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As filed with the Securities and Exchange Commission on March 24, 2025

Registration No. 333-283561

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

Neurogene Inc.
(Exact name of registrant as specified in its charter)

Delaware	**98-0542593**
(State or other jurisdiction of incorporation or organization)	**(I.R.S. Employer Identification No.)**

535 W 24th St.
5th Floor
New York, NY 10011
(855) 508-3568
(Address, including zip code, and telephone number, including area code, of registrant's principal executive offices)

Donna Cochener
Senior Vice President, General Counsel
Neurogene Inc.
535 W 24th St.
5th Floor
New York, NY 10011
(855) 508-3568
(Name, address, including zip code, and telephone number, including area code, of agent for service)

Copies to:
Ryan A. Murr
Branden C. Berns
Gibson, Dunn & Crutcher LLP
One Embarcadero Center, Suite 2600
San Francisco, CA 94111
(415) 393-8373

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, 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 or until this registration statement shall become effective on such date as the Commission, acting pursuant to said Section 8(a), may determine.

EXPLANATORY NOTE

Neurogene Inc., a Delaware corporation (the "***Company***"), filed a Registration Statement on Form S-1 on December 2, 2024, which was declared effective on December 16, 2024 (the "***registration statement***"). This Post-Effective Amendment No. 1 to Form S-1 on Form S-3 (the "***Post-Effective Amendment No. 1***") is being filed by the Company to (i) convert the registration statement on Form S-1 into a registration statement on Form S-3 and (ii) include updated information regarding certain of the selling stockholders named in the prospectus.

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

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The information in this prospectus is not complete and may be changed. The Selling Stockholders named in this prospectus may not sell these securities or accept an offer to buy these securities 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 such offer or sale is not permitted.

SUBJECT TO COMPLETION, DATED MARCH 24, 2025

PROSPECTUS

Neurogene Inc.

4,000,042 Shares

Common Stock

Offered by the Selling Stockholders

This prospectus relates to the proposed resale or other disposition by the selling stockholders identified herein (the "Selling Stockholders") of up to (i) 1,835,000 shares of our common stock, par value $0.000001 per share ("Common Stock") and (ii) 2,165,042 shares of Common Stock issuable upon the exercise of pre-funded warrants (the "Pre-Funded Warrants"). The shares of Common Stock registered by this prospectus are referred to herein as the "Resale Shares."

The Resale Shares were issued and sold to accredited investors in a private placement (the "PIPE"), which closed on November 5, 2024. We are not selling any Resale Shares under this prospectus and will not receive any of the proceeds from the sale or other disposition of Resale Shares by the Selling Stockholders. Upon any exercise of the Pre-Funded Warrants by payment of cash, however, we will receive the nominal cash exercise price paid by the holders of the Pre-Funded Warrants. We intend to use those proceeds, if any, for general corporate purposes.

The Selling Stockholders may sell the Resale Shares on any national securities exchange or quotation service on which the securities may be listed or quoted at the time of sale, on the over-the-counter market, in one or more transactions otherwise than on these exchanges or systems, such as privately negotiated transactions, or using a combination of these methods, and at fixed prices, at prevailing market prices at the time of the sale, at varying prices determined at the time of sale, or at negotiated prices. See the disclosure under the heading "Plan of Distribution" elsewhere in this prospectus for more information about how the Selling Stockholders may sell or otherwise dispose of their Resale Shares hereunder.

The Selling Stockholders may sell any, all or none of the securities offered by this prospectus and we do not know when or in what amount the Selling Stockholders may sell their Resale Shares hereunder following the effective date of the registration statement of which this prospectus forms a part. Discounts, concessions, commissions and similar selling expenses attributable to the sale of the Resale Shares will be borne by the Selling Stockholder. We will pay certain fees and expenses (other than discounts, concessions, commissions and similar selling expenses) incident to the registration of the Resale Shares with the SEC.

You should carefully read this prospectus and any applicable prospectus supplement before you invest in any of the securities being offered.

Our Common Stock is traded on The Nasdaq Global Market under the symbol "NGNE." On March 21, 2025, the last reported sale price for our Common Stock was $14.21 per share.

An investment in our securities involves a high degree of risk. You should carefully consider the information under the heading "Risk Factors" beginning on page 4. of this prospectus and any applicable prospectus supplement. We are a "smaller reporting company" as defined by Rule 12b-2 of the Exchange Act and are subject to reduced public company reporting requirements. Neither the Securities and Exchange Commission (nor any state securities commission has approved or disapproved of these securities or determined if this prospectus is truthful or complete. Any representation to the contrary is a criminal offense.

The date of this prospectus is , 2025.

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ABOUT THIS PROSPECTUS

This prospectus is part of a registration statement that we filed with the Securities and Exchange Commission (the "***SEC***") using a "shelf" registration process. Under this shelf registration process, from time to time, the Selling Stockholders may sell the securities described herein in one or more offerings as described in this prospectus.

A prospectus supplement may also add, update, or change information included in this prospectus. Any statement contained in this prospectus will be deemed to be modified or superseded for purposes of this prospectus to the extent that a statement contained in such prospectus supplement modifies or supersedes such statement. Any statement so modified will be deemed to constitute a part of this prospectus only as so modified, and any statement so superseded will be deemed not to constitute a part of this prospectus. You should carefully read this prospectus, any accompanying prospectus supplement, any free writing prospectuses we have prepared or authorized as well as the information incorporated in this prospectus or any accompanying prospectus supplement by reference. See "*Information Incorporated by Reference*." You should rely only on the information contained in this prospectus, any applicable prospectus supplement or any related free writing prospectus we have prepared or authorized, or any subsequent material incorporated herein or therein by reference. See "*Where You Can Find More Information.*"

Neither we nor the Selling Stockholders have authorized anyone to provide you with any information or to make any representation other than the information and representations contained in or incorporated by reference into this prospectus, any accompanying prospectus supplement or any free writing prospectus we have prepared or authorized. We and the Selling Stockholders take no responsibility for, and can provide no assurances as to the reliability of, any other information that others may give you. The information contained in this prospectus (and in any supplement or amendment to this prospectus) or any related free writing prospectus, and the documents incorporated by reference herein and therein, are accurate only as of their respective dates, regardless of the time of delivery of this prospectus, any applicable prospectus supplement or any related free writing prospectus, or any sale of a security. Our business, financial condition, results of operations and prospects may have changed since those dates. We urge you to read carefully this prospectus (as supplemented and amended) before deciding whether to invest in any of the shares of Common Stock being offered.

This prospectus contains summaries of certain provisions contained in some of the documents described herein, but reference is made to the actual documents for complete information. All of 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 entitled "*Where You Can Find More Information*."

In this prospectus, unless the context otherwise requires, the terms "Neurogene," the "Registrant," the "Company," "we," "us," and "our" refer to Neurogene Inc. (formerly Neoleukin Therapeutics, Inc.), a Delaware corporation, and Neurogene Inc., a Nevada corporation, the wholly owned operating subsidiary of the Delaware corporation. The name "Neurogene" is a trademark of the Company in the United States. This report also contains references to registered marks, trademarks and trade names of other companies that are property of their respective holders. All other trademarks, registered marks and trade names appearing in this report are the property of their respective holders.

INFORMATION INCORPORATED BY REFERENCE

This registration statement incorporates by reference important business and financial information about the Company that is not included in or delivered with this document. The information incorporated by reference is considered to be part of this prospectus, and the SEC allows us to "incorporate by reference" the information we file with it, which means that we can disclose important information to you by referring you to those documents instead of having to repeat the information in this prospectus. Any information referenced in this way is considered part of this prospectus. Any subsequent information filed with the SEC will automatically be deemed to update and supersede the information in this prospectus and in our other filings with the SEC. We incorporate by reference:

- our Annual Report on Form 10-K for the fiscal year ended December 31, 2024, filed with the SEC on March 17, 2025 (our "***Annual Report***"); and
- the description of our securities contained in Exhibit 4.3 to our Annual Report, as may be further amended by any amendments or reports filed for the purposes of updating this description.

