanding under our equity incentive plans as of December 31, 2024;
- up to 2,491,968 shares of common stock available for future issuance under the Kyverna Therapeutics, Inc. 2024 Equity Incentive Plan as of December 31, 2024, which contains provisions that may increase its share reserve each year, and pursuant to which 2,160,745 shares of common stock were added to the reserve on January 1, 2025;

- up to 422,000 shares of common stock available for future issuance under the Kyverna Therapeutics, Inc. 2024 Employee Stock Purchase Plan as of December 31, 2024, which contains provisions that may increase its share reserve each year, and pursuant to which 422,000 shares of common stock were added to the reserve on January 1, 2025; and

- up to 1,070,741 shares of common stock available for future issuance under the Kyverna Therapeutics, Inc. 2024 Inducement Equity Incentive Plan as of December 31, 2024, of which 425,000 shares are subject to an option granted to Naji H. Gehchan, M.D., our Chief Medical and Development Officer, on January 22, 2025 as an inducement material to Dr. Gehchan's employment with us, per the terms of our offer letter with Dr. Gehchan dated January 3, 2025.

To the extent that options are exercised, new options or other equity awards are issued under our equity incentive plans, or we issue additional shares of common stock or other equity or convertible debt securities in the future, there may be further dilution to investors participating in this offering. Moreover, we may choose to raise additional capital because of market conditions or strategic considerations even if we believe that we have sufficient funds for our current or future operating plans. If we raise additional capital 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 the Sales Agreement with Jefferies, under which we may offer and sell our shares of common stock from time to time through Jefferies acting as agent. Pursuant to this prospectus, we may issue and sell up to $50,000,000 of shares of our common stock. Sales of our shares of common stock, if any, under this prospectus will be made by any method that is deemed to be an "at the market offering" as defined in Rule 415(a)(4) under the Securities Act.

Each time we wish to issue and sell our shares of common stock under the Sales Agreement, we will notify Jefferies of the number of shares to be issued, the dates on which such sales are anticipated to be made, any limitation on the number of shares to be sold in any one day and any minimum price below which sales may not be made. Once we have so instructed Jefferies, unless Jefferies declines to accept the terms of such notice, Jefferies has agreed to use its commercially reasonable efforts consistent with its normal trading and sales practices to sell such shares up to the amount specified on such terms. The obligations of Jefferies under the Sales Agreement to sell our shares of common stock are subject to a number of conditions that we must meet.

The settlement of sales of shares between us and Jefferies is generally anticipated to occur on the first trading day following the date on which the sale was made. Sales of our shares of 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 Jefferies may agree upon. There is no arrangement for funds to be received in an escrow, trust or similar arrangement.

We will pay Jefferies a commission equal to 3% of the aggregate gross proceeds we receive from each sale of our shares of common stock. 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. In addition, we have agreed to reimburse Jefferies for the fees and disbursements of its counsel, payable upon execution of the Sales Agreement, in an amount not to exceed $75,000, in addition to certain ongoing disbursements of its legal counsel. In accordance with FINRA Rule 5110, these reimbursed fees and expenses are deemed underwriting compensation for this offering. We estimate that the total expenses for the offering, excluding any commissions or expense reimbursement payable to Jefferies under the terms of the Sales Agreement will be approximately $275,655. The remaining sale proceeds, after deducting any other transaction fees, will equal our net proceeds from the sale of such shares.

Jefferies will provide written confirmation to us before the open on the Nasdaq Global Select Market on the day following each day on which our shares of common stock are sold under the Sales Agreement. Each confirmation will include the number of shares sold on that day, the aggregate gross proceeds of such sales and the proceeds to us.

In connection with the sale of our shares of common stock on our behalf, Jefferies will be deemed to be an "underwriter" within the meaning of the Securities Act, and the compensation of Jefferies will be deemed to be underwriting commissions or discounts. We have agreed to indemnify Jefferies against certain civil liabilities, including liabilities under the Securities Act. We have also agreed to contribute to payments Jefferies may be required to make in respect of such liabilities.

The offering of our shares of common stock pursuant to the Sales Agreement will terminate upon the earlier of (i) the sale of all shares of common stock subject to the Sales Agreement and (ii) the termination of the Sales Agreement as permitted therein. We and Jefferies may each terminate the Sales Agreement at any time upon ten trading days' prior notice.

This summary of the material provisions of the Sales Agreement does not purport to be a complete statement of its terms and conditions. A copy of the Sales Agreement is filed as an exhibit to the registration statement of which this prospectus forms a part.

