

## 6,974,248 Shares of Common Stock



This prospectus supplement is being filed to update and supplement the information contained in the prospectus dated April 12, 2024 (as supplemented from time to time, the “Prospectus”), which forms a part of our registration statement on Form S-1 (No. 333-278566), with the information contained in our Current Report on Form 8-K filed with the Securities and Exchange Commission on April 16, 2024 (the “Current Report”). Accordingly, we have attached the Current Report to this prospectus supplement. 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.

This prospectus supplement updates and supplements the information in the Prospectus and is not complete without, and may not be delivered or utilized except in combination with, the Prospectus, including any amendments or supplements thereto. This prospectus supplement should be read in conjunction with the Prospectus and if there is any inconsistency between the information in the Prospectus and this prospectus supplement, you should rely on the information in this prospectus supplement.

Our Common Stock is listed on The Nasdaq Global Market (“Nasdaq”) under the symbol “LXEO”. On April 15, 2024, the last quoted sale price for our Common Stock as reported on Nasdaq was \$12.09 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.

**Investing in our securities involves a high degree of risk. Before buying any securities, you should carefully read the discussion of the risks of investing in our securities in “Risk Factors” beginning on page 13 of the Prospectus.**

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

Prospectus supplement dated April 16, 2024

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UNITED STATES  
SECURITIES AND EXCHANGE COMMISSION  
WASHINGTON, D.C. 20549

FORM 8-K

CURRENT REPORT

Pursuant to Section 13 or 15(d) of the Securities Exchange Act of 1934

Date of Report (Date of earliest event reported): April 16, 2024

Lexeo Therapeutics, Inc.

(Exact name of Registrant as Specified in Its Charter)

Delaware  
(State or Other Jurisdiction  
of Incorporation)

001-41855  
(Commission File Number)

85-4012572  
(IRS Employer  
Identification No.)

345 Park Avenue South, Floor 6  
New York, New York  
(Address of Principal Executive Offices)

10010  
(Zip Code)

Registrant's Telephone Number, Including Area Code: 212 547-9879

N/A

(Former Name or Former Address, if Changed Since Last Report)

Check the appropriate box below if the Form 8-K filing is intended to simultaneously satisfy the filing obligation of the registrant under any of the following provisions:

- Written communications pursuant to Rule 425 under the Securities Act (17 CFR 230.425)
- Soliciting material pursuant to Rule 14a-12 under the Exchange Act (17 CFR 240.14a-12)
- Pre-commencement communications pursuant to Rule 14d-2(b) under the Exchange Act (17 CFR 240.14d-2(b))
- Pre-commencement communications pursuant to Rule 13e-4(c) under the Exchange Act (17 CFR 240.13e-4(c))

Securities registered pursuant to Section 12(b) of the Act:

Title of each class	Trading Symbol(s)	Name of each exchange on which registered
Common Stock, \$0.0001 par value per share	LXEO	Nasdaq Global Market

Indicate by check mark whether the registrant is an emerging growth company as defined in Rule 405 of the Securities Act of 1933 (§ 230.405 of this chapter) or Rule 12b-2 of the Securities Exchange Act of 1934 (§ 240.12b-2 of this chapter).

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 13(a) of the Exchange Act.

**Item 8.01 Other Events.**

On April 16, 2024, Lexeo Therapeutics, Inc. (the “**Registrant**”) issued a press release announcing that the U.S. Food and Drug Administration granted Fast Track designation to the Registrant’s AAVrh.10hFXN-based gene therapy candidate, LX2006. A copy of the press release is attached as Exhibit 99.1 to this Current Report on Form 8-K and is incorporated by reference herein.

**Item 9.01 Financial Statements and Exhibits.**

(d) Exhibits.

<b>Exhibit Number</b>	<b>Description</b>
99.1	<a href="#">Press Release</a>
104	Cover Page Interactive Data File (embedded within the Inline XBRL document)

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**SIGNATURES**

Pursuant to the requirements of the Securities Exchange Act of 1934, the registrant has duly caused this report to be signed on its behalf by the undersigned hereunto duly authorized.

Lexeo Therapeutics, Inc.

Date: April 16, 2024

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

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## **Lexeo Therapeutics Granted FDA Fast Track Designation for LX2006, an AAV-Based Gene Therapy Candidate for the Treatment of Friedreich's Ataxia Cardiomyopathy**

**NEW YORK** – April 16, 2024 (GLOBE NEWSWIRE) – Lexeo Therapeutics, Inc. (Nasdaq: LXEO), a clinical stage genetic medicine company dedicated to pioneering treatments for genetically defined cardiovascular diseases and APOE4-associated Alzheimer's disease, today announced the U.S. Food and Drug Administration (FDA) has granted Fast Track designation to LX2006, the company's AAVrh.10hFXN-based gene therapy candidate for the treatment of Friedreich's ataxia (FA) cardiomyopathy. LX2006 is designed to deliver a functional frataxin gene to promote frataxin protein expression and restore mitochondrial function in myocardial cells.