Notwithstanding the foregoing, information furnished under Items 2.02 and 7.01 of any Current Report on Form 8-K, including the related exhibits under Item 9.01, is not incorporated by reference in this prospectus or any prospectus supplement.

We also incorporate by reference into this prospectus any further filings we make with the SEC under Sections 13(a), 13(c), 14 or 15(d) of the Securities Exchange Act of 1934, as amended (the "***Exchange Act***") (other than portions deemed to have been "furnished" and not filed with the SEC, including those made pursuant to Item 2.02 or Item 7.01 of Form 8-K or other information), including all filings filed after the date hereof and prior to the completion of the offering of all securities under 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 Neurogene Inc., 535 W 24th St., 5th Floor, New York, NY 10011, telephone: (855) 508-3568. You also may access these filings on our website at www.neurogene.com. We do not incorporate the information on our website into this prospectus and you should not consider any information on, or that can be accessed through, our website as part of this prospectus (other than those filings with the SEC that we specifically incorporate by reference into 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.

WHERE YOU CAN FIND MORE INFORMATION

We are subject to the informational requirements of the Exchange Act and are required to file annual, quarterly and other reports, proxy statements and other information with the SEC. The SEC maintains an Internet site (http://www.sec.gov) that contains reports, proxy and information statements, and various other information about us.

Information about us is also available at our website at http://www.neurogene.com. You may access these materials free of charge as soon as reasonably practicable after they are electronically filed with, or furnished to, the SEC. However, the information on our website is not a part of this prospectus and is not incorporated by reference into this prospectus.

We have filed with the SEC this registration statement relating to the securities covered by this prospectus. This prospectus is a part of the registration statement and does not contain all of the information in the registration statement. Whenever a reference is made in this prospectus to a contract or other document of ours, please be aware that the reference is only a summary and that you should refer to the exhibits that are part of the registration statement for a copy of the contract or other document. You may review a copy of the registration statement through the SEC's website or our website.

CAUTIONARY STATEMENT CONCERNING FORWARD-LOOKING STATEMENTS

We make "forward-looking statements" within the meaning of Section 27A of the Securities Act of 1933, as amended (the "***Securities Act***"), and Section 21E of the Exchange Act of 1934, as amended (the "***Exchange Act***"), in this prospectus and any accompanying prospectus supplement, including the documents that we incorporate by reference herein and therein. These forward-looking statements can generally be identified as such because the context of the statement will include words such as "may," "will," "intend," "plan," "believe," "anticipate," "expect," "estimate," "predict," "potential," "continue," "likely," "target," "forecast," or "opportunity," the negative of these words or other similar words. Similarly, statements that describe our plans, strategies, intentions, expectations, objectives, goals or prospects and other statements that are not historical facts are also forward-looking statements. For such statements, we claim the protection of the Private Securities Litigation Reform Act of 1995. Readers of this prospectus are cautioned not to place undue reliance on these forward-looking statements, which speak only as of the time this prospectus was filed with the SEC. These forward-looking statements are based largely on our expectations and projections about future events and future trends affecting our business and are subject to risks and uncertainties that could cause actual results to differ materially from those anticipated in the forward-looking statements. These risks and uncertainties include, without limitation, the risk factors discussed in the section titled "Risk Factors" and elsewhere and incorporated by reference in this prospectus. Except as required by law, we assume no obligation to update or revise these forward-looking statements for any reason, even if new information becomes available in the future.

Any forward-looking statements in this prospectus reflect our current views with respect to future events or to our future financial performance and involve known and unknown risks, uncertainties, and other factors that may cause our actual results, performance, or achievements to be materially different from any future results, performance, or achievements expressed or implied by these forward-looking statements.

This prospectus also contains or incorporates by reference estimates, projections, and other information concerning our industry, our business, and the markets for certain diseases, including data regarding the estimated size of those markets, and the incidence and prevalence of certain medical conditions. Information that is based on estimates, forecasts, projections, market research, or similar methodologies is inherently subject to uncertainties and actual events or circumstances may differ materially from events and circumstances reflected in this information. Unless otherwise expressly stated, we obtained this industry, business, market, and other data from reports, research surveys, studies, and similar data prepared by market research firms and other third parties, industry, medical and general publications, government data, and similar sources.

PROSPECTUS SUMMARY

This summary may not contain all the information that you should consider before investing in securities. You should read the entire prospectus carefully, including the sections titled "Risk Factors" and the consolidated financial statements and related notes and information incorporated by reference into this prospectus, before making an investment decision. Some of the statements in this summary constitute forward-looking statements, see "Cautionary Statement Concerning Forward-Looking Statements."

Company Overview

We are a clinical-stage biotechnology company committed to overcoming the limitations of conventional gene therapy and turning today's complex devastating neurological diseases into treatable conditions. By harnessing our proprietary transgene regulation technology, EXACT™ (Expression Attenuation via Construct Tuning), we are building a robust and differentiated product portfolio of genetic medicines for rare neurological diseases with high unmet need not otherwise addressable by conventional gene therapy. Our EXACT approach leverages key scientific breakthroughs, including gene transfer technology, microRNA-based genetic circuits, and adeno-associated virus delivery, and is designed to deliver therapeutic levels of transgene to key areas of the brain that underlie neurological disease pathology.

Our first clinical-stage program to utilize the EXACT platform is NGN-401, which is in development for the treatment of Rett syndrome, a disease with a patient population that has a significant unmet need, and that ultimately progresses to substantial neurological and physical impairment and premature death. We are conducting a Phase 1/2 open-label, multi-center clinical trial of NGN-401 gene therapy for the treatment of female patients with classic Rett syndrome that is assessing the safety, tolerability, and efficacy of NGN-401 at a dose of 1E15 vg.

In addition to NGN-401, we have also been pursuing a conventional gene therapy program in a Phase 1/2 clinical trial of NGN-101 for the treatment of CLN5 Batten disease. This patient population has a significant unmet need, and experiences extensive neurological and physical impairment leading to blindness, loss of motor function and early mortality. Our Phase 1/2 clinical trial of NGN-101 was the first trial to assess the treatment of both neurodegenerative and ocular disease manifestations of Batten disease. In November 2024, we announced that the Company does not expect to move forward with the NGN-101 CLN5 Batten disease gene therapy program; given the rarity of the disease, continued investment in the program was predicated on alignment on a streamlined registrational pathway with FDA. To support a streamlined pathway, we submitted a regenerative medicine advanced therapy ("***RMAT***") application to the FDA. Despite our belief that we met the standard of preliminary clinical evidence required to obtain an RMAT designation, the RMAT application was denied. We are currently evaluating options for the program.

Corporation Information

On December 18, 2023 (the "Closing Date"), we completed our business combination (the "Reverse Merger") with Neurogene Inc., a Nevada corporation ("Neurogene OpCo"). In connection with the completion of the Reverse Merger, the Company changed its name from "Neoleukin Therapeutics, Inc." to "Neurogene Inc.," and the business conducted by the Company became primarily the business conducted by Neurogene OpCo.

Our principal executive offices are located at 535 W 24th St., 5th Floor, New York, NY 10011 and our telephone number is (855) 508-3568. Our website is www.neurogene.com. Information contained on or accessible through our website is not a part of this prospectus supplement, and the inclusion of our website address in this prospectus supplement is an inactive textual reference only.

Implications of Being a Smaller Reporting Company

We are a "smaller reporting company," meaning that the market value of our Common Stock held by non-affiliates is less than $700.0 million and our annual revenue is less than $100.0 million during the most recently completed fiscal year. We will continue to be a smaller reporting company so long as either (i) the market value of our Common Stock held by non-affiliates is less than $250.0 million or (ii) our annual revenue is less than $100.0 million during the most recently completed fiscal year and the market value of our Common Stock held by non-

affiliates is less than $700.0 million. 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 and smaller reporting companies have reduced disclosure obligations regarding executive compensation.

