

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

**POST EFFECTIVE
AMENDMENT NO. 1 TO
FORM S-1 ON
FORM S-3
REGISTRATION STATEMENT**

*Under
THE SECURITIES ACT OF 1933*

LEXEO THERAPEUTICS, INC.

(Exact name of Registrant as specified in its charter)

Delaware
(State or other jurisdiction of
incorporation or organization)

85-4012572
(I.R.S. Employer
Identification Number)

345 Park Avenue South, Floor 6
New York, New York, 10010
Tel: (212) 547-9879
(Address, including zip code, and telephone number, including area code, of Registrant's principal executive offices)

R. Nolan Townsend
Chief Executive Officer
Lexeo Therapeutics, Inc.
345 Park Avenue South, Floor 6
New York, New York, 10010
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(Name, address, including zip code, and telephone number, including area code, of agent for service)

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Approximate date of commencement of proposed sale to the public: From time to time after the effective date of this registration statement.

If the only securities being registered on this Form are being offered pursuant to dividend or interest reinvestment plans, please check the following box:

If any of the securities being registered on this Form are to be offered on a delayed or continuous basis pursuant to Rule 415 under the Securities Act of 1933, other than securities offered only in connection with dividend or interest reinvestment plans, check the following box.

If this Form is filed to register additional securities for an offering pursuant to Rule 462(b) under the Securities Act, please check the following box and list the Securities Act registration statement number of the earlier effective registration statement for the same offering.

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

If this Form is a registration statement pursuant to General Instruction I.D. or a post-effective amendment thereto that shall become effective upon filing with the Commission pursuant to Rule 462(e) under the Securities Act, check the following box.

If this Form is a post-effective amendment to a registration statement filed pursuant to General Instruction I.D. filed to register additional securities or additional classes of securities pursuant to Rule 413(b) under the Securities Act, check the following box.

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

Large accelerated filer

Accelerated filer

Non-accelerated filer

Smaller reporting company

Emerging growth company

If an emerging growth company, indicate by check mark if the registrant has elected not to use the extended transition period for complying with any new or revised financial accounting standards provided pursuant to Section 7(a)(2)(B) of the Securities Act.

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

Securities Act of 1933, as amended or until the Registration Statement shall become effective on such date as the Securities and Exchange Commission acting pursuant to said Section 8(a), may determine.

EXPLANATORY NOTE

On April 9, 2024, we filed a registration statement with the Securities and Exchange Commission, or the SEC, on Form S-1 (File No. 333-278566), or the Initial Registration Statement. The Initial Registration Statement was declared effective by the SEC on April 12, 2024 to initially register the resale from time to time by the selling stockholders identified in this prospectus of 6,974,248 shares of our common stock, par value \$0.0001 per share.

We are filing this Post-Effective Amendment No. 1 to Form S-1 on Form S-3, or the Post-Effective Amendment No. 1, to (i) convert the registration statement on Form S-1 into a registration statement on Form S-3; and (ii) update certain other information in the Initial Registration Statement.

No additional securities are being registered under this Post-Effective Amendment No. 1. All applicable registration fees were paid at the time of the filing of the Initial Registration Statement.

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

Subject to Completion, dated December 2, 2024

PROSPECTUS

6,974,248 Shares of Common Stock



This prospectus relates to the offer and resale from time to time of up to 6,974,248 shares (the "Shares") of common stock, par value \$0.0001 per share ("Common Stock"), of Lexeo Therapeutics, Inc., a Delaware corporation (the "Company"), by the selling stockholders identified in this prospectus, including their transferees, pledgees or donees or their respective successors (the "Selling Stockholders"). The Shares consist of (i) 6,278,905 shares which were issued and sold to the Selling Stockholders on March 13, 2024 (the "Closing Date") in a private placement (the "Private Placement") pursuant to a common stock purchase agreement among us and such Selling Stockholders dated March 11, 2024 (the "Purchase Agreement") and (ii) 695,343 shares of Common Stock held by the Selling Stockholders as of March 11, 2024. Concurrently with the Purchase Agreement, we entered into a registration rights agreement (the "Registration Rights Agreement") with the Selling Stockholders, and we are registering the Shares being offered hereunder pursuant to such registration rights agreement on behalf of the Selling Stockholders, to be offered and sold by them from time to time.

The Selling Stockholders may sell any, all or none of the securities and we do not know when or in what amount the Selling Stockholders may sell their securities hereunder following the date of this prospectus. The Selling Stockholders may sell the securities described in this prospectus in a number of different ways and at varying prices. We provide more information about how the Selling Stockholders may sell their securities in the section titled "Plan of Distribution" appearing elsewhere in this prospectus.

We will not receive any of the proceeds from the sale of the securities by the Selling Stockholders. We will pay the expenses associated with registering the sales by the Selling Stockholders other than any underwriting discounts and commissions, as described in more detail in the section titled "Use of Proceeds" appearing elsewhere in this prospectus.

Our Common Stock is listed on The Nasdaq Global Market ("Nasdaq") under the symbol "LXEO". On November 29, 2024, the last quoted sale price for our Common Stock as reported on Nasdaq was \$8.23 per share.

We are an "emerging growth company" and a "smaller reporting company" as defined under the federal securities laws, and, as such, may elect to comply with certain reduced public company reporting requirements for this prospectus and for future filings. See "Prospectus Summary—Implications of Being an Emerging Growth Company and a Smaller Reporting Company."

Investing in our securities involves a high degree of risk. Before buying any securities, you should carefully read the discussion of the risks and uncertainties of investing in our securities described in the section titled "[Risk Factors](#)" beginning on page 6 of this prospectus, and under similar headings in any amendments or supplements to this prospectus as well as the documents incorporated by reference in this prospectus.

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

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.

Prospectus dated _____, 2024

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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 the “shelf” registration process. Under this shelf registration process, the Selling Stockholders and their permitted transferees may, from time to time, sell the shares offered by them described in the section titled “Plan of Distribution.” We will not receive any proceeds from the sale by such Selling Stockholders of the securities offered by them described in this prospectus.

This prospectus provides you with a general description of the securities that may be offered. To the extent necessary, each time that the Selling Securityholders offer and sell securities, we or the Selling Securityholders may provide a prospectus supplement to this prospectus that contains specific information about the securities being offered and sold and the specific terms of that offering. To the extent permitted by law, we may also authorize one or more free writing prospectuses that may contain material information relating to these offerings. Such prospectus supplement or free writing prospectus may also add, update or change information contained in this prospectus with respect to that offering. If there is any inconsistency between the information in this prospectus and the applicable prospectus supplement or free writing prospectus, you should rely on the prospectus supplement or free writing prospectus, as applicable. Before purchasing any securities, you should carefully read both this prospectus and any applicable prospectus supplement (and any applicable free writing prospectuses), together with the additional information described under the heading “Where You Can Find More Information” and “Incorporation by Reference.”

Neither we nor the Selling Securityholders have authorized anyone to provide you with any information or to make any representations other than those contained, or incorporated by reference, in this prospectus, any applicable prospectus supplement or in any related free writing prospectus. Neither we nor the Selling Securityholders take any responsibility for, nor provide any assurance as to the reliability of, any other information that others may give you. This prospectus and any applicable prospectus supplement or any related free writing prospectus do not constitute an offer to sell or the solicitation of an offer to buy any securities other than the securities described in the applicable prospectus supplement or an offer to sell or the solicitation of an offer to buy such securities in any circumstances in which such offer or solicitation is unlawful. You should assume that the information appearing in this prospectus and any applicable prospectus supplement to this prospectus is accurate only as of the date on its respective cover, that the information appearing in any applicable free writing prospectus is accurate only as of the date of that free writing prospectus, and that any information incorporated by reference is accurate only as of the date of the document incorporated by reference, unless we indicate otherwise. Our business, financial condition, results of operations and prospects may have changed materially since those dates.

This prospectus, any prospectus supplement or free writing prospectus, and the documents incorporated by reference therein contain summaries of certain provisions contained in some of the documents described or incorporated by reference herein, but reference is made to the actual documents for complete information. All of

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the summaries are qualified in their entirety by the actual documents. Copies of some of the documents referred to herein have been filed, will be filed or will be incorporated by reference as exhibits to the registration statement of which this prospectus is a part, and you may obtain copies of those documents as described below under the section titled “Where You Can Find More Information.”

