

**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): March 18, 2024

MADRIGAL PHARMACEUTICALS, INC.

(Exact name of registrant as specified in its charter)

Delaware
(State or other jurisdiction
of incorporation)

001-33277
(Commission
File No.)

04-3508648
(I.R.S. Employer
Identification No.)

Four Tower Bridge
200 Barr Harbor Drive, Suite 200
West Conshohocken, Pennsylvania
(Address of principal executive office)

19428
(Zip Code)

Registrant's telephone number, including area code: (267) 824-2827

(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))

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.

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	MDGL	The NASDAQ Stock Market LLC

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 1.01. Entry into a Material Definitive Agreement.

On March 18, 2024, Madrigal Pharmaceuticals, Inc. (the “Company”) entered into an Underwriting Agreement (the “Underwriting Agreement”) with Goldman Sachs & Co. LLC, Jefferies LLC, Cowen and Company, LLC, Evercore Group L.L.C. and Piper Sandler & Co, as representatives of the several underwriters named therein (the “Underwriters”), for the sale of (i) 750,000 shares of common stock (the “Shares”) of the Company, \$0.0001 par value per share (the “Common Stock”), and (ii) pre-funded warrants (the “Pre-Funded Warrants”) to purchase 1,557,692 shares of Common Stock in an underwritten public offering (the “Offering”). The public offering price for the Shares is \$260.00 per share, less underwriting discounts and commissions. The public offering price for the Pre-Funded Warrants is \$259.9999 per Pre-Funded Warrant, which represents the per share public offering price for the Shares less a \$0.0001 per share exercise price for each such Pre-Funded Warrant. The exercise price of the Pre-Funded Warrants is \$0.0001. Pursuant to the terms of the Underwriting Agreement, the Company granted the Underwriter a 30-day option to purchase up to 346,153 additional shares of Common Stock, at the public offering price, less the underwriting discount and commissions.

The Pre-Funded Warrants are exercisable at any time after the date of issuance. A holder of Pre-Funded Warrants may not exercise the warrant if the holder, together with its affiliates, would beneficially own more than 9.99% of the number of shares of Common Stock outstanding immediately after giving effect to such exercise. A holder of Pre-Funded Warrants may increase or decrease this percentage, but not in excess of 19.99%, by providing at least 61 days’ prior notice to the Company.

The Company estimates net proceeds from the Offering, after deducting the underwriting discount and commissions and other estimated offering expenses payable by the Company, will be approximately \$574.0 million, excluding any exercise of the Underwriter’s option to purchase additional shares. The closing of the Offering is expected to occur on March 21, 2024, subject to the satisfaction of customary closing conditions.

The Company intends to use the net proceeds from the Offering for its commercial activities in connection with the launch of Rezdifra™ (resmetrom) in the U.S. and for general corporate purposes, including, without limitation, research and development expenditures, ongoing clinical trial expenditures, manufacture and supply of drug substance and drug products, potential ex-U.S. commercialization or partnering opportunities, potential acquisitions or licensing of new technologies, capital expenditures and working capital.

The Company made certain representations, warranties and covenants in the Underwriting Agreement and also agreed to indemnify the Underwriter against certain liabilities, including liabilities under the Securities Act of 1933, as amended. The representations, warranties and covenants contained in the Underwriting Agreement were made only for purposes of such agreement and as of specific dates, were solely for the benefit of the parties to such agreement, and may be subject to limitations agreed upon by the contracting parties.

In connection with the Underwriting Agreement, the Company and the Company’s directors and executive officers also agreed not to sell or transfer any Common Stock without first obtaining the written consent of the Underwriter, subject to certain exceptions, for 60 days after the date of the Prospectus (as defined in the Underwriting Agreement).

A copy of the Underwriting Agreement is attached to this Current Report on Form 8-K as Exhibit 1.1 and incorporated herein by reference. The foregoing is only a brief description of the material terms of the Underwriting Agreement, does not purport to be a complete description of the rights and obligations of the parties thereunder, and is qualified in its entirety by reference to Exhibit 1.1. The form of Pre-Funded Warrant is attached to this Current Report on Form 8-K as Exhibit 4.1, and the foregoing description of the terms of the Pre-Funded Warrants is qualified in its entirety by reference to such exhibit. The legal opinion of Hogan Lovells US LLP related to the offering is filed as Exhibit 5.1 to this Current Report on Form 8-K.

The Company registered the Common Stock pursuant to its registration statement on Form S-3ASR (File No. 333-256666) filed with the Securities and Exchange Commission on June 1, 2021 and a prospectus supplement thereunder.