The Offering

Common Stock to be Offered by the Selling Stockholders	4,000,042 shares, which includes 2,165,042 shares of Common Stock issuable upon the exercise of Pre-Funded Warrants held by certain of the Selling Stockholders.
Terms of the Offering	The Selling Stockholders will determine when and how they will dispose of the Resale Shares registered under this prospectus for resale.
Use of Proceeds	We will not receive any proceeds from the sale of the shares of Common Stock covered by this prospectus. The net proceeds from the sale of the Resale Shares offered by this prospectus will be received by the Selling Stockholders. Upon any exercise of the Pre-Funded Warrants by payment of cash, however, we will receive the nominal cash exercise price paid by the holders of the Pre-Funded Warrants. See the section titled "Use of Proceeds."
Risk Factors	See "Risk Factors" beginning on page 4, for a discussion of factors you should carefully consider before deciding to invest in our Common Stock.
Nasdaq Global Market symbol	NGNE

RISK FACTORS

Investing in shares of our Common Stock involves a high degree of risk. You should carefully consider the risks, uncertainties and other factors described in our most recent Annual Report on Form 10-K, as supplemented and updated by subsequent Quarterly Reports on Form 10-Q and Current Reports on Form 8-K that we have filed or will file with the SEC, and in other documents which are incorporated by reference into 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 before making an investment decision. It is not possible to predict or identify all such risks; our business, financial condition, results of operations and future growth prospects could also be materially and adversely affected by factors, events or uncertainties that are not presently known to us or that we currently do not consider to present significant risks to our operations. Therefore, you should not consider the risks and uncertainties described in the documents incorporated by reference herein to be a complete statement of all the potential risks or uncertainties that we face. For more information, see "*Information Incorporated by Reference*" and "*Where You Can Find More Information*".

USE OF PROCEEDS

We are not selling any securities under this prospectus, and we will not receive any proceeds from the sale of the Resale Shares covered hereby. The net proceeds from the sale of the Resale Shares offered by this prospectus will be received by the Selling Stockholders. Some of the shares of Common Stock offered hereby are issuable upon the exercise of the Pre-Funded Warrants. Upon exercise of such Pre-Funded Warrants for cash, we will receive the nominal cash exercise price paid by the holders of the Pre-Funded Warrants. We intend to use those proceeds, if any, for general corporate purposes.

Subject to limited exceptions, the Selling Stockholders will pay any underwriting discounts and commissions and expenses incurred by the Selling Stockholders for brokerage, accounting, tax or legal services or any other expenses incurred by the Selling Stockholders in disposing of any of the Resale Shares. We will bear the costs, fees and expenses incurred in effecting the registration of the Resale Shares covered by this prospectus, including all registration and filing fees, Nasdaq listing fees and fees and expenses of our counsel and our independent registered public accounting firm.

SELLING STOCKHOLDERS

This prospectus covers the resale or other disposition from time to time by the Selling Stockholders identified in the table below of up to an aggregate of 4,000,042 shares of our Common Stock. The Selling Stockholders may from time to time offer and sell any or all of the Resale Shares set forth below pursuant to this prospectus and any accompanying prospectus supplement.

Cory Freedland, PhD is a partner of Samsara BioCapital, L.P. ("Samsara LP") and a member of our board of directors. In addition, Robert Baffi is a Venture Partner at Samsara LP and a member of our board of directors. From December 2019 until the closing of the Reverse Merger, M. Cantey Boyd also served as a director of the Company as a representative of Baker Funds (as defined below) and their affiliates. The Company also entered into a Letter Agreement with Baker Bros. Advisors LP ("BBA") on July 17, 2023, pursuant to which BBA has the right to nominate one person for election as a director of the Company at any time that BBA owns at least 12.5% of the then-outstanding stock of the Company and which also obligates the Company to enter into a registration rights agreement with any BBA entity who may be deemed an "affiliate" of the Company. Eli Casdin is the Managing Member of Casdin Capital, LLC ("Casdin Capital"), Casdin Partners GP, LLC ("CP GP"), Casdin Private Growth Equity Fund GP, LLC ("CPGE GP") and Casdin Private Growth Equity Fund II GP, LLC ("CPGE II GP"), and served as a director of the Company from February 2021 until October 2022. Except as otherwise disclosed herein, the Selling Stockholders do not have, and within the past three years have not had, any position, office or other material relationship with us.

The following table sets forth the names of the Selling Stockholders, the number of shares of Common Stock beneficially owned by the Selling Stockholders as of March 13, 2025, the number of shares of Common Stock that may be offered under this prospectus and the number of shares of our Common Stock that will be owned after this offering by the Selling Stockholders assuming all of the shares registered for resale hereby are sold.

The Selling Stockholders may sell some, all or none of their Resale Shares. We do not know how long the Selling Stockholders will hold the Resale Shares before selling them, and we currently have no agreements, arrangements or understandings with the Selling Stockholders regarding the sale or other disposition of any of the Resale Shares.

The information set forth below is based upon information obtained from the Selling Stockholders and upon information in our possession regarding the issuance of the shares of Common Stock and Pre-Funded Warrants in connection with the PIPE. The percentages of Common Stock beneficially owned after the offering by each Selling Stockholder below are based on 14,929,566 shares of Common Stock outstanding as of March 13, 2025.

Name of Selling Stockholders[1]	Common Stock Beneficially Owned Before Offering [2]	Common Stock that May Be Offered Pursuant to Prospectus	Common Stock Beneficially Owned After Offering[2]	
			Number	Percentage (%)
Entities affiliated with RTW Investments, LP[3]	1,507,313	600,007	1,133,656	7.4
Samsara BioCapital, LP[4]	1,721,832	200,000	1,541,832	10.3
Entities affiliated with Great Point Partners, LLC[5]	470,964	360,000	110,964	*
Entities affiliated with EcoR1 Capital, LLC[6]	1,507,588	500,010	1,563,082	9.99
Entities affiliated with Redmile Group, LLC[7]	1,468,066	500,003	968,063	6.42
Entities affiliated with Casdin Capital, LLC[8]	1,295,361	500,000	795,361	5.33
Entities affiliated with Baker Bros. Advisors LP[9]	748,821	1,100,022	806,595	4.99
Commodore Capital Master LP[10]	925,000	240,000	685,000	4.59

* Less than 1%

(1) To our knowledge, unless otherwise indicated, all persons named in the table above have sole voting and investment power with respect to their shares of Common Stock.

(2) "Beneficial ownership" is a term broadly defined by the SEC in Rule 13d-3 under the Exchange Act and includes more than the typical form of stock ownership, that is, stock held in the person's name. The term also includes what is referred to as "indirect ownership," meaning ownership of shares as to which a person has or shares investment power.

(3) Shares listed under "Common Stock Beneficially Owned Before the Offering" consist of 1,348,656 shares of Common Stock and 158,657 shares of Common Stock issuable upon the exercise of Pre-Funded Warrants held in the aggregate by RTW Master Fund, Ltd., RTW Innovation Master Fund, Ltd. and RTW Biotech Opportunities Operating Ltd. (collectively, the "RTW Funds"). Pursuant to the terms of the Pre-Funded Warrants, the Pre-Funded Warrants will be exercisable only to the extent that after giving effect to such exercise the holder thereof and their affiliates would beneficially own no more than 9.99% of outstanding Common Stock of the Company. However, RTW Investments, LP ("RTW") may from time to time provide written notice to the Company, to increase such beneficial ownership limitation to any other percentage not in excess of 19.99%. Any such change will not be effective until the 61st day after such notice is delivered to the Company. As a result of this restriction, the number of shares of Common Stock that may be issued upon exercise of the Pre-Funded Warrants by RTW Funds may change depending upon changes in the outstanding shares of Common Stock. Without giving effect to the above beneficial ownership limitation, the Pre-Funded Warrants that the RTW Funds hold would be exercisable for an aggregate of 385,007 shares of Common Stock. RTW, in its capacity as the investment manager of the RTW Funds, has the power to vote and the power to direct the disposition of the shares held by the RTW Funds. Accordingly, RTW may be deemed to be the beneficial owner of such securities. Roderick Wong, M.D., as the Managing Partner of RTW, has the power to direct the vote and disposition of the securities held by RTW. Dr. Wong disclaims beneficial ownership of the shares held by the RTW Funds, except to the extent of his pecuniary interest therein. The address and principal office of RTW Investments, LP is 40 10th Avenue, Floor 7, New York, NY 10014, and the address of Dr. Wong and each of the RTW Funds is c/o RTW Investments, LP, 40 10th Avenue, Floor 7, New York, NY 10014.