For investors outside of the United States: Neither we nor the Selling Securityholders, have done anything that would permit this offering or possession or distribution of this prospectus in any jurisdiction where action for that purpose is required, other than in the United States. 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 our securities and the distribution of this prospectus outside the United States.

The Lexeo design logo and the Lexeo mark appearing in this prospectus are the property of Lexeo Therapeutics, Inc. Trade names, trademarks and service marks of other companies appearing in this prospectus are the property of their respective holders. We have omitted the ® and TM designations, as applicable, for the trademarks used in this prospectus.

SPECIAL NOTE REGARDING FORWARD-LOOKING STATEMENTS

This prospectus, any prospectus supplement and the documents incorporated by reference herein and therein contain certain statements that constitute forward-looking statements within the meaning of Section 27A of the Securities Act and Section 21E of the Securities Exchange Act of 1934, as amended, or the Exchange Act. that involve risks and uncertainties. In some cases, you can identify forward-looking statements by terms such as “may,” “will,” “should,” “expect,” “plan,” “anticipate,” “could,” “intend,” “target,” “project,” “estimate,” “believe,” “estimate,” “predict,” “potential” or “continue” or the negative of these terms or other similar expressions intended to identify statements about the future, but these are not the exclusive means of identifying such statements. Those statements appear in this prospectus, any accompanying prospectus supplement and the documents incorporated herein and therein by reference, particularly in the sections titled “Business,” “Risk Factors” and “Management’s Discussion and Analysis of Financial Condition and Results of Operations” and include statements regarding the intent, belief or current expectations of our management that are subject to known and unknown risks, uncertainties and assumptions. We make such forward-looking statements pursuant to the safe harbor provisions of the Private Securities Litigation Reform Act of 1995 and other federal securities laws. Forward-looking statements contained or incorporated by reference in this prospectus include, without limitation, statements about:

- the timing, progress and results of our preclinical studies and clinical trials of our product candidates, including statements regarding the timing of initiation and completion of studies or trials and related preparatory work, the period during which the results of the trials will become available and our research and development programs;
- the timing of our planned investigational new drug, or IND, submissions, initiation of planned clinical trials and timing of expected clinical results for LX2006, LX1001, LX2020, if applicable, and our other future product candidates;
- the timing of any submission of filings for regulatory approval of and our ability to obtain and maintain regulatory approvals for LX2006, LX1001, LX2020 and any other product candidates;
- the impact of public health crises (such as COVID-19) and other adverse global economic conditions on our operations and the potential disruption in the operations and business of third-party manufacturers, contract research organizations, or CROs, other service providers, and collaborators with whom we conduct business;
- our ability to identify patients with the diseases treated by our product candidates, and to enroll patients in trials;
- the beneficial characteristics, safety, efficacy and therapeutic effects of our product candidates;
- the ability of our preclinical studies and clinical trials to demonstrate safety and efficacy of our product candidates, and other positive results;
- our expectations regarding the size of the patient populations, market acceptance and opportunity for and clinical utility of our product candidates, if approved for commercial use;
- our manufacturing capabilities and strategy, including the scalability and commercial viability of our manufacturing methods and processes;
- our reliance on third-party manufacturing partners to comply with significant regulations with respect to manufacturing our products;
- our expectations regarding the scope of any approved indication for LX2006, LX1001, LX2020 or any other product candidate;
- our ability to successfully commercialize our product candidates, if approved;
- our ability to leverage our platform to identify and develop future product candidates;

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- our estimates of our expenses, ongoing losses, future revenue, capital requirements and our need for or ability to obtain additional funding before we can expect to generate any revenue from product sales;
- our ability to establish or maintain collaborations or strategic relationships and any expected benefits related thereto;
- our ability to identify, recruit and retain key personnel;
- 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 candidates, and the scope of such protection;
- our financial performance;
- our competitive position and the development of and projections relating to our competitors 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 caution you that the foregoing list does not contain all of the forward-looking statements made in this prospectus, any prospectus supplement and the information incorporated by reference herein and therein.

We have based these forward-looking statements largely on our current expectations and projections about our business, the industry in which we operate and financial trends that we believe may affect our business, financial condition, results of operations and prospects, and these forward-looking statements are not guarantees of future performance or development. The forward-looking statements contained in this prospectus, any prospectus supplement and the information incorporated by reference herein and therein speak only as of the applicable date of such document and are subject to a number of risks, uncertainties and assumptions described in the section titled “Risk Factors” and elsewhere in this prospectus, any prospectus supplement and the information incorporated by reference herein and therein. Because forward-looking statements are inherently subject to risks and uncertainties, some of which cannot be predicted or quantified and some of which are beyond our control, you should not rely on these forward-looking statements as predictions of future events. Although we believe that we have a reasonable basis for each forward-looking statement contained in this prospectus and the documents incorporated by reference in this prospectus, the events and circumstances reflected in our forward-looking statements may not be achieved or occur and actual results could differ materially from those projected in the forward-looking statements. Except as required by applicable law, we do not plan to publicly update or revise any forward-looking statements contained in this prospectus, any prospectus supplement and the information incorporated by reference herein and therein, whether as a result of any new information, future events or otherwise.

In addition, statements in this prospectus, any prospectus supplement and the information incorporated by reference herein and therein 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 document containing such statement, and while we believe such information forms a reasonable basis for such statements, such information may be limited or incomplete, and our 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 you are cautioned not to unduly rely upon these statements.

PROSPECTUS SUMMARY

This summary highlights, and is qualified in its entirety by, information contained elsewhere in or incorporated by reference in this prospectus. This summary does not contain all of the information you should consider before investing in our Common Stock. You should carefully read this entire prospectus, especially the section of this prospectus titled “Risk Factors” and the financial statements and related notes and other information that we incorporate by reference herein, including our Annual Report on Form 10-K and our Quarterly Reports on Form 10-Q. As used in this prospectus, unless the context otherwise requires, references to “we,” “us,” “our,” “the Company,” and “Lexeo” refer to Lexeo Therapeutics, Inc.

Overview

We are a clinical stage genetic medicine company dedicated to transforming healthcare by applying pioneering science to fundamentally change how disease is treated. By taking aim at the underlying genetic cause of the devastating diseases we target, we seek to create substantial positive impact and reduce the overwhelming burdens placed on people receiving treatment, their caregivers, and healthcare systems. Our current pipeline consists of candidates targeting patient populations that place significant burden on society and are most amenable to our genetic medicine approach.

Our most advanced cardiovascular product candidate, LX2006 for the treatment of patients with Friedreich ataxia, or FA, cardiomyopathy, is currently being evaluated in SUNRISE-FA, an ongoing Phase 1/2 clinical trial. We have observed an increase in frataxin protein expression in the hearts of four patients that have undergone cardiac biopsies across cohort 1 (n=1) and cohort 2 (n=3). In July 2024, we announced interim clinical data of LX2006 from the ongoing Lexeo-sponsored SUNRISE-FA trial and Cornell investigator-initiated trial, providing baseline characteristics from 11 participants that had been treated and follow-up data from 8 participants that had reached at least 6-months of follow-up, showing improvements in key cardiac biomarkers including left ventricular mass index, lateral wall thickness, and high-sensitivity troponin I. LX2006 has been generally well-tolerated across both SUNRISE-FA and Weill Cornell investigator-initiated trials to date. One possibly treatment-related Grade 2 event of asymptomatic myocarditis was observed one year after dosing; participant with multiple comorbidities and history of flu-like symptoms prior to diagnosis which may have been a contributing factor. A biopsy was performed six weeks after diagnosis and results were negative for myocarditis and participant remains asymptomatic. In November 2024, we announced that we reached alignment with the U.S. Food and Drug Administration, or FDA, on key elements of a registrational development plan for LX2006, including accelerated approval pathway with left ventricular mass index and frataxin protein expression as co-primary registrational endpoints. LX2006 has received Rare Pediatric Disease designation, Orphan Drug designation, Fast Track designation and Regenerative Medicine Advanced Therapy, or RMAT, designation from the FDA, and Orphan Medicinal Product designation from the European Commission. Our second most advanced cardiovascular product candidate, LX2020 for the treatment of arrhythmogenic cardiomyopathy, or ACM, caused by mutations in the PKP2 gene, referred to as PKP2-ACM, is currently being evaluated in HEROIC-PKP2, an ongoing Phase 1/2 clinical trial. We have completed enrollment of cohort 1 and expect to provide an interim data readout from that cohort in the later part of the first quarter or early part of the second quarter of 2025. LX2020 received Fast Track and Orphan Drug designations from the FDA in December 2023.