Cautionary Note Regarding Forward Looking Statements

This Current Report on Form 8-K and certain of the materials filed herewith contain forward-looking statements within the meaning of the Private Securities Litigation Reform Act of 1995, as amended, including, without limitation, statements regarding the Offering and use of proceeds. The words “may,” “might,” “will,” “could,” “would,” “should,” “expect,” “plan,” “anticipate,” “intend,” “believe,” “expect,” “estimate,” “seek,” “predict,” “future,” “project,” “potential,” “target” and similar words or expressions are intended to identify forward-looking statements, although not all forward-looking statements contain these identifying words. Any forward-looking statements, such as those related to the anticipated closing of the Offering and use of proceeds, are subject to a number of risks, uncertainties and important factors that may cause actual events or results to differ materially from those expressed or implied by any forward-looking statements contained in this Current Report on Form 8-K or the materials furnished or filed herewith, including, without limitation, uncertainties related to market conditions and the completion of the Offering on the anticipated terms or at all. These and other risks and uncertainties are described in greater detail in the section entitled “Risk Factors” in the Company’s final prospectus supplement filed with the SEC pursuant to Rule 424(b)(5) on March 20, 2024, in Part I, Item 1A of the Company’s Annual Report on Form 10-K for the year ended December 31, 2023, filed with the SEC on February 28, 2024, and in the Company’s other filings with the SEC. Undue reliance should not be placed on forward-looking statements, which speak only as of the date they are made. The Company undertakes no obligation to update any forward-looking statements to reflect new information, events or circumstances after the date they are made, or to reflect the occurrence of unanticipated events.

Item 9.01. Financial Statements and Exhibits.

(d) The following exhibits are filed as part of this report:

Exhibit Number	Description
1.1	Underwriting Agreement, dated March 18, 2024.
4.1	Form of Pre-Funded Warrant (incorporated by reference to Exhibit 4.1 to the Company’s Current Report on Form 8-K filed with the SEC on October 2, 2023).
5.1	Opinion of Hogan Lovells US LLP.
23.1	Consent of Hogan Lovells US LLP (included in the opinion filed as Exhibit 5.1).
104	Cover Page Interactive Data File (embedded within the Inline XBRL document).

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, thereunto duly authorized.

Madrigal Pharmaceuticals, Inc.
(the Registrant)

Date: March 20, 2024

By: /s/ Mardi C. Dier
Mardi C. Dier
Senior Vice President and Chief Financial Officer

MADRIGAL PHARMACEUTICALS, INC.**750,000 Shares of Common Stock, par value \$0.0001 per share****Pre-Funded Warrants to Purchase 1,557,692 Shares of Common Stock**

Underwriting Agreement

March 18, 2024

Goldman Sachs & Co. LLC
Jefferies LLC
Cowen and Company, LLC
Evercore Group L.L.C.
Piper Sandler & Co.

As representatives (the "Representatives") of the several Underwriters
named in Schedule I hereto,

c/o Goldman Sachs & Co. LLC
200 West Street,
New York, New York 10282-2198

c/o Jefferies LLC
520 Madison Avenue
New York, New York 10022

c/o Cowen and Company, LLC
599 Lexington Ave, 25th Floor
New York, New York 10022

c/o Evercore Group L.L.C.
55 East 52nd Street
New York, New York 10055

c/o Piper Sandler & Co.
1251 Avenue of the Americas, 7th Floor
New York, New York 10020

Ladies and Gentlemen:

Madrigal Pharmaceuticals, Inc., a Delaware corporation (the "Company"), proposes, subject to the terms and conditions stated in this agreement (this "Agreement"), to issue and sell to the Underwriters named in Schedule I hereto (the "Underwriters") (i) an aggregate of 750,000 shares (the "Firm Shares") of the Company's common stock, \$0.0001 par value (the "Common Stock"), and (ii) warrants of the Company to purchase 1,557,692 shares of Common Stock at an exercise price equal to \$0.0001 per share (the "Pre-Funded Warrants" and, together

with the Firm Shares, the “Firm Securities”). As used herein, “Warrant Shares” means the shares of Common Stock issuable upon exercise of the Pre-Funded Warrants. In addition, the Company has granted to the Underwriters an option to purchase up to 346,153 additional shares of Common Stock (the “Optional Shares”). The Firm Shares and the Optional Shares that the Underwriters elect to purchase pursuant to Section 2 hereof are herein collectively called the “Shares,” and together with the Pre-Funded Warrants are referred to as the “Offered Securities.”