(4) Shares listed under "Common Stock Beneficially Owned Before the Offering" consist of (i) 1,717,127 shares of Common Stock held by Samsara LP, and (ii) 4,705 shares of Common Stock issuable upon exercise of stock options held by Cory Freedland exercisable within 60 days of the date of this table. Excludes shares of Common Stock issuable upon the exercise of Pre-Funded Warrants held by Samsara LP. Pursuant to the terms of the Pre-Funded Warrants, the Pre-Funded Warrants will be exercisable only to the extent that after giving effect to such exercise the holder thereof and their affiliates would beneficially own no more than 9.80% of outstanding Common Stock of the Company. However, Samsara LP may from time to time provide written notice to the Company, to increase such beneficial ownership limitation to any other percentage not in excess of 19.99%. Any such change will not be effective until the 61st day after such notice is delivered to the Company. As a result of this restriction, the number of shares of Common Stock that may be issued upon exercise of the Pre-Funded Warrants by Samsara LP may change depending upon changes in the outstanding shares of Common Stock. Without giving effect to the above beneficial ownership limitation, the Pre-Funded Warrants that Samsara LP holds would be exercisable for an aggregate of 87,070 shares of Common Stock. Samsara BioCapital GP, LLC ("Samsara GP") is the sole general partner of Samsara LP and may be deemed to have voting and investment power over the securities held by Samsara LP. Dr. Srinivas Akkaraju is a managing member of Samsara GP and may be deemed to have voting and dispositive power over the securities held by Samsara LP. The address of the above persons is 628 Middlefield Road, Palo Alto, CA 94301.

(5) Shares listed under "Common Stock Beneficially Owned Before the Offering" consist of (i) 306,125 shares of Common Stock held by Biomedical Value Fund, L.P. ("BVF") and (ii) 164,839 shares of Common Stock held by Biomedical Offshore Value Fund, Ltd. ("BOVF" and together with BVF, the "GPP Entities"). Great Point Partners, LLC ("Great Point") is the investment manager of the GPP Entities and by virtue of such status may be deemed to be the beneficial owner of the shares held by each of the GPP Entities. Each of Dr. Jeffrey R. Jay, M.D., as Senior Managing Member of Great Point, and Ms. Lillian Nordahl, as Managing Director of Great Point, has voting and investment power with respect to the shares held by each of the GPP Entities, and therefore may be deemed to be the beneficial owner of the shares held by the GPP Entities, except to the extent of their respective pecuniary interests. The address for the foregoing persons is 165 Mason Street, 3rd Floor, Greenwich, CT 06830.

(6) Shares listed under "Common Stock Beneficially Owned Before the Offering" consist of (i) 1,097,570 shares of Common Stock held by EcoR1 Capital Fund Qualified, L.P. ("Qualified Fund"), (ii) 88,811 shares of Common Stock held by EcoR1 Capital Fund, L.P. ("Capital Fund"), (iii) 84,961 shares of Common Stock held by EcoR1 Venture Opportunity Fund, L.P. ("Opportunity Fund") and (iv) 236,246 shares of Common Stock issuable in the aggregate upon the exercise of Pre-Funded Warrants held by Qualified Fund and Capital Fund. Pursuant to the terms of the Pre-Funded Warrants, the Pre-Funded Warrants will be exercisable only to the extent that after giving effect to such exercise the holder thereof and their affiliates would beneficially own no more than 9.99% of outstanding Common Stock of the Company. However, Qualified Fund or Capital Fund may from time to time provide written notice to the Company to increase such beneficial ownership limitation to any other percentage not in excess of 19.99%. Any such change will not be effective until the 61st day after such notice is delivered to the Company. As a result of this restriction, the number of shares of Common Stock that may be issued upon exercise of the Pre-Funded Warrants by Qualified Fund or Capital Fund may change depending upon changes in the outstanding shares of Common Stock. Without giving effect to the above beneficial ownership limitation, the Pre-Funded Warrants that Qualified Fund holds would be exercisable for an aggregate of 1,041,172 shares of Common Stock and the Pre-Funded Warrants that Capital Fund holds would be exercisable for an aggregate of 48,486 shares of Common Stock. EcoR1 Capital, LLC ("EcoR1") is the general partner of Qualified Fund and Capital Fund and the investment advisor to Opportunity Fund. Biotech Opportunity GP, LLC ("Opportunity GP") is the general partner of Opportunity Fund. Oleg Nodelman is the control person of EcoR1 and Opportunity GP and may be deemed to share dispositive and voting power over the shares held by Qualified Fund, Capital Fund and Opportunity Fund. Mr. Nodelman, EcoR1 and Opportunity GP each disclaim beneficial ownership of all shares except to the extent of their pecuniary interest therein. The address of the above persons is 357 Tehama Street #3, San Francisco, CA 94103.

(7) Shares listed under "Common Stock Beneficially Owned Before the Offering" consist of 1,308,063 shares of Common Stock and 160,003 shares of Common Stock issuable upon the exercise of Pre-Funded Warrants held by certain private investment vehicles (the "Redmile Funds") managed by Redmile Group, LLC ("Redmile"), including 652,030 shares of Common Stock held by Redmile Biopharma Investments I, L.P. ("Redmile Biopharma I"). Pursuant to the terms of the Pre-Funded Warrants, the Pre-Funded Warrants will be exercisable only to the extent that after giving effect to such exercise the holder thereof and their affiliates would beneficially own no more than 9.99% of outstanding Common Stock of the Company. However, Redmile may from time to time provide written notice to the

Company, to increase such beneficial ownership limitation to any other percentage not in excess of 19.99%. Any such change will not be effective until the 61st day after such notice is delivered to the Company. As a result of this restriction, the number of shares of Common Stock that may be issued upon exercise of the Pre-Funded Warrants by Redmile Funds may change depending upon changes in the outstanding shares of Common Stock. Without giving effect to the above beneficial ownership limitation, the Pre-Funded Warrants that Redmile Funds hold would be exercisable for an aggregate of 160,003 shares of Common Stock, all of which are held by Redmile Biopharma I. The 500,003 shares listed under "Common Stock that May Be Offered Pursuant to Prospectus" consist of (i) 102,297 shares of Common Stock held directly by Redmile Capital Fund, LP, (ii) 65,211 shares of Common Stock held directly by Redmile Capital Offshore Master Fund, Ltd., (iii) 100,000 shares of Common Stock held directly by Redmile Capital Offshore II Master Fund, Ltd. (iv) 52,452 shares of Common Stock held directly by Redmile Strategic Long Only Trading Sub, Ltd., (v) 20,040 shares of Common Stock held directly by Redmile Strategic Trading Sub, Ltd. and (vi) 160,003 shares of Common Stock issuable upon the exercise of Pre-Funded Warrants held directly by Redmile Biopharma I. Redmile is the investment manager/adviser to the Redmile Funds, and, in such capacity, exercises voting and investment power over all of the shares held by the Redmile Funds and may be deemed to be the beneficial owner of these securities. Jeremy C. Green serves as the managing member of Redmile and also may be deemed to be the beneficial owner of these securities. Redmile and Mr. Green each disclaim beneficial ownership of these securities, except to the extent of its or his pecuniary interest in such securities, if any. The address of the Redmile Funds is c/o Redmile Group, LLC, One Letterman Drive, Building D, Suite D3-300, San Francisco, CA 94129.

(8) Shares listed under "Common Stock Beneficially Owned Before the Offering" consist of (i) 1,075,000 shares of Common Stock held by Casdin Partners Master Fund, L.P. ("CPM Fund"), (ii) 132,217 shares of Common Stock held by Casdin Private Growth Equity Fund, L.P. ("CPGE Fund") and (iii) 88,144 shares of Common Stock held by Casdin Private Growth Equity Fund II, L.P. ("CPGE II Fund"). CP GP is the general partner of CPM Fund. CPGE GP is the general partner of CPGE Fund, CPGE II GP is the general partner of CPGE II Fund, and Casdin Capital is the investment adviser to each of CPM, CPGE Fund and CPGE II Fund. Eli Casdin is the Managing Member of Casdin Capital, CP GP, CPGE GP and CPGE II GP. Mr. Casdin, Casdin Capital, CP GP, CPGE GP and CPGE II GP disclaim beneficial ownership of any of the reported shares of Common Stock herein, except to the extent of their pecuniary interest therein. The address of the foregoing persons is 1350 Avenue of the Americas, Suite 2600, New York, NY 10019.