Our lead Alzheimer’s disease product candidate, LX1001, for the treatment of APOE4 homozygous patients with Alzheimer’s disease, is in an ongoing Phase 1/2 trial. In October 2024, we reported interim data across all four dose cohorts at the Clinical Trials on Alzheimer’s Disease conference in Madrid, Spain. LX1001 was generally well-tolerated across all dose cohorts with no reports of amyloid-related imaging abnormalities. Four serious adverse events were reported, with three deemed unrelated to treatment and one event of mild-moderate sensorineural hearing loss assessed as possibly related to treatment with repeat audiometry pending. A dose and time-dependent increase in neuroprotective APOE2 expression was observed in all participants with ongoing

durability at 12 months, and reductions in cerebrospinal fluid tau biomarkers and tau positron emission tomography were seen in a majority of patients.

We are targeting diseases that have seen limited penetration of precision medicine, which we define as medications that treat the underlying molecular mechanism of a disease, and where we believe there is significant opportunity for gene therapy to play a role as a key therapeutic option. We believe the specific indications we are initially targeting, FA cardiomyopathy, PKP2-ACM and APOE4-associated Alzheimer's disease, are highly amenable to gene therapy, where administration of a single dose has the potential to either restore loss-of-function or minimize gain-of-function mutations by treating the underlying genetic cause of the disease. Although few precision medicines are currently approved for the treatment of cardiovascular conditions or Alzheimer's disease, recent approvals by the FDA suggest a willingness to approve new precision medicines based on biomarkers and functional endpoints. Together with improved diagnostics and increased testing, these developments may offer one of the most substantial opportunities for the uptake of precision medicines in the global pharmaceutical marketplace.

Each of our gene therapy candidates utilizes the vector construct, dose and route of administration that we believe will result in the most favorable biodistribution and safety profile for our product candidate for each disease. Our most advanced cardiovascular and APOE4-associated Alzheimer's disease programs use the AAVrh10 vector due to its high transduction efficiency in both myocardial cells and neurons, potential for lower toxicity given the opportunity to utilize lower doses compared to other well-established AAV serotypes, and low pre-existing immunity.

By specifically tailoring our technological approach to each targeted disease, we believe we can optimize our programs to achieve the highest likelihood of having therapeutic impact. We target genetically defined indications in specific sub-groups of patients that offer the potential to demonstrate therapeutic impact through improvement in functional endpoints or biomarkers, have high unmet need and large market opportunities, have established proof-of-concept in relevant preclinical models, and have organized patient advocacy groups and identifiable patient populations. In addition to targeting cardiovascular diseases and APOE4-associated Alzheimer's disease that we believe can be addressed by our current approach utilizing AAVrh10, we have ongoing discovery efforts to identify next-generation vector technologies with the best potential therapeutic profile. Finally, we continuously seek to bolster our pipeline through relationships with academic institutions, providing us access to cutting edge genetic medicines research which will include not only AAV gene therapy but also other potential therapeutic payload types and non-viral delivery systems. In August 2023, we announced a strategic investment from Sarepta Therapeutics, Inc. to explore collaboration opportunities within our preclinical cardiovascular pipeline.

Corporate History and Information

In February 2017, we were formed as a Delaware limited liability company under the name LEXEO Therapeutics, LLC. In November 2020, we converted into a Delaware corporation and were renamed Lexeo Therapeutics, Inc. Our principal executive offices are located at 345 Park Avenue South, Floor 6, New York, New York 10010, and our telephone number is (212) 547-9879. Our website address is www.lexeotx.com. The information contained on, or accessible through, our website is not incorporated by reference in this prospectus. Our Annual Report on Form 10-K, Quarterly Reports on Form 10-Q, Current Reports on Form 8-K and amendments to reports filed pursuant to Sections 13(a) and 15(d) of the Exchange Act, are filed with the SEC. Such reports and other information filed by us with the SEC are available free of charge on our website at ir.lexeotx.com when such reports are available on the SEC's website. The SEC maintains an internet site that contains reports, proxy and information statements and other information regarding issuers that file electronically with the SEC at www.sec.gov. The information contained on the websites referenced in this prospectus and in the documents that are incorporated by reference in this prospectus is not incorporated by reference in this filing. Further, our references to website URLs are intended to be inactive textual references only.

IPO and PIPE Financing

On November 7, 2023, we completed our initial public offering, or IPO, pursuant to which we issued and sold 9,090,910 shares of our Common Stock. Subsequently, we issued and sold 1,048,746 additional shares in connection with the partial exercise by the underwriters of their 30-day option to purchase additional shares of Common Stock at a public offering price of \$11.00 per share. The total gross proceeds from the IPO and the subsequent partial exercise of the underwriters' 30-day option to purchase additional shares of Common Stock were approximately \$111.5 million and the total net proceeds were approximately \$100.3 million, after deducting underwriting discounts and commissions and other offering expenses.

In addition, on March 13, 2024, we issued and sold 6,278,905 shares of our Common Stock at a price per share of \$15.13 pursuant to the Private Placement. The gross proceeds from the Private Placement were approximately \$95 million, and the total net proceeds were approximately \$88.9 million, after deducting commissions and offering expenses.

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, 2028, (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 U.S. Securities and Exchange Commission, which means the market value of our Common Stock that is held by non-affiliates exceeds \$700.0 million as of the prior June 30, 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 the documents incorporated by reference into this prospectus. Accordingly, the information contained and incorporated by reference 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 plus the proposed aggregate amount of gross proceeds to us as a result of this offering is less than \$700.0 million and our annual revenue was less than \$100.0 million during the most recently completed fiscal year. We may continue to be a smaller reporting company after this offering if either (i) the market value of our shares held by non-affiliates is less than \$250.0 million or (ii) our annual revenue was less than \$100.0 million during the most recently completed fiscal year and the market value of our shares 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.

Channels of Distribution

We announce material information to the public through filings with the SEC, the investor relations page on our website, press releases, public conference calls, and webcasts in order to achieve broad, non-exclusionary distribution of information to the public and for complying with our disclosure obligations under Regulation FD. We encourage investors, the media, and others to follow the channels listed above and to review the information disclosed through such channels. Any updates to the list of disclosure channels through which we will announce information will be posted on the investor relations page on our website.

THE OFFERING

Resale of Common Stock	The offer and sale of shares were initially registered in the Initial Registration Statement filed on April 9, 2024. No new shares are being added in this Post-Effective Amendment No. 1.
Shares of Common Stock offered by the Selling Stockholders hereunder	6,974,248 shares
Use of Proceeds	We will not receive any proceeds from the sale of our Common Stock offered by the Selling Stockholders under this prospectus, or the “Securities. See the section of this prospectus titled “Use of Proceeds” appearing elsewhere in this prospectus for more information.
Risk Factors	See the section titled “Risk Factors” beginning on page 6 of this prospectus and the documents incorporated herein by reference, for a discussion of factors that you should consider carefully before deciding to invest in our Common Stock.
Nasdaq Global Market Symbol	“LXEO”

Unless otherwise noted, the number of our shares of Common Stock outstanding is based on 33,070,045 shares of Common Stock outstanding as of September 30, 2024, and excludes:

- 3,471,849 shares of our Common Stock issuable upon the exercise of outstanding options, with a weighted-average exercise price of \$11.44 per share;
- 272,692 shares of our Common Stock issuable upon the vesting of restricted stock units, or RSUs, outstanding as of September 30, 2024 under our 2023 Equity Incentive Plan, or the 2023 Plan;
- 2,458 shares of our Common Stock issuable upon the vesting of RSUs granted after September 30, 2024 under the 2023 Plan;
- 2,447,697 shares of our Common Stock reserved for future issuance under the 2023 Plan; and
- 505,284 shares of our Common Stock reserved for future issuance under our 2023 Employee Stock Purchase Plan, or the 2023 ESPP.