Jefferies and its affiliates may in the future provide various investment banking, commercial banking, financial advisory and other financial services for us and our affiliates, for which services they may in the future receive customary fees. In the course of its business, Jefferies may actively trade our securities for its own account or

for the accounts of customers, and, accordingly, Jefferies may at any time hold long or short positions in such securities.

A prospectus in electronic format may be made available on a website maintained by Jefferies, and Jefferies may distribute the prospectus electronically.

LEGAL MATTERS

The validity of the issuance of the common stock offered by this prospectus will be passed upon for us by Paul Hastings LLP, Palo Alto, California. Covington & Burling LLP, New York, New York is counsel for Jefferies in connection with this offering.

EXPERTS

The financial statements of Kyverna Therapeutics, Inc. as of December 31, 2024 and 2023 and for the years then ended incorporated by reference in this prospectus and in the registration statement have been so incorporated in reliance on the report of BDO USA, P.C., an independent registered public accounting firm, given on the authority of said firm as experts in auditing and accounting.

WHERE YOU CAN FIND ADDITIONAL INFORMATION

We have filed with the SEC a registration statement on Form S-3 under the Securities Act with respect to the securities to be offered under this prospectus. This prospectus, which constitutes a part of the registration statement, does not contain all of the information set forth or incorporated by reference in the registration statement of which this prospectus is a part and the exhibits to such registration statement. For further information with respect to us and the securities offered by this prospectus, we refer you to the registration statement of which this prospectus is a part and the exhibits to such registration statement. Statements contained in this prospectus as to the contents of any contract or any other document are not necessarily complete. If a contract or document has been filed as an exhibit to the registration statement or an exhibit to the reports or other documents incorporated by reference into this prospectus, please see the copy of the contract or document that has been filed. Each statement in this prospectus relating to a contract or document filed as an exhibit is qualified in all respects by the filed exhibit.

The SEC maintains an Internet website that contains reports, proxy statements and other information about issuers, like us, that file electronically with the SEC. The address of that website is *www.sec.gov*. You may also request a copy of these filings, at no cost, by writing us at 5980 Horton St., STE 550, Emeryville, CA 94608 or telephoning us at (510) 925-2492.

We are subject to the information and reporting requirements of the Exchange Act and, in accordance with this law, file periodic reports, proxy statements and other information with the SEC. These periodic reports, proxy statements and other information are available at the website of the SEC referred to above. You may access these materials free of charge as soon as reasonably practicable after they are electronically filed with, or furnished to, the SEC. We also maintain a website at *www.kyvernatx.com*. The inclusion of our website address in this prospectus is an inactive textual reference only. 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.

INCORPORATION OF CERTAIN INFORMATION BY REFERENCE

The SEC allows us to incorporate by reference the information and reports we file with it into this prospectus, which means that we can disclose important information to you by referring you to these documents. The information incorporated by reference is an important part of this prospectus, and information we file later with the SEC will automatically update and supersede this information. We are incorporating by reference the documents listed below as of their respective dates of filing, which we have already filed with the SEC. Any report or information within any of the documents referred below that is furnished, but not filed, shall not be incorporated by reference into this prospectus.

- our Annual Report on Form 10-K for the fiscal year ended December 31, 2024, filed with the SEC on March 27, 2025;
- our Current Report on Form 8-K filed with the SEC on January 21, 2025 and March 27, 2025; and
- the description of our common stock set forth in our Registration Statement on Form 8-A (File No. 001-41947), filed with the SEC under Section 12(b) of the Exchange Act on February 5, 2024, including any amendments or reports filed for the purpose of updating such description, including the description of our common stock included as Exhibit 4.2 to our Annual Report on Form 10-K for the year ended December 31, 2023, filed with the SEC on March 26, 2024.

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 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 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.

You may obtain any of the documents incorporated by reference in this prospectus from the SEC through the SEC's website at the address provided above. Documents incorporated by reference are also 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 or phone number:

Kyverna Therapeutics, Inc.
5980 Horton St., STE 550
Emeryville, CA 94608
(510) 925-2492
Attn: Chief Executive Officer

You also may access these filings on our internet site at *www.kyvernatx.com*. The inclusion of our website address in this prospectus is an inactive textual reference only. 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 have incorporated exhibits into the registration statement of which this prospectus is a part. You should read the exhibits carefully for provisions that may be important to you.

Up to $50,000,000

Common Stock

Prospectus

Jefferies

April 15, 2025