(9) Shares listed under "Common Stock Beneficially Owned Before the Offering" consist of (i) 57,476 shares of Common Stock held by 667, L.P. ("667") and 614,474 shares of Common Stock held by Baker Brothers Life Sciences, L.P. ("Life Sciences" and together with 667, the "Baker Funds") and (ii) 76,871 shares of Common Stock issuable in the aggregate upon the exercise of Pre-Funded Warrants held by the Baker Funds. Pursuant to the terms of the Pre-Funded Warrants, the Pre-Funded Warrants will be exercisable only to the extent that after giving effect to such exercise the holder thereof and their affiliates would beneficially own no more than 4.99% of the outstanding Common Stock of the Company. However, the Baker Funds may from time to time provide written notice to the Company, to increase such beneficial ownership limitation to any other percentage not in excess of 19.99%. Any such change will not be effective until the 61st day after such notice is delivered to the Company. As a result of this restriction, the number of shares of Common Stock that may be issued upon exercise of the Pre-Funded Warrants by the Baker Funds may change depending upon changes in the outstanding shares of Common Stock. Without giving effect to the above beneficial ownership limitation, the Pre-Funded Warrants that the Baker Funds hold would be exercisable for 360,043 shares of Common Stock by 667 and 4,043,216 shares of Common Stock by Life Sciences. BBA is the management company and investment advisor to the Baker Funds and has sole voting and investment power with respect to these securities. Baker Bros. Advisors (GP) LLC (the "BBA GP") is the sole general partner of BBA. Julian C. Baker and Felix J. Baker are managing members of the BBA GP. Julian C. Baker, Felix J. Baker, BBA and the BBA GP may be deemed to be beneficial owners of the securities directly held by the Baker Funds. Julian C. Baker, Felix J. Baker, BBA and the BBA GP disclaim beneficial ownership of all securities held by the Baker Funds, except to the extent of their pecuniary interest therein. The business address of BBA, BBA GP, Julian C. Baker and Felix J. Baker is 860 Washington Street, 3rd Floor, New York, NY 10014.

(10) Shares listed under "Common Stock Beneficially Owned Before the Offering" consist of 925,000 shares of Common Stock held by Commodore Capital Master LP. Commodore Capital LP is the investment manager to Commodore Capital Master LP and may be deemed to beneficially own the shares held by Commodore Capital Master LP. Michael Kramarz and Robert Egen Atkinson are the managing partners of Commodore Capital LP and exercise investment discretion with respect to these shares. Commodore Capital LP and Commodore Capital Master LP have shared voting and dispositive power with respect to these shares. The address of Commodore Capital LP and Commodore Capital Master LP is 444 Madison Avenue, 35th Floor, New York, NY 10022.

PLAN OF DISTRIBUTION

The Selling Stockholders may, from time to time, sell any or all of their shares of Common Stock on any stock exchange, market or trading facility on which the shares are traded or in private transactions. These sales may be at fixed or negotiated prices. The Selling Stockholders may use any one or more of the following methods when selling shares:

- ordinary brokerage transactions and transactions in which a broker-dealer solicits purchasers;
- block trades in which a 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 under this prospectus;
- an exchange distribution in accordance with the rules of the applicable exchange;
- privately negotiated transactions;
- "at the market" or through market makers or into an existing market for the shares;
- delivery of securities in settlement of short sales after the date of this prospectus;
- through the writing or settlement of options or other hedging transactions, whether through an options exchange or otherwise;
- through the distribution of the Common Stock by any Selling Stockholder to its partners, members or stockholders;
- through broker-dealers that agree with any Selling Stockholder to sell a specified number of such shares at a stipulated price per share;
- through one or more underwritten offerings on a firm commitment or best efforts basis;
- a combination of any such methods of sale; and
- any other method permitted pursuant to applicable law.

The Selling Stockholders will act independently of us and each other in making decisions with respect to the timing, manner and size of each sale. The Selling Stockholders also may resell all or a portion of the shares in open market transactions in reliance upon Rule 144, as permitted by that rule, or Section 4(a)(1) under the Securities Act, if available, rather than under this prospectus, provided that they meet the criteria and conform to the requirements of those provisions.

In connection with the sale of the shares, the Selling Stockholders may enter into hedging transactions with broker-dealers or other financial institutions, which may in turn engage in short sales of the Common Stock in the course of hedging the positions they assume. The Selling Stockholders may also sell shares of our Common Stock short and deliver these securities to close out its 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 any Selling Stockholder from the sale of the shares offered by them will be the purchase price of the Common Stock less discounts or commissions, if any. Each Selling Stockholder reserves the right to accept and, together with its agents from time to time, to reject, in whole or in part, any proposed purchase of Common Stock to be made directly or through agents. We will not receive any of the proceeds from this offering.

The Selling Stockholders and any broker-dealers that act in connection with the sale of securities may be deemed to be "underwriters" within the meaning of Section 2(a)(11) of the Securities Act in connection with such sales, and any commissions received by such broker-dealers and any profit on the resale of the securities sold by them while acting as principals may be deemed to be underwriting discounts or commissions under the Securities Act. In the event that any Selling Stockholder is deemed to be an "underwriter" within the meaning of Section 2(a)(11) of the Securities Act, such Selling Stockholder will be subject to the prospectus delivery requirements of the Securities Act. A Selling Stockholder 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. To our knowledge, none of the Selling Stockholders have received any shares as underwriting compensation.

A Selling Stockholder may from time to time pledge or grant a security interest in some or all of the shares of Common Stock beneficially owned by it and, if it defaults in the performance of its secured obligations, the pledgees or secured parties may offer and sell the shares of Common Stock from time to time under this prospectus after we have filed a supplement to this prospectus, or, if required, a post-effective amendment to the registration statement of which this prospectus is a part, supplementing or 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 or other successors in interest will be the selling beneficial owners for purposes of this prospectus and may sell the shares of Common Stock from time to time under this prospectus after we have filed a supplement to this prospectus or, if required, a post-effective amendment to the registration statement of which this prospectus is a part, supplementing or amending the list of Selling Stockholders to include the transferee or other successors in interest as Selling Stockholders under this prospectus.

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, any applicable commissions or discounts with respect to a particular offer will be set forth in an amendment or supplement to this prospectus.

We will pay all registration expenses incurred relating to the registration of the shares with the SEC, subject to reimbursement by the Selling Stockholders, pursuant to the 2024 Registration Rights Agreement (as defined herein), and the Selling Stockholders will pay all selling expenses, including underwriting discounts and selling commissions, related to the sale of the shares registered under this registration statement. We have agreed to indemnify the Selling Stockholders against certain losses, claims, damages and liabilities, including liabilities under the Securities Act.

Each of the Selling Stockholders has advised us that it has not entered into any agreements, understandings or arrangements with any underwriters or broker-dealers regarding the sale of their shares of Common Stock, nor is there an underwriter or coordinating broker acting in connection with a proposed sale of shares of Common Stock by the Selling Stockholder. If we are notified by a Selling Stockholder that any material arrangement has been entered into with a broker-dealer for the sale of shares of Common Stock, if required, we will file a supplement to this prospectus. If a Selling Stockholder uses this prospectus for any sale of the shares of Common Stock, it will be subject to the prospectus delivery requirements of the Securities Act.

We have advised the Selling Stockholders that the anti-manipulation rules of Regulation M under the Exchange Act may apply to sales of shares of our Common Stock in the market and to the activities of the Selling Stockholders and their respective affiliates. These rules may limit the timing of purchases and sales of the shares by any Selling Stockholder. Regulation M may also restrict the ability of any person engaged in the distribution of the shares of Common Stock to engage in market-making activities with respect to the shares of Common Stock. All of the foregoing may affect the marketability of the shares of Common Stock and the ability of any person or entity to engage in market-making activities with respect to the shares of Common Stock.