Unless otherwise noted, the information in this prospectus assumes no exercise of outstanding options or vesting of RSUs subsequent to September 30, 2024.

RISK FACTORS

Investing in our Common Stock involves a high degree of risk. Before making an investment decision, you should consider carefully the risks, uncertainties and assumptions described under “Part I—Item 1A—Risk Factors” of our most recent Annual Report on Form 10-K and in “Part II—Item 1A—Risk Factors” in our most recent Quarterly Report on Form 10-Q filed subsequent to such Form 10-K that are incorporated herein by reference as may be amended, supplemented or superseded from time to time by other reports we file with the SEC in the future, and all other information contained or incorporated by reference in this prospectus, as updated by our subsequent filings under the Exchange Act, and the risk factors and other information contained in any applicable prospectus supplement and any applicable free writing prospectus. Our business, operating results, financial condition or prospects could also be harmed by risks and uncertainties not currently known to us or that we currently do not believe are material. If any of the risks actually occur, our business, operating results, financial condition and prospects could be adversely affected. In that event, the market price of our Common Stock could decline, and you could lose part or all of your investment. Please also carefully read the sections titled “Cautionary Note Regarding Forward-Looking Statements” and “Incorporation by Reference.”

USE OF PROCEEDS

All of the Shares offered by the Selling Stockholders pursuant to this prospectus will be sold by the Selling Stockholders for their respective accounts. We will not receive any of the proceeds from the sale of the Shares hereunder.

SELLING STOCKHOLDERS

This prospectus relates to the resale of up to 6,974,248 shares of our Common Stock held by the Selling Stockholders.

The Selling Stockholders may from time to time offer and sell any or all of the shares of Common Stock set forth below pursuant to this prospectus and any accompanying prospectus supplement. When we refer to the “Selling Stockholders” in this prospectus, we mean the persons listed in the table below, and the pledgees, donees, transferees, assignees, successors, designees and others who later come to hold any of the Selling Stockholders’ interest in the Common Stock other than through a public sale.

The following table is prepared based on information provided to us by the Selling Stockholders and the 33,077,545 shares of Common Stock outstanding as of November 15, 2024. It sets forth, as of the date of this prospectus, the names of the Selling Stockholders, and the aggregate number of shares of Common Stock that the Selling Stockholders may offer pursuant to this prospectus. Shares of Common Stock offered and beneficially owned are based primarily on information initially provided to us by the Selling Stockholders indicating the Common Stock they wished to be covered by this registration statement and eligible for sale under this prospectus. For purposes of this table, we have assumed that the Selling Stockholders will have sold all of the securities covered by this prospectus upon the completion of the offering.

We cannot advise you as to whether the Selling Stockholders will in fact sell any or all of such securities. In particular, the Selling Stockholders identified below may have sold, transferred or otherwise disposed of all or a portion of their shares after the date on which they provided us with information regarding their securities. Any changed or new information given to us by the Selling Stockholders, including regarding the identity of, and the securities held by, each Selling Stockholder, will be set forth in a prospectus supplement or amendments to the registration statement of which this prospectus is a part, if and when necessary.

Please see the section entitled “Plan of Distribution” for further information regarding the Selling Stockholders’ method of distributing these securities.

We have determined beneficial ownership in accordance with the rules and regulations of the SEC and the information is not necessarily indicative of beneficial ownership for any other purpose. Except as indicated by the footnotes below, we believe, based on information furnished to us, that the persons and entities named in the table below have sole voting and sole investment power with respect to all shares that they beneficially own, subject to applicable community property laws.

Unless otherwise indicated, the address of each beneficial owner listed in the table below is c/o Lexeo Therapeutics, Inc., 345 Park Avenue South, Floor 6, New York, New York, 10010.

Name of Selling Stockholder	Shares Beneficially Owned Prior to this Offering		Shares Being Offered	Shares Beneficially Owned After this Offering	
	Number of Shares	Percentage		Number of Shares	Percentage
Adage Capital Partners, L.P.(1)	1,247,736	3.8%	1,222,736	25,000	*
Allostery Master Fund LP(2)	123,046	*	33,046	90,000	*
Braidwell Partners Master Fund LP(3)	1,322,277	4.0%	1,321,877	400	*
Citadel CEMF Investments Ltd. and affiliates(4)	2,504,412	7.6%	462,656	2,041,756	6.2%
Eventide Asset Management, LLC(5)	3,369,147	10.2%	330,469	3,038,678	9.2%
Gray’s Creek Capital Partners Fund I, LP(6)	128,784	*	33,046	95,738	*
Integrated Core Strategies (US) LLC(7)	783,694	2.4%	462,656	321,038	1.0%
Invus Public Equities, L.P.(8)	801,716	2.4%	198,281	603,435	1.8%

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Name of Selling Stockholder	Shares Beneficially Owned Prior to this Offering		Shares Being Offered	Shares Beneficially Owned After this Offering	
	Number of Shares	Percentage		Number of Shares	Percentage
Irving Investors, LLC(9)	99,140	*	99,140	—	*
Laurion Capital Master Fund Ltd(10)	454,182	1.4%	198,281	255,901	*
Longitude Capital Partners IV, LLC(11)	2,765,381	8.4%	198,281	2,567,100	7.8%
Novo Holdings A/S(12)	1,638,298	5.0%	330,469	1,307,829	4.0%
Octagon Investments Master Fund LP(13)	132,187	*	132,187	—	*
Omega Fund VI, L.P.(14)	2,355,904	7.1%	198,281	2,157,623	6.5%
RA Capital Healthcare Fund, L.P.(15)	660,938	2.0%	660,938	—	*
Entities Affiliated with Vestal Point Capital, LP(16)	175,000	*	165,234	9,766	*
Woodline Master Fund LP(17)	794,483	2.4%	794,483	—	*
Xantium Partners L.P.(18)	132,187	*	132,187	—	*

* Represents beneficial ownership or voting power of less than one percent.

- (1) Represents shares held by Adage Capital Partners, L.P. (“Adage Capital Partners”). Adage Capital Management, L.P. (“Adage Capital Management”) has investment control over the securities held by Adage Capital Partners. Bob Atchinson and Phillip Gross are the managing members of Adage Capital Advisors, L.L.C., which is the managing member of Adage Capital Partners GP, L.L.C., which is the general partner of Adage Capital Management, and each such person or entity, as the case may be, has shared voting and/or investment power over the shares held by Adage Capital Partners and may be deemed the beneficial owner of such shares, and each such person or entity, as the case may be, disclaims beneficial ownership of such securities except to the extent of their respective pecuniary interest therein. The address of Adage Capital Partners is 200 Clarendon Street, 52nd Floor, Boston, Massachusetts 02116.
- (2) Represents shares held by Allostry Master Fund LP (“Allostry Master Fund”). Allostry Funds GP LLC (“Allostry Funds GP”) may be deemed the beneficial owner of the shares held by Allostry Master Fund because it is the general partner of Allostry Master Fund. Allostry Investments LP (“Allostry Investments”) may be deemed the beneficial owner of the shares held by Allostry Master Fund because it is the investment manager of Allostry Master Fund. Allostry Investments GP LLC (the “Investments GP”) may be deemed the beneficial owner of the shares beneficially held by Allostry Investments because it is the general partner of Allostry Investments. Christopher Staral and David Modest may be deemed the beneficial owners of the shares beneficially held by each of Investments GP and Allostry Funds GP by virtue of their positions as managing members of Investments GP and Allostry Funds GP. The address of Allostry Master Fund is c/o Maples Corporate Services Limited, Ugland House, South Church Street, Grand Cayman KY1-1104, Cayman Islands.
- (3) Represents shares held by Braidwell Partners Master Fund LP (“Braidwell Partners”). The general partner of Braidwell Partners is Braidwell GP LLC (“Braidwell GP”), and the investment manager of Braidwell Partners is Braidwell LP. Braidwell Management LLC (“Braidwell Management”) is the managing member of both Braidwell GP and Braidwell LP. Alex Karnal and Brian Kreiter are the managing members of Braidwell Management and may be deemed to share voting and investment power with respect to the shares held by Braidwell Partners. Mr. Karnal and Mr. Kreiter disclaim beneficial ownership of the shares held by Braidwell Partners except to the extent of their pecuniary interests in such shares, if any. The address of Braidwell Partners is c/o Braidwell LP, One Harbor Point, 2200 Atlantic Street, Stamford, Connecticut 06902.
- (4) Represents shares held by Citadel CEMF Investments Ltd. (“CCIL”) and affiliates. “Shares Beneficially Owned Prior to the Offering” includes (i) 462,656 shares held by CCIL, a selling stockholder, and (ii) 2,041,756 shares held by affiliates of CCIL, including Citadel Multi-Strategy Equities Master Fund Ltd. (“CEMF”), which holds 2,038,606 shares. Citadel Advisors LLC (“Citadel Advisors”) is the portfolio manager of CCIL and CEMF. Citadel Advisors Holdings LP (“CAH”), is the sole member of Citadel Advisors. Citadel GP LLC (“CGP”), is the general partner of CAH. Kenneth Griffin owns a controlling