1. The Company represents and warrants to, and agrees with, each of the Underwriters that:

(i) An “automatic shelf registration statement” as defined under Rule 405 under the Securities Act of 1933, as amended (the “Act”) on Form S-3 (File No. 333-256666) in respect of the Offered Securities has been filed with the Securities and Exchange Commission (the “Commission”) not earlier than three (3) years prior to the date hereof; such registration statement, and any post-effective amendment thereto, became effective on filing; and no stop order suspending the effectiveness of such registration statement or any part thereof, has been issued and no proceeding for that purpose has been initiated or, to the Company’s knowledge, threatened by the Commission, and no notice of objection of the Commission to the use of such registration statement or any post-effective amendment thereto pursuant to Rule 401(g)(2) under the Act has been received by the Company (the base prospectus filed as part of such registration statement, in the form in which it has most recently been filed with the Commission on or prior to the date of this Agreement, is hereinafter called the “Basic Prospectus”; any preliminary prospectus (including any preliminary prospectus supplement) relating to the Offered Securities filed with the Commission pursuant to Rule 424(b) under the Act is hereinafter called a “Preliminary Prospectus”; the various parts of such registration statement, including all exhibits thereto but excluding Form T-1 and including any prospectus supplement relating to the Offered Securities that is filed with the Commission and deemed by virtue of Rule 430B to be part of such registration statement, each as amended at the time such part of the registration statement became effective, are hereinafter collectively called the “Registration Statement”; the Basic Prospectus, as amended and supplemented immediately prior to the Applicable Time (as defined in Section 1(iii) hereof), is hereinafter called the “Pricing Prospectus”; the form of the final prospectus relating to the Offered Securities filed with the Commission pursuant to Rule 424(b) under the Act in accordance with Section 5(a) hereof is hereinafter called the “Prospectus”; any reference herein to the Basic Prospectus, the Pricing Prospectus, any Preliminary Prospectus or the Prospectus shall be deemed to refer to and include the documents incorporated by reference therein pursuant to Item 12 of Form S-3 under the Act, as of the date of such prospectus; any reference to any amendment or supplement to the Basic Prospectus, any Preliminary Prospectus or the Prospectus shall be deemed to refer to and include any post-effective amendment to the Registration Statement, any prospectus supplement relating to the Offered Securities filed with the Commission pursuant to Rule 424(b) under the Act and any documents filed under the Securities Exchange Act of 1934, as amended (the “Exchange Act”), and incorporated therein, in each case after the date of the Basic Prospectus, such Preliminary Prospectus or the Prospectus, as the case may be; any reference to any amendment to the Registration Statement shall be deemed to refer to and include any annual report of the Company filed pursuant to Section 13(a) or 15(d) of the Exchange Act after the effective date of the Registration Statement that is incorporated by reference in the Registration Statement; any oral or written communication with potential investors undertaken in reliance on Rule 163B under the Act is hereinafter called a “Testing-the-Waters Communication”; and any Testing-the-Waters Communication that is a written communication within the meaning of Rule 405 under the Act is hereinafter called a “Written Testing-the-Waters Communication”; any “issuer free writing prospectus” as defined in Rule 433 under the Act relating to the Offered Securities is hereinafter called an “Issuer Free Writing Prospectus”);

(ii) (A) No order preventing or suspending the use of any Preliminary Prospectus or any Issuer Free Writing Prospectus has been issued by the Commission, and (B) each Preliminary Prospectus, at the time of filing thereof, conformed in all material respects to the requirements of the Act and the rules and regulations of the Commission thereunder, and did not contain an untrue statement of a material fact or omit to state a material fact required to be stated therein or necessary to make the statements therein, in the light of the circumstances under which they were made, not misleading; provided, however, that this representation and warranty shall not apply to any statements or omissions made in reliance upon and in conformity with the Underwriter Information;

(iii) For the purposes of this Agreement, the “Applicable Time” is 7:30 p.m. (Eastern time) on the date of this Agreement. The Pricing Prospectus, as supplemented by the information listed on Schedule II(c) hereto, taken together (collectively, the “Pricing Disclosure Package”), as of the Applicable Time did not, and as of each Time of Delivery (as defined in Section 4(a) of this Agreement) will not, include any untrue statement of a material fact or omit to state any material fact necessary in order to make the statements therein, in the light of the circumstances under which they were made, not misleading; and each Issuer Free Writing Prospectus and each Written Testing-the-Waters Communication does not conflict with the information contained in the Registration Statement, the Pricing Prospectus or the Prospectus and each Issuer Free Writing Prospectus and each Written Testing-the-Waters Communication, as supplemented by and taken together with the Pricing Disclosure Package as of the Applicable Time, did