Our Common Stock is listed on The Nasdaq Global Market under the symbol "NGNE." There can be no assurance that any Selling Stockholder will sell any or all of the shares of Common Stock registered pursuant to this prospectus.

DESCRIPTION OF CAPITAL STOCK

The following description of our capital stock is intended as a summary only and therefore is not a complete description of our capital stock. This description is based upon, and is qualified by reference to, our amended and restated certificate of incorporation ("charter"), our amended and restated bylaws ("bylaws") and applicable provisions of Delaware corporate law. You should read our charter and our bylaws, copies of which are filed as exhibits to the registration statement of which this prospectus forms a part.

Authorized Capital Stock

Our authorized capital stock consists of 450,000,000 shares of Common Stock and 50,000,000 shares of undesignated preferred stock, par value $0.000001 per share ("Preferred Stock").

Common Stock

Our charter authorizes the issuance of up to 450,000,000 shares of our Common Stock. All outstanding shares of our Common Stock are validly issued, fully paid and nonassessable.

Voting

The holders of Common Stock are entitled to one vote per share on all matters submitted to a vote of stockholders, except for matters relating solely to the terms of Preferred Stock on which holders of our Common Stock shall not be entitled to vote as provided in our charter. A majority vote of the shares present in person or represented by proxy and entitled to vote on the subject matter is required for the holders of our Common Stock to take action on all matters, except as otherwise required by law, our charter or our bylaws. Our charter does not provide for cumulative voting in the election of directors.

Dividends

Subject to preferences that may be applicable to any then-outstanding Preferred Stock, holders of Common Stock are entitled to receive ratably those dividends, if any, as may be declared from time to time by the board of directors out of legally available funds.

Distributions on Liquidation

In the event of our liquidation, dissolution or winding up, holders of Common Stock will be entitled to share ratably in the net assets legally available for distribution to stockholders after the payment of all of our debts and other liabilities and the satisfaction of any liquidation preference granted to the holders of any then-outstanding shares Preferred Stock.

Rights and Preferences

Holders of Common Stock have no preemptive, conversion or subscription rights and there are no redemption or sinking fund provisions applicable to our Common Stock. The rights, preferences and privileges of the holders of Common Stock are subject to, and may be adversely affected by, the rights of the holders of shares of any series of Preferred Stock that we may designate in the future.

Preferred Stock

Under the terms of our charter, our board of directors has the authority, without further action by our stockholders, to issue up to 50,000,000 shares of Preferred Stock in one or more series, to establish from time to time the number of shares to be included in each such series, to fix the dividend, voting and other rights, preferences and privileges of the shares of each wholly unissued series and any qualifications, limitations or restrictions thereon, and to increase or decrease the number of shares of any such series, but not below the number of shares of such series then outstanding. Our board of directors may authorize the issuance of Preferred Stock with voting or conversion rights that could adversely affect the voting power or other rights of the holders of our Common Stock. The issuance of Preferred Stock, while providing flexibility in connection with possible acquisitions and other

corporate purposes, could, among other things, have the effect of delaying, deferring or preventing a change in our control and may adversely affect the market price of our Common Stock and the voting and other rights of the holders of our Common Stock.

Anti-Takeover Effects of Delaware Law and Provisions of Our Charter and Bylaws

Our charter and bylaws include a number of provisions that may have the effect of delaying, deferring or preventing another party from acquiring control of us and encouraging persons considering unsolicited tender offers or other unilateral takeover proposals to negotiate with our board of directors rather than pursue non-negotiated takeover attempts.

- ***Issuance of undesignated Preferred Stock***: Under our charter, our board of directors has the authority, without further action by the stockholders, to issue up to 50,000,000 shares of undesignated Preferred Stock with rights and preferences, including voting rights, designated from time to time by our board of directors. The existence of authorized but unissued shares of Preferred Stock enables our board of directors to make it more difficult to attempt to obtain control of us by means of a merger, tender offer, proxy contest or otherwise.

- ***Classified board***: Our charter establishes a classified board of directors consisting of three classes of directors, with staggered three-year terms. Only one class of directors is elected at each annual meeting of our stockholders, with the other classes continuing for the remainder of their respective three-year terms. This provision may have the effect of delaying a change of control of our board of directors.

- ***Election and removal of directors and board vacancies:*** Our bylaws provide that directors will be elected by a plurality vote. Our charter and bylaws also provide that our board of directors has the right to increase or decrease the size of the board to fill vacancies on the board. Directors may be removed only for cause by the affirmative vote of the holders of at least 66 2/3% of the votes that all our stockholders would be entitled to cast in an annual election of directors. Only our board of directors is authorized to fill vacant directorships. In addition, the number of directors constituting our board of directors may be set only by resolution adopted by a majority of the whole board of directors. These provisions prevent stockholders from increasing the size of our board of directors and gaining control of our board of directors by filling the resulting vacancies with its own nominees.

- ***Requirements for advance notification of stockholder nominations and proposals***: Our bylaws establish advance notice procedures with respect to stockholder proposals and the nomination of candidates for election as directors that specify certain requirements as to the timing, form and content of a stockholder's notice. Business that may be conducted at an annual meeting of stockholders will be limited to those matters properly brought before the meeting. These provisions may make it more difficult for our stockholders to bring matters before our annual meeting of stockholders or to nominate directors at annual meetings of stockholders.

- ***No written consent of stockholders***: Our charter provides that all stockholder actions be taken by a vote of the stockholders at an annual or special meeting, and that stockholders may not take any action by written consent in lieu of a meeting. This limit may lengthen the amount of time required to take stockholder actions and would prevent the amendment of our bylaws or removal of directors by our stockholders without holding a meeting of stockholders.

- ***No stockholder ability to call special meetings***: Our bylaws provide that only a majority of the members of our board of directors then in office may be able to call special meetings of stockholders and only those matters set forth in the notice of the special meeting may be considered or acted upon at a special meeting of stockholders.

- ***Amendments to certificate of incorporation and bylaws***: As required by the Delaware General Corporation Law (the "***DGCL***"), any amendment to our charter will be required to be approved by a majority of our board of directors as well as, if required by law or the charter, a majority of the outstanding shares entitled to vote on the amendment and a majority of the outstanding shares of each class entitled to vote thereon as

a class, except that the amendment of provisions to board classification, election, removal and vacancies, stockholder action, certificate amendments, bylaw amendments, liability of directors, indemnification of directors and officers, and Delaware exclusive forum must be approved by not less than 66 2/3% of the outstanding shares entitled to vote on the amendment, voting together as a single class. Any amendment to our bylaws must be approved by either a majority of the authorized number of directors constituting the board of directors or not less than 66 2/3% of the outstanding shares entitled to vote on the amendment, voting together as a single class.

These provisions are designed to enhance the likelihood of continued stability in the composition of our board of directors and its policies, to discourage certain types of transactions that may involve an actual or threatened acquisition of our company and to reduce our vulnerability to an unsolicited acquisition proposal. We also designed these provisions to discourage certain tactics that may be used in proxy fights. However, these provisions could have the effect of discouraging others from making tender offers for our shares and, as a consequence, they may also reduce fluctuations in the market price of our shares that could result from actual or rumored takeover attempts.

Section 203 of the Delaware General Corporation Law

We are subject to the provisions of Section 203 of the DGCL. In general, Section 203 prohibits a publicly held Delaware corporation from engaging in a "business combination" with an "interested stockholder" for a three-year period following the time that this stockholder becomes an interested stockholder, unless the business combination is approved in advance by a majority of the independent directors or by the holders of at least two-thirds of the outstanding disinterested shares. The application of Section 203 of the DGCL could also have the effect of delaying or preventing a change of control of us.