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interest in CGP. Mr. Griffin, as the owner of a controlling interest in CGP, may be deemed to have shared power to vote or direct the vote of, and/or shared power to dispose or to direct the disposition over, the shares beneficially owned reported here. “Shares to be Sold in this Offering” are shares held by CCIL. This disclosure is not and shall not be construed as an admission that Mr. Griffin or any of the entities listed above is the beneficial owner of any securities of the Company other than the securities actually owned by such person (if any). The address of CCIL and CEMF is c/o Citadel Enterprise Americas LLC, Southeast Financial Center, 200 S. Biscayne Blvd., Suite 3300, Miami, Florida 33131.

- (5) Represents shares held by Mutual Fund Series Trust, on behalf of Eventide Healthcare & Life Sciences Fund. Eventide Healthcare & Life Sciences Fund is a registered investment company for which Eventide Asset Management, LLC acts as investment advisor. Eventide Asset Management, LLC has voting and investment power with respect to the shares. The address of Mutual Fund Series Trust is Mutual Fund Series Trust, O/B/O Eventide Healthcare & Life Sciences Fund, 80 Arkay Drive, Suite 110, Hauppauge, New York 11788.
- (6) Represents shares held by Gray’s Creek Capital Partners Fund I, LP (“Gray’s Creek Capital Partners”). Gray’s Creek Capital Partners is managed by Gray’s Creek Capital Advisors, LLC (“Gray’s Creek Capital Advisors”) and Gray’s Creek Capital Partners, GP (“Gray’s Creek GP”). Jason R. Little and Gerrit B. Parker are the natural persons who have voting or investment control over the shares held by Gray’s Creek Capital Advisors and Gray’s Creek GP, and thus have voting or investment control over the shares being offered. The address of Gray’s Creek Capital Partners is 272 Post Road East, Westport, Connecticut 06880.
- (7) Represents shares held by Integrated Core Strategies (US) LLC and its affiliates, ICS Opportunities II LLC and ICS Opportunities, Ltd. These shares may be deemed to be beneficially owned by Millennium Management LLC, Millennium Group Management LLC and Mr. Englander and/or other investment managers that may be controlled by Millennium Group Management LLC (the managing member of Millennium Management LLC) and Mr. Englander (the sole voting trustee of the managing member of Millennium Group Management LLC). The foregoing should not be construed in and of itself as an admission by Millennium Management LLC, Millennium Group Management LLC or Mr. Englander as to the beneficial ownership of the securities held by such entities. The address for Integrated Core Strategies (US) LLC is c/o Millennium Management LLC, 399 Park Avenue, New York, New York 10022.
- (8) Represents shares held by Invus Public Equities, L.P. (“Invus PE”). Invus Public Equities Advisors, LLC (“Invus PE Advisors”) controls Invus PE, as its general partner and accordingly, may be deemed to beneficially own the shares held by Invus PE. The Geneva branch of Artal International S.C.A. (“Artal International”) controls Invus PE Advisors, as its managing member and accordingly, may be deemed to beneficially own the shares held by Invus PE. Artal International Management S.A. (“Artal International Management”), as the managing partner of Artal International, controls Artal International and accordingly, may be deemed to beneficially own the shares that Artal International may be deemed to beneficially own. Artal Group S.A. (“Artal Group”), as the sole stockholder of Artal International Management, controls Artal International Management and accordingly, may be deemed to beneficially own the shares that Artal International Management may be deemed to beneficially own. Westend S.A. (“Westend”), as the parent company of Artal Group, controls Artal Group and accordingly, may be deemed to beneficially own the shares that Artal Group may be deemed to beneficially own. Stichting Administratiekantoor Westend (the “Stichting”), as majority shareholder of Westend, controls Westend and accordingly, may be deemed to beneficially own the shares that Westend may be deemed to beneficially own. Mr. Amaury Wittouck, as the sole member of the board of the Stichting, controls the Stichting and accordingly, may be deemed to beneficially own the shares that the Stichting may be deemed to beneficially own. The address for Invus PE and Invus PE Advisors is 750 Lexington Avenue, 30th Floor, New York, NY 10022. The address for Artal International, Artal International Management, Artal Group, Westend and Mr. Wittouck is Valley Park, 44, Rue de la Vallée, L-2661, Luxembourg. The address for the Stichting is Claude Debussylaan, 46, 1082 MD Amsterdam, The Netherlands.
- (9) Represents shares held by Irving Investors, LLC. Jeremy Ableson is the natural person who has voting or investment control over the shares held by Irving Investors, LLC. The address of Irving Investors, LLC is 205 Detroit Street (4th Floor), Denver, Colorado 80206.

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- (10) Represents shares held by Laurion Capital Master Fund Ltd. (“Laurion Capital Master Fund”). Laurion Capital Management LP (“Laurion Capital Management”), the investment manager of Laurion Capital Master Fund, has voting and investment power over the shares held by Laurion Capital Master Fund. Messrs. Benjamin A. Smith and Sheehan Maduraperuma are the managing members of Laurion Capital GP LLC (“Laurion Capital GP”), which is the general partner of Laurion Capital Management. Each of Laurion Capital Master Fund, Laurion Capital GP, Benjamin A. Smith and Sheehan Maduraperuma disclaims beneficial ownership over these shares. The address of Laurion Capital Master Fund is c/o Laurion Capital Management LP, 360 Madison Avenue, Suite 1900, New York, New York 10017.
- (11) Represents shares held by Longitude Venture Partners IV, L.P. (“LVP IV”). Longitude Capital Partners IV, LLC (LCP IV), is the general partner of LVP IV and may be deemed to have voting and investment power over the shares held by LVP IV. Patrick Enright and Juliet Tammenoms Bakker are managing members of LCP IV and may be deemed to share voting and investment power over the shares held by LVP IV. Each of LCP IV, Ms. Tammenoms Bakker and Mr. Enright disclaims beneficial ownership of such shares except to the extent of their respective pecuniary interests therein. The address of LVP IV is 2740 Sand Hill Road, 2nd Floor, Menlo Park, California 94025.
- (12) Represents shares held by Novo Holdings A/S (“Novo”). Novo has the sole power to vote and dispose these shares, and no person or entity is deemed to have any beneficial ownership or reportable pecuniary interest in the shares held by Novo. The address for Novo is Tuborg Havnevej 19, DK-2900 Hellerup, Denmark.
- (13) Represents shares held by Octagon Investments Master Fund LP (“Octagon Master Fund”). Octagon Capital Advisors LP (“Octagon”) serves as the investment manager of Octagon Master Fund. Mr. Ting Jia is the managing member of Octagon. By virtue of these relationships, each of Octagon and Mr. Jia may be deemed to beneficially own the Company’s shares directly owned by Octagon Master Fund. The address of Octagon Master Fund is c/o Octagon 654 Madison Avenue 21st Floor, New York, New York 10065.
- (14) Represents shares held by Omega Fund VI, L.P. (“Omega Fund”). Omega Fund VI GP Manager, Ltd. (“Omega Ltd.”) is the sole general partner of Omega Fund VI GP, L.P. (“Omega GP”), which is the sole general partner of Omega Fund. Each of Omega Ltd. and Omega GP may be deemed to own beneficially the shares held by Omega Fund. Otello Stampacchia, Claudio Nessi and Anne-Mari Paster are the directors of Omega Ltd., and, as a result, may be deemed to share voting and investment power over the shares held directly by Omega Fund. Each of Dr. Stampacchia, Dr. Nessi, Ms. Paster, Omega Ltd. and Omega GP disclaims beneficial ownership of the shares held by Omega Fund except to the extent of their pecuniary interest therein. The address for Omega Fund is 888 Boylston Street, Suite 1111, Boston, Massachusetts 02199.
- (15) Represents shares held by RA Capital Healthcare Fund L.P. (“RA Capital Healthcare”). RA Capital Management, L.P. (“RA Capital Management”) is the investment manager for RA Capital Healthcare. The general partner of RA Capital Management is RA Capital Management GP, LLC (“RA Capital Management GP”), of which Peter Kolchinsky and Rajeev Shah are the managing members. Each of RA Capital Management, RA Capital Management GP, Mr. Kolchinsky and Mr. Shah may be deemed to have voting and investment power over the shares held by RA Capital Healthcare. RA Capital Management, RA Capital Management GP, Mr. Kolchinsky and Mr. Shah disclaim beneficial ownership of such shares, except to the extent of any pecuniary interest therein. The address of the persons and entities listed above is 200 Berkeley Street, 18th Floor, Boston, Massachusetts 02116.
- (16) Represents (i) 81,812 shares held by Vestal Point Master Fund, LP (“Vestal Point Master Fund”) and (ii) 93,188 shares held by an account separately managed by Vestal Point Capital, LP (“Vestal Point Capital”). The sole general partner of Vestal Point Master Fund is Vestal Point Partners GP, LLC (“Vestal Point Partners GP”). The managing member of Vestal Point Partners GP is Ryan Wilder. The sole general partner of Vestal Point Capital is Vestal Point Capital, LLC. The managing member of Vestal Point Capital, LLC is Mr. Wilder. As a result, Mr. Wilder may be deemed to have voting and investment power over the shares held by Vestal Point Master Fund and the account separately managed by Vestal Point Capital. Mr. Wilder disclaims beneficial ownership of such shares, except to the extent of his pecuniary interest therein. The address of these entities and Mr. Wilder is c/o Vestal Point Capital, LP, 632 Broadway, Suite 602, New York, New York 10012.