Fast Track is a process designed to facilitate the development and expedite the review of new drugs intended to treat serious conditions and address unmet medical need. This designation was granted based on available preclinical data. SUNRISE-FA, a Phase 1/2 multicenter, 52-week, dose-ascending, open-label clinical trial, is ongoing to evaluate the safety and tolerability, as well as preliminary efficacy, of LX2006 in patients with FA cardiomyopathy.

"FA cardiomyopathy is the leading cause of death among FA patients, and there are currently no approved treatment options. The FDA's Fast Track designation for LX2006 underscores the significant unmet need for effective treatment options to address the cardiac impact of this debilitating disease," said R. Nolan Townsend, Chief Executive Officer of Lexeo Therapeutics. "We believe today's Fast Track designation, along with the previously announced Rare Pediatric Disease and Orphan Drug designations granted to LX2006, will allow for enhanced regulatory interactions and the potential for this life-improving therapy to reach FA patients more quickly."

LX2006 is administered as a one-time intravenous infusion to patients in at least two ascending-dose cohorts with the potential for a third cohort. Long-term safety and efficacy will be evaluated for an additional four years following completion of the initial year of the trial, resulting in data from a total of five years post-LX2006 treatment.

### **About LX2006**

LX2006 is an AAV-based gene therapy candidate delivered intravenously for the treatment of FA cardiomyopathy, the most common cause of mortality in patients with FA affecting approximately 5,000 patients in the United States. LX2006 is designed to target the cardiac manifestations of FA by delivering a functional frataxin gene to promote the expression of the frataxin protein and restore mitochondrial function in myocardial cells. In preclinical studies, LX2006 reversed the cardiac abnormalities in FA disease models and showed improvement in cardiac function and survival while demonstrating a favorable safety profile. The FDA has granted Fast Track designation, Rare Pediatric Disease designation and Orphan Drug designation to LX2006 for the treatment of FA cardiomyopathy.

### **About Lexeo Therapeutics**

Lexeo Therapeutics is a New York City-based, clinical stage genetic medicine company dedicated to transforming healthcare by applying pioneering science to fundamentally change how genetically defined cardiovascular diseases and APOE4-associated Alzheimer's disease are treated. Using a stepwise development approach, Lexeo is leveraging early proof-of-concept functional and biomarker data to advance a pipeline of cardiovascular and APOE4-associated Alzheimer's disease programs.

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### **Cautionary Note Regarding Forward-Looking Statements**

Certain statements in this press release may constitute “forward-looking statements” within the meaning of the federal securities laws, including, but not limited to, our expectations and plans regarding our current product candidates and programs, including statements regarding the anticipated timing of the initiation of and results from our clinical trials and other information that is not historical information. Words such as “may,” “might,” “will,” “objective,” “intend,” “should,” “could,” “can,” “would,” “expect,” “believe,” “design,” “estimate,” “predict,” “potential,” “develop,” “plan” or the negative of these terms, and similar expressions, or statements regarding intent, belief, or current expectations, are forward-looking statements. While Lexeo believes these forward-looking statements are reasonable, undue reliance should not be placed on any such forward-looking statements. These forward-looking statements are based upon current information available to the company as well as certain estimates and assumptions and are subject to various risks and uncertainties (including, without limitation, those set forth in Lexeo’s filings with the U.S. Securities and Exchange Commission (SEC)), many of which are beyond the company’s control and subject to change. Actual results could be materially different from those indicated by such forward looking statements as a result of many factors, including but not limited to: risks and uncertainties related to global macroeconomic conditions and related volatility; expectations regarding the initiation, progress, and expected results of Lexeo’s preclinical studies, clinical trials and research and development programs; the unpredictable relationship between preclinical study results and clinical study results; delays in submission of regulatory filings or failure to receive regulatory approval; liquidity and capital resources; and other risks and uncertainties identified in Lexeo’s Annual Report on Form 10-K for the annual period ended December 31, 2023, filed with the SEC on March 11, 2024, and subsequent future filings Lexeo may make with the SEC. New risks and uncertainties may emerge from time to time, and it is not possible to predict all risks and uncertainties. Lexeo claims the protection of the Safe Harbor contained in the Private Securities Litigation Reform Act of 1995 for forward-looking statements. Lexeo expressly disclaims any obligation to update or alter any statements whether as a result of new information, future events or otherwise, except as required by law.

### **Media Response:**

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### **Investor Response:**

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