Choice of Forum

Our charter requires that the Court of Chancery of the State of Delaware be the exclusive forum for the following types of actions or proceedings under Delaware statutory or common law: (1) any derivative action or proceeding brought on our behalf; (2) any action asserting a claim of breach of a fiduciary duty owed by any director, officer or other employee to us or our stockholders; (3) any action asserting a claim against us or any director or officer or other employee arising pursuant to the DGCL or our charter or bylaws; or (4) any action asserting a claim against us that is governed by the internal affairs doctrine. This provision would not apply to claims brought to enforce a duty or liability created by the Exchange Act, or any other claim for which the federal courts have exclusive jurisdiction. Our bylaws provide further that the federal district courts of the United States will be the exclusive forum for resolving any complaint asserting a cause of action arising under the Securities Act. The forum selection provisions will not apply to claims brought to enforce a duty or liability created by the Securities Exchange Act. It is possible that a court could find that such provisions are inapplicable for a particular claim or action or that such provisions are unenforceable. In addition, under the Securities Act, federal courts have concurrent jurisdiction over all suits brought to enforce any duty or liability created by the Securities Act, and investors cannot waive compliance with the federal securities laws and the rules and regulations thereunder. Although we believe these provisions benefit us by providing increased consistency in the application of Delaware law for the specified types of actions and proceedings, the provisions may have the effect of discouraging lawsuits against us or our directors or officers.

Registration Rights Agreements

2016 Registration Rights Agreement

In connection with our public offering of Common Stock on September 19, 2016, we entered into a registration rights agreement with certain holders of our securities (the "2016 Registration Rights Agreement"). Under the 2016 Registration Rights Agreement, we agree that, if at any time and from time to time after December 19, 2016, those investors demand that we register their shares of our Common Stock for resale under the Securities Act, we would be obligated to effect such registration. We have registered an aggregate of approximately 1,292,268 shares (after giving effect to the 1-for-5 reverse stock split in September 2023 and the subsequent 1-for-4 reverse stock split in December 2023) for resale, from time to time, by such stockholders. Our registration obligations under the 2016 Registration Rights Agreement covers all shares now held or hereafter acquired by the stockholders who are a party

to such agreement (the "2016 Registrable Securities") and is in effect until the earlier of (a) the date when all of the 2016 Registrable Securities (as defined therein) subject to the demand registration rights under the 2016 Registration Rights Agreement have been sold pursuant to an effective registration statement, (b) the 2016 Registrable Securities have been sold pursuant to Rule 144 under the Securities Act (or other similar rule); (c) the 2016 Registrable Securities may be resold without limitations as to volume or manner of sale pursuant to Rule 144 under the Securities Act or (d) 10 years after the date of the 2016 Registration Rights Agreement, and includes our obligation to facilitate certain underwritten public offerings of our Common Stock by these stockholders in the future.

The foregoing description of the 2016 Registration Rights Agreement does not purport to be complete and is qualified in its entirety by the full text of the 2016 Registration Rights Agreement, a copy of which is filed as Exhibit 4.2 to this registration statement.

2024 Registration Rights Agreement

In connection with the closing of the PIPE, on November 5, 2024, we entered into a registration rights agreement (the "2024 Registration Rights Agreement") with the Selling Stockholders, pursuant to which, among other things, we agreed to file a registration statement covering the resale of the shares of Common Stock issued in the PIPE and the shares of Common Stock underlying the Pre-Funded Warrants issued in the PIPE (the "2024 Registrable Securities") by no later than the 30th calendar day following the closing date of the PIPE. In addition, we have agreed to use our best efforts to cause such registration statement to become effective as soon as practicable, but in any event no later than the earlier of (a) the 105th calendar day following the Closing Date or, (b) the fifth business day after the date we are notified (orally or in writing, whichever is earlier) by the Securities and Exchange Commission that the registration statement will not be "reviewed" or will not be subject to further review. We are required to use our best efforts to keep such registration statement continuously effective until the date that all 2024 Registrable Securities covered by such registration statement (i) have been sold, thereunder or pursuant to Rule 144, or (ii) may be sold without volume or manner-of-sale restrictions pursuant to Rule 144 and without the requirement for us to be in compliance with the current public information requirement under Rule 144. We will be responsible for all fees and expenses incurred in connection with the registration of the 2024 Registrable Securities.

The 2024 Registration Rights Agreement requires us to provide certain customary indemnification to the Selling Stockholders in connection with the registration statement.

The foregoing description of the 2024 Registration Rights Agreement does not purport to be complete and is qualified in its entirety by the full text of the 2024 Registration Rights Agreement, a copy of which is filed as Exhibit 4.3 to this registration statement.

Transfer Agent and Registrar

Equiniti Trust Company, LLC serves as the transfer agent and registrar for our Common Stock.

Listing

Our Common Stock is listed on the Nasdaq Global Market under the symbol "NGNE."

LEGAL MATTERS

Certain legal matters, including the legality of the securities offered, has been passed upon for us by Gibson, Dunn & Crutcher LLP, San Francisco, California. Additional legal matters may be passed upon for us or any underwriters, dealers or agents, by counsel that we will name in the applicable prospectus supplement.

EXPERTS

The financial statements of Neurogene Inc. as of December 31, 2024 and 2023, and for each of the two years in the period ended December 31, 2024, incorporated by reference in this prospectus, have been audited by Deloitte & Touche LLP, an independent registered public accounting firm, as stated in their report. Such financial statements are incorporated by reference in reliance upon the report of such firm given their authority as experts in accounting and auditing.

PART II

INFORMATION NOT REQUIRED IN PROSPECTUS

Item 14. Other Expenses of Issuance and Distribution

The expenses payable by us in connection with the issuance and distribution of the securities being registered hereunder on Form S-3 (other than underwriting discounts and commissions, if any) are set forth below. The Selling Stockholders will not bear any portion of such expenses. Each item listed is estimated, except for the SEC registration fee:

SEC registration fee	$	13,197 *
Printing and engraving		90,000
Legal fees and expenses		250,000
Accounting fees and expenses		75,000
Miscellaneous expenses		10,000
Total	$	438,197

* Previously paid.

Item 15. Indemnification of Officers and Directors

Section 145 of the DGCL authorizes a court to award, or a corporation's board of directors to grant, indemnity to directors and officers under certain circumstances and subject to certain limitations. The terms of Section 145 of the DGCL are sufficiently broad to permit indemnification under certain circumstances for liabilities, including reimbursement of expenses incurred, arising under the Securities Act.

As permitted by the DGCL, the Registrant's charter contains provisions that eliminate the personal liability of its directors for monetary damages for any breach of fiduciary duties as a director to the fullest extent permitted under applicable law.

As permitted by the DGCL, the Registrant's bylaws provide that:

- the Registrant is required to indemnify its directors and executive officers to the fullest extent permitted by the DGCL, subject to very limited exceptions;
- the Registrant may indemnify its other employees and agents as set forth in the DGCL;
- the Registrant is required to advance expenses, as incurred, to its directors and executive officers in connection with a legal proceeding to the fullest extent permitted by the DGCL, subject to very limited exceptions; and
- the rights conferred in the bylaws are not exclusive.

The Registrant has entered, and intends to continue to enter, into separate indemnification agreements with its directors and executive officers to provide these directors and executive officers additional contractual assurances regarding the scope of the indemnification set forth in the Registrant's charter and bylaws and to provide additional procedural protections. At present, there is no pending litigation or proceeding involving a director or executive officer of the Registrant regarding which indemnification is sought.

The indemnification provisions in the Registrant's charter, bylaws and the indemnification agreements entered into or to be entered into between the Registrant and each of its directors and executive officers may be sufficiently broad to permit indemnification of the Registrant's directors and executive officers for liabilities arising under the Securities Act.

The Registrant currently carries liability insurance for its directors and officers.