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- (17) Represents shares held by Woodline Master Fund LP (“Woodline Master Fund”). Woodline Partners LP (“Woodline Partners”) serves as the investment manager of Woodline Master Fund and may be deemed to be the beneficial owner of the shares. Woodline Partners disclaims any beneficial ownership of these shares. The address of Woodline Master Fund is 4 Embarcadero Center, Suite 3450, San Francisco, California 94111.
- (18) Represents shares held by Xantium Partners L.P. (“Xantium Partners”). Tudor Investment Corporation is the trading advisor that both directs investment and retains voting power for the shares held by Xantium Partners. The address for Xantium Partners is c/o Tudor Investment Corporation, 200 Elm Street, Stamford, Connecticut 06902.

DESCRIPTION OF CAPITAL STOCK

The description of our securities is incorporated by reference to Exhibit 4.3 to our Annual Report on Form 10-K for the year ended December 31, 2023, filed with the SEC on March 11, 2024.

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, distribute in kind for no consideration 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:

- 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 effected after the date the registration statement of which this prospectus is a part is declared effective by the SEC;
- through the writing or settlement of options or other hedging transactions, whether through an options exchange or otherwise;
- broker-dealers may agree with the Selling Stockholders to sell a specified number of such shares at a stipulated price per share;
- through the distribution of the securities by any Selling Stockholder to its partners, members or stockholders;
- by pledge to secured debts and other obligations or any transfer upon the foreclosure under such pledges;
- directly to one or more purchasers;
- through delayed delivery requirements;
- a combination of any such methods of sale; and
- any other method permitted by 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 pledgee, transferee 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 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

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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 the creation of 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).

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. The Company 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 of 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 agents, 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 Securities Exchange Act of 1934, as amended, 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 commercially reasonable 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 (1) such time as all of the shares covered by this prospectus have been disposed of pursuant to and in accordance with such registration statement or (2) the date that all the shares covered by this prospectus cease to be Registrable Securities.

We will bear all costs, expenses and fees in connection with the registration of the Selling Stockholders’ securities, which will total approximately \$123,000.00.

LEGAL MATTERS

The validity of the Securities offered hereby has been passed upon for us by Wilson Sonsini Goodrich & Rosati, Professional Corporation, New York, New York, which has acted as our counsel in connection with this offering.

EXPERTS

The financial statements of Lexeo Therapeutics, Inc. as of December 31, 2023 and 2022, and for the years then ended have been incorporated by reference herein in reliance upon the report of KPMG LLP, independent registered public accounting firm, upon the authority of said firm as experts in accounting and auditing.

WHERE YOU CAN FIND ADDITIONAL INFORMATION

We file annual, quarterly and current reports, proxy statements and other information with the SEC. The SEC maintains an Internet website at www.sec.gov that contains reports, proxy and information statements and other information about issuers, like us, that file electronically with the SEC. We also maintain a website at www.lexeotx.com. We make available, free of charge, on our investor relations website at ir.lexeotx.com, our Annual Reports on Form 10-K, Quarterly Reports on Form 10-Q, Current Reports on Form 8-K and amendments to these reports as soon as reasonably practicable after electronically filing or furnishing those reports to the SEC. Information contained on our website is not a part of or incorporated by reference in this prospectus and the inclusion of our website and investor relations website addresses in this prospectus is an inactive textual reference only.

This prospectus and any prospectus supplement is part of a registration statement that we filed with the SEC and do not contain all of the information in the registration statement. You should review the information and exhibits in the registration statement for further information on us and the securities that we are offering. Forms of any documents establishing the terms of the offered securities are filed as exhibits to the registration statement of which this prospectus forms a part or under cover of a Current Report on Form 8-K and incorporated in this prospectus by reference. Statements in this prospectus or any prospectus supplement about these documents are summaries and each statement is qualified in all respects by reference to the document to which it refers. You should read the actual documents for a more complete description of the relevant matters.

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. 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 (File No. 001-41855):

- our Annual Report on [Form 10-K](#) for the fiscal year ended December 31, 2023, filed with the SEC on March 11, 2024;
- our definitive Proxy Statement on [Schedule 14A](#), filed with the SEC on April 26, 2024 (excluding those portions that are not incorporated by reference into our Annual Report on Form 10-K for the fiscal year ended December 31, 2023);
- our Quarterly Reports on Form 10-Q for the quarters ended March 31, 2024, June 30, 2024 and September 30, 2024, filed with the SEC on [May 9, 2024](#), [August 12, 2024](#) and [November 13, 2024](#), respectively; and

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- our Current Reports on Form 8-K filed with the SEC on [March 11, 2024](#), [April 16, 2024](#), [April 22, 2024](#), [April 22, 2024](#), [June 28, 2024](#), [July 8, 2024](#), [July 15, 2024](#), [October 9, 2024](#), [October 30, 2024](#) and [November 13, 2024](#), in each case to the extent the information included in such reports is filed and not furnished.

We also incorporate by reference into this prospectus all documents (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) that are filed by us with the SEC pursuant to Sections 13(a), 13(c), 14 or 15(d) of the Exchange Act after the date of the initial registration statement of which this prospectus is a part and prior to the effectiveness of such registration statement and all documents that are filed by us with the SEC pursuant to Sections 13(a), 13(c), 14 or 15(d) of the Exchange Act after the date of this prospectus but prior to the termination of the offering. These documents include periodic reports, such as Annual Reports on Form 10-K, Quarterly Reports on Form 10-Q and Current Reports on Form 8-K, as well as proxy statements.

Notwithstanding the statements in the preceding paragraphs, no document, report or exhibit (or portion of any of the foregoing) or any other information that we have “furnished” to the SEC pursuant to the Exchange Act shall be incorporated by reference in this prospectus.

We will furnish without charge to you, on written or oral request, a copy of any or all of the documents incorporated by reference in this prospectus, including exhibits to these documents. You should direct any requests for documents to Lexeo Therapeutics, Inc., Attn: Corporate Secretary, 345 Park Avenue South, Floor 6, New York, New York 10010.