Item 16. Exhibits

Exhibit	Description
2.1†	Agreement and Plan of Merger, dated as of July 17, 2023, by and among Neoleukin Therapeutics, Inc., Project North Merger Sub, Inc. and Neurogene Inc. (Incorporated by reference to Exhibit 2.1 to the Registrant's Current Report on Form 8-K filed with the Securities and Exchange Commission on July 18, 2023).
3.1	Amended and Restated Certificate of Incorporation of the Company, filed December 18, 2023 (Incorporated by reference to Exhibit 3.2 of the Registrant's Current Report on Form 8-K filed with the Securities and Exchange Commission on December 19, 2023).
3.2	Amended and Restated Bylaws of the Company (Incorporated by reference to Exhibit 3.3 of the Registrant's Current Report on Form 8-K filed with the Securities and Exchange Commission on December 19, 2023).
3.3	Certificate of Designation of Preferences, Rights and Limitations of Series A Convertible Stock of Neurogene Inc. filed August 8, 2019 (Incorporated by reference to Exhibit 3.1 of the Registrant's Current Report on Form 8-K filed with the Securities and Exchange Commission on August 12, 2019).
4.1	Specimen Common Stock Certificate of Neurogene Inc. (Incorporated by reference to Exhibit 4.1 to the Registrant's Quarterly Report on Form 10-Q for the quarter ended March 31, 2014 filed with the Securities and Exchange Commission on May 13, 2014).
4.2	Registration Rights Agreement, dated September 19, 2016, by and between Aquinox Pharmaceuticals, Inc. and the persons listed on Schedule A attached thereto (Incorporated by reference to Exhibit 10.1 to the Registrant's Current Report on Form 8-K filed with the Securities and Exchange Commission on September 20, 2016).
4.3	Form of Registration Rights Agreement (Incorporated by reference to Exhibit 10.2 to Registrant's Current Report on Form 8-K filed with the Securities and Exchange Commission on November 4, 2024).
4.4	Form of Pre-Funded Warrant (Incorporated by reference to Exhibit 4.1 to Registrant's Current Report on Form 8-K filed with the Securities and Exchange Commission on December 19, 2019).
4.5	Form of Pre-Funded Warrant (Incorporated by reference to Exhibit 4.1 to Registrant's Current Report on Form 8-K filed with the Securities and Exchange Commission on July 2, 2020).
4.6	Form of Pre-Funded Warrant (Incorporated by reference to Exhibit A of Exhibit C to Exhibit 2.1 to Registrant's Current Report on Form 8-K filed with the Securities and Exchange Commission on July 18, 2023).
4.7	Form of Pre-Funded Warrant (Incorporated by reference to Exhibit 4.1 to Registrant's Current Report on Form 8-K filed with the Securities and Exchange Commission on November 4, 2024).
5.1	Opinion of Gibson, Dunn & Crutcher LLP.
23.1	Consent of Deloitte & Touche LLP.
23.2	Consent of Gibson, Dunn & Crutcher LLP (included in Exhibit 5.1 hereto).
24.1*	Power of Attorney.

† Portions of this exhibit (indicated by asterisk) have been omitted in accordance with the rules of the Securities and Exchange Commission.
* Previously filed.

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;

(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 Commission pursuant to Rule 424(b) if, in the aggregate, the changes in volume and price represent no more than 20% change in the maximum aggregate offering price set forth in the "Calculation of Filing Fees Tables" or "Calculation of Registration Fee" table, as applicable, 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 (a)(1)(i), (a)(1)(ii) and (a)(1)(iii) do not apply if the information required to be included in a post-effective amendment by those paragraphs is contained in periodic reports filed with or furnished to the Commission by the Registrant pursuant to section 13 or section 15(d) of the Securities Exchange Act of 1934 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 of 1933, 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 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 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 purposes of determining any liability under the Securities Act of 1933, each filing of the Registrant's annual report pursuant to section 13(a) or section 15(d) of the Securities Exchange Act of 1934 (and, where applicable, each filing of an employee benefit plan's annual report pursuant to section 15(d) of the Securities Exchange Act of 1934) 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.

(6) Insofar as indemnification for liabilities arising under the Securities Act of 1933 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 certifies that it has reasonable grounds to believe that it meets all requirements for filing on Form S-3 and has duly caused this registration statement to be signed on its behalf by the undersigned, thereunto duly authorized, in the City of New York, State of New York, on March 24, 2025.

NEUROGENE INC.

By: /s/ Rachel McMinn
Rachel McMinn, Ph.D.
Chief Executive Officer

Signatures

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

Signature	Title	Date
/s/ Rachel McMinn, Ph.D. Rachel McMinn, Ph.D.	Chief Executive Officer, Director (Principal Executive Officer)	March 24, 2025
* Christine Mikail, J.D.	President and Chief Financial Officer (Principal Financial and Accounting Officer)	March 24, 2025
* Robert Baffi, Ph.D.	Director	March 24, 2025
* Cory Freedland, Ph.D.	Director	March 24, 2025
* Sarah B. Noonberg, M.D., Ph.D.	Director	March 24, 2025
* Rohan Palekar	Director	March 24, 2025
* Robert Keith Woods	Director	March 24, 2025

*By: /s/ Rachel McMinn, Ph.D.
Rachel McMinn, Ph.D.
Attorney-in-Fact

Exhibit 5.1

GIBSON DUNN

Gibson, Dunn & Crutcher LLP
One Embarcadero Center
San Francisco, CA 94111-3715
Tel 415.393.8200
gibsondunn.com

March 24, 2025

Neurogene Inc.
535 W 24th St., 5th Floor
New York, NY 10011

Re: Neurogene Inc.
Registration Statement on Form S-3

Ladies and Gentlemen:

We have acted as counsel to Neurogene Inc., a Delaware corporation (the "Company"), in connection with the preparation and filing with the Securities and Exchange Commission (the "Commission") of a Registration Statement on Form S-3 (the "Registration Statement") pursuant to the Securities Act of 1933, as amended (the "Securities Act"), relating to the resale from time to time by the selling stockholders named therein of (i) up to 1,835,000 shares (the "Shares") of the Company's common stock, par value $0.000001 per share ("Common Stock"), and (ii) 2,165,042 shares of Common Stock (the "Pre-Funded Warrant Shares") issuable upon the exercise of pre-funded warrants (the "Pre-Funded Warrants").

In arriving at the opinion expressed below, we have examined originals, or copies certified or otherwise identified to our satisfaction as being true and complete copies of the originals, of the specimen common stock certificates, form of Pre-Funded Warrant and such other documents, corporate records, certificates of officers of the Company and of public officials and other instruments as we have deemed necessary or advisable to enable us to render these opinions. In our examination, we have assumed without independent investigation the genuineness of all signatures, the legal capacity and competency of all natural persons, the authenticity of all documents submitted to us as originals and the conformity to original documents of all documents submitted to us as copies.

Based on the foregoing, and subject to the assumptions, exceptions, qualifications and limitations set forth herein, we are of the opinion that (i) the Shares are validly issued, fully paid and non-assessable, (ii) provided that the Pre-Funded Warrants have been duly executed and delivered by the Company and duly delivered to the purchaser thereof against payment therefor, then the Pre-Funded Warrants, when issued and sold as described in the Registration Statement, assuming a sufficient number of Pre-Funded Warrant Shares are at the time available for issuance, will be a valid and legally binding obligation of the Company, enforceable against the Company in accordance with its terms, except as enforcement thereof may be limited by bankruptcy, insolvency, reorganization, moratorium or other similar laws relating to or affecting creditors' rights generally and by general equitable principles (regardless of whether such enforceability is considered in a proceeding at law or in equity) and implied covenants of good faith and fair dealing, and (iii) the Pre-Funded Warrant Shares, when issued upon a valid exercise of the Pre-Funded Warrants in accordance with their terms, will have been duly authorized and validly issued and will be fully paid and non-assessable.

We consent to the filing of this opinion as an exhibit to the Registration Statement, and we further consent to the use of our name under the caption "Legal Matters" in the Registration Statement and the prospectus that forms a part thereof. In giving these consents, we do not thereby admit that we are within the

category of persons whose consent is required under Section 7 of the Securities Act or the rules and regulations of the Commission.

Very truly yours,

/s/ Gibson, Dunn & Crutcher LLP

Exhibit 23.1

CONSENT OF INDEPENDENT REGISTERED PUBLIC ACCOUNTING FIRM

We consent to the incorporation by reference in this Registration Statement No. 333-283561on Form S-3 of our report dated March 24, 2025, relating to the financial statements of Neurogene Inc., appearing in the Annual Report on Form 10-K of Neurogene Inc. for the year ended December 31, 2024. We also consent to the reference to us under the heading "Experts" in such Registration Statement.

/s/ Deloitte & Touche LLP

Seattle, Washington

March 24, 2025