You also may access these filings on our website at ir.lexeotx.com. We do not incorporate the information on our website into this prospectus or any supplement to this prospectus and you should not consider any information on, or that can be accessed through, our website as part of this prospectus or any supplement to this prospectus (other than those filings with the SEC that we specifically incorporate by reference into this prospectus or any supplement to this prospectus).

Any statement contained in a document incorporated or deemed to be incorporated by reference in this prospectus will be deemed modified, superseded or replaced for purposes of this prospectus to the extent that a statement contained in this prospectus modifies, supersedes or replaces such statement.

6,974,248 Shares of Common Stock



PROSPECTUS

, 2024

You should rely only on the information contained in this prospectus or any supplement or amendment hereto. We have not authorized anyone to provide you with different information. You should not assume that the information contained in this prospectus or any supplement or amendment hereto is accurate as of any date other than the date of this prospectus or any such supplement or amendment. 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.

PART II
INFORMATION NOT REQUIRED IN PROSPECTUS

Item 14. Other Expenses of Issuance and Distribution

The following table sets forth all expenses to be paid by us in connection with the issuance and distribution of the shares of Common Stock being registered by this registration statement. All amounts shown are estimates except for the SEC registration fee.

We will bear all costs, expenses and fees in connection with the registration of the securities. Selling Stockholders, however, will bear all brokers and underwriting commissions and discounts, if any, attributable to their sale of the Securities.

	Amount
SEC registration fee ⁽¹⁾	\$ 12,991.02
Accounting fees and expenses	40,000.00
Legal fees and expenses	50,000.00
Financial printing and miscellaneous expenses	20,000.00
Total	\$ 122,991.02

⁽¹⁾ Previously paid.

Item 15. Indemnification of Directors and Officers

Section 102(b)(7) of the Delaware General Corporation Law, or the DGCL, allows a corporation to provide in its certificate of incorporation that a director of the corporation will not be personally liable to the corporation or its stockholders for monetary damages for breach of fiduciary duty as a director, except where the director breached the duty of loyalty, failed to act in good faith, engaged in intentional misconduct or knowingly violated a law, authorized the payment of a dividend or approved a stock repurchase in violation of Delaware corporate law or obtained an improper personal benefit. Our amended and restated certificate of incorporation provides for this limitation of liability.

Section 145 of the DGCL, provides, among other things, that a Delaware corporation may indemnify any person who was, is or is threatened to be made, party to any threatened, pending or completed action, suit or proceeding, whether civil, criminal, administrative or investigative (other than an action by or in the right of such corporation), by reason of the fact that such person is or was an officer, director, employee or agent of such corporation or is or was serving at the request of such corporation as a director, officer, employee or agent of another corporation or enterprise. The indemnity may include expenses (including attorneys' fees), judgments, fines and amounts paid in settlement actually and reasonably incurred by such person in connection with such action, suit or proceeding, provided such person acted in good faith and in a manner he or she reasonably believed to be in or not opposed to the corporation's best interests and, with respect to any criminal action or proceeding, had no reasonable cause to believe that his or her conduct was unlawful. A Delaware corporation may indemnify any persons who were or are a party to any threatened, pending or completed action or suit by or in the right of the corporation by reason of the fact that such person is or was a director, officer, employee or agent of another corporation or enterprise. The indemnity may include expenses (including attorneys' fees) actually and reasonably incurred by such person in connection with the defense or settlement of such action or suit, provided such person acted in good faith and in a manner he or she reasonably believed to be in or not opposed to the corporation's best interests, provided further that no indemnification is permitted without judicial approval if the officer, director, employee or agent is adjudged to be liable to the corporation. Where an officer or director is successful on the merits or otherwise in the defense of any action referred to above, the corporation must indemnify him or her against the expenses (including attorneys' fees) which such officer or director has actually and reasonably incurred.

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Section 145 further authorizes a corporation to purchase and maintain insurance on behalf of any person who is or was a director, officer, employee or agent of the corporation or is or was serving at the request of the corporation as a director, officer, employee or agent of another corporation or enterprise, against any liability asserted against such person and incurred by such person in any such capacity, or arising out of his or her status as such, whether or not the corporation would otherwise have the power to indemnify such person under Section 145.

Our Bylaws provide that we must indemnify and advance expenses to our directors and officers to the full extent authorized by the DGCL.

We have entered into indemnification agreements with each of our directors and executive officers. Such agreements may require us, among other things, to advance expenses and otherwise indemnify our executive officers and directors against certain liabilities that may arise by reason of their status or service as executive officers or directors, to the fullest extent permitted by law.

The indemnification rights set forth above shall not be exclusive of any other right which an indemnified person may have or hereafter acquire under any statute, any provision of our Certificate of Incorporation, Bylaws, agreement, vote of stockholders or disinterested directors or otherwise. Notwithstanding the foregoing, we shall not be obligated to indemnify a director or officer in respect of a proceeding (or part thereof) instituted by such director or officer, unless such proceeding (or part thereof) has been authorized by the Board pursuant to the applicable procedure outlined in our Bylaws.

Section 174 of the DGCL provides, among other things, that a director, who willfully or negligently approves of an unlawful payment of dividends or an unlawful stock purchase or redemption, may be held jointly and severally liable for such actions. A director who was either absent when the unlawful actions were approved or dissented at the time may avoid liability by causing his or her dissent to such actions to be entered in the books containing the minutes of the meetings of the Board at the time such action occurred or immediately after such absent director receives notice of the unlawful acts.

We currently maintain and expect to continue to maintain standard policies of insurance that provide coverage (1) to our directors and officers against loss arising from claims made by reason of breach of duty or other wrongful act and (2) to us with respect to indemnification payments that we may make to such directors and officers.

These provisions may discourage stockholders from bringing a lawsuit against our directors for breach of their fiduciary duty. These provisions also may have the effect of reducing the likelihood of derivative litigation against directors and officers, even though such an action, if successful, might otherwise benefit us and our stockholders. Furthermore, a stockholder's investment may be adversely affected to the extent we pay the costs of settlement and damage awards against officers and directors pursuant to these indemnification provisions.

We believe that these provisions, the insurance, and the indemnity agreements are necessary to attract and retain talented and experienced officers and directors.

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Item 16. Exhibits and Financial Statement Schedules

(a) Exhibits

Exhibit No.	Description	Form	Incorporated by reference		Exhibit No.	Filing Date	Filed or Furnished Herewith
			File No.				
3.1	Amended and Restated Certificate of Incorporation of the Registrant (as amended and currently in effect)	8-K	001-41855		3.1	November 7, 2023	
3.2	Amended and Restated Bylaws of the Registrant (as amended and currently in effect)	8-K	001-41855		3.2	November 7, 2023	
4.1†	Amended and Restated Investors' Rights Agreement, dated August 10, 2021, by and among the Registrant and certain of its stockholders	S-1	333-274777		4.1	September 29, 2023	
4.2	Form of Common Stock Certificate of the Registrant	S-1/A	333-274777		4.2	October 30, 2023	
4.3	Form of Registration Rights Agreement, dated March 11, 2024	10-K	001-41855		4.4	March 11, 2024	
5.1	Opinion of Wilson Sonsini Goodrich & Rosati, P.C.	S-1	333-278566		5.1	April 9, 2024	
23.1	Consent of KPMG LLP, independent registered public accounting firm of Lexeo Therapeutics, Inc.						X
23.2	Consent of Wilson Sonsini Goodrich & Rosati, P.C. (included in Exhibit 5.1 hereto)	S-1	333-278566		23.2	April 9, 2024	
24.1	Power of Attorney (included in the signature page to this Registration Statement)						X
107	Filing Fee Table	S-1	333-278566		107	April 9, 2024	

† Schedules and exhibits to this agreement have been omitted pursuant to Item 601(b)(2) of Regulation S-K. A copy of any omitted schedule and/or exhibit will be furnished to the SEC upon request.

(b) Financial Statement Schedules

All financial statement schedules are omitted because the information called for is not required or is shown either in the consolidated financial statements or in the accompanying notes. The financial statements filed as part of this registration statement are listed in the index to the financial statements immediately preceding such financial statements, which index to the financial statements is incorporated herein by reference.

Item 17. Undertakings

(a) The undersigned registrant hereby undertakes:

(1) to file, during any period in which offers or sales are being made, a post-effective amendment to this registration statement:

- (i) to include any prospectus required by Section 10(a)(3) of the Securities Act of 1933, as amended, or the Securities Act;
- (ii) to reflect in the prospectus any facts or events arising after the effective date of the registration statement (or the most recent post-effective amendment thereof) which, individually or in the aggregate, represent a fundamental change in the information set forth in the registration statement. Notwithstanding the foregoing, any increase or decrease in volume of securities offered (if the total dollar value of securities offered would not exceed that which was registered) and any deviation from the low or high end of the estimated maximum offering range may be reflected in the form of prospectus filed with the SEC, pursuant to Rule 424(b) if, in the aggregate, the changes in volume and price represent no more than a 20% change in the maximum aggregate offering price set forth in the "Calculation of Registration Fee" table in the effective registration statement; and
- (iii) to include any material information with respect to the plan of distribution not previously disclosed in the registration statement or any material change to such information in the registration statement;

provided, however, that paragraphs (1)(i), (1)(ii) and (1)(iii) do not apply if the information required to be included in a post-effective amendment by those paragraphs is contained in reports filed with or furnished to the SEC by the registrant pursuant to Section 13 or Section 15(d) of the Securities Exchange Act of 1934, as amended, or the Exchange Act, that are incorporated by reference in the registration statement, or is contained in a form of prospectus filed pursuant to Rule 424(b) that is part of the registration statement.

(2) that, for the purpose of determining any liability under the Securities Act, each such post-effective amendment shall be deemed to be a new registration statement relating to the securities offered therein, and the offering of such securities at that time shall be deemed to be the initial bona fide offering thereof.

(3) to remove from registration by means of a post-effective amendment any of the securities being registered which remain unsold at the termination of the offering.

(4) that, for the purpose of determining liability under the Securities Act to any purchaser:

- (i) each prospectus filed by the registrant pursuant to Rule 424(b)(3) shall be deemed to be part of the registration statement as of the date the filed prospectus was deemed part of and included in the registration statement; and
- (ii) each prospectus required to be filed pursuant to Rule 424(b)(2), (b)(5), or (b)(7) as part of a registration statement in reliance on Rule 430B relating to an offering made pursuant to Rule 415(a)(1)(i), (vii) or (x) for the purpose of providing the information required by Section 10(a) of the Securities Act of 1933 shall be deemed to be part of and included in the registration statement as of the earlier of the date such form of prospectus is first used after effectiveness or the date of the first contract of sale of securities in the offering described in the prospectus. As provided in Rule 430B, for liability purposes of the issuer and any person that is at that date an underwriter, such date shall be deemed to be a new effective date of the registration statement relating to the securities in the registration statement to which that prospectus relates, and the offering of such securities at that time shall be deemed to be the initial bona fide offering thereof. Provided, however, that no statement made in a registration

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statement or prospectus that is part of the registration statement or made in a document incorporated or deemed incorporated by reference into the registration statement or prospectus that is part of the registration statement will, as to a purchaser with a time of contract of sale prior to such effective date, supersede or modify any statement that was made in the registration statement or prospectus that was part of the registration statement or made in any such document immediately prior to such effective date.

(5) that, for the purpose of determining liability of the registrant under the Securities Act to any purchaser in the initial distribution of the securities, the undersigned registrant undertakes that in a primary offering of securities of the undersigned registrant pursuant to this registration statement, regardless of the underwriting method used to sell the securities to the purchaser, if the securities are offered or sold to such purchaser by means of any of the following communications, the undersigned registrant will be a seller to the purchaser and will be considered to offer or sell such securities to such purchaser:

- (i) any preliminary prospectus or prospectus of the undersigned registrant relating to the offering required to be filed pursuant to Rule 424;
- (ii) any free writing prospectus relating to the offering prepared by or on behalf of the undersigned registrant or used or referred to by the undersigned registrant;
- (iii) the portion of any other free writing prospectus relating to the offering containing material information about the undersigned registrant or its securities provided by or on behalf of the undersigned registrant; and
- (iv) any other communication that is an offer in the offering made by the undersigned registrant to the purchaser.

(6) that, for purposes of determining any liability under the Securities Act, each filing of the registrant's annual report pursuant to Section 13(a) or Section 15(d) of the Exchange Act (and, where applicable, each filing of an employee benefit plan's annual report pursuant to Section 15(d) of the Exchange Act) that is incorporated by reference in the registration statement shall be deemed to be a new registration statement relating to the securities offered therein, and the offering of such securities at that time shall be deemed to be the initial bona fide offering thereof.

(b) Insofar as indemnification for liabilities arising under the Securities Act may be permitted to directors, officers and controlling persons of the registrant pursuant to the foregoing provisions, or otherwise, the registrant has been advised that in the opinion of the Securities and Exchange Commission such indemnification is against public policy as expressed in the Securities Act and is, therefore, unenforceable. In the event that a claim for indemnification against such liabilities (other than the payment by the registrant of expenses incurred or paid by a director, officer or controlling person of the registrant in the successful defense of any action, suit or proceeding) is asserted by such director, officer or controlling person in connection with the securities being registered, the registrant will, unless in the opinion of its counsel the matter has been settled by controlling precedent, submit to a court of appropriate jurisdiction the question whether such indemnification by it is against public policy as expressed in the Securities Act and will be governed by the final adjudication of such issue.

SIGNATURES

Pursuant to the requirements of the Securities Act of 1933, the registrant has duly caused this registration statement to be signed on its behalf by the undersigned, thereunto duly authorized in New York, New York, on December 2, 2024.

LEXEO THERAPEUTICS, INC.

By: /s/ R. Nolan Townsend
R. Nolan Townsend
Chief Executive Officer

POWER OF ATTORNEY

KNOW ALL PERSONS BY THESE PRESENTS, that each person whose signature appears below constitutes and appoints R. Nolan Townsend and Jenny R. Robertson and each one of them, as his or her true and lawful attorneys-in-fact and agents, with full power of substitution and resubstitution, for them and in their name, place and stead, in any and all capacities, to sign any and all amendments (including post-effective amendments) to this registration statement, and to sign any new registration statement with respect to the offering contemplated thereby filed pursuant to Rule 462(b) under the Securities Act of 1933, as amended, and all post-effective amendments thereto, and to file the same, with all exhibits thereto and other documents in connection therewith, with the Securities and Exchange Commission, granting unto said attorneys-in-fact and agents, and each of them, full power and authority to do and perform each and every act and thing requisite and necessary to be done in connection therewith, as fully to all intents and purposes as they might or could do in person, hereby ratifying and confirming all that said attorneys-in-fact and agents or any of them, or their substitute or substitutes, may lawfully do or cause to be done by virtue hereof.

Pursuant to the requirements of the Securities Act of 1933, this registration statement has been signed by the following persons in the capacities and on the dates indicated.

<u>Signature</u>	<u>Title</u>	<u>Date</u>
<u>/s/ R. Nolan Townsend</u> R. Nolan Townsend	Chief Executive Officer and Director (Principal Executive, Financial and Accounting Officer)	December 2, 2024
<u>/s/ Mette Kirstine Agger</u> Mette Kirstine Agger	Director	December 2, 2024
<u>/s/ Steven Altschuler</u> Steven Altschuler, M.D.	Director	December 2, 2024
<u>/s/ Paula HJ Cholmondeley</u> Paula HJ Cholmondeley	Director	December 2, 2024
<u>/s/ Brenda Cooperstone</u> Brenda Cooperstone, M.D.	Director	December 2, 2024
<u>/s/ Reinaldo Diaz</u> Reinaldo Diaz	Director	December 2, 2024

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<u>/s/ Tim Van Hauwermeiren</u> Tim Van Hauwermeiren	Director	December 2, 2024
<u>/s/ Tolga Tanguler</u> Tolga Tanguler	Director	December 2, 2024

Consent of Independent Registered Public Accounting Firm

We consent to the use of our audit report dated March 11, 2024, with respect to the consolidated financial statements of Lexeo Therapeutics, Inc., incorporated herein by reference, and to the reference to our firm under the heading "Experts" in the prospectus.

KPMG LLP

New York, New York
December 2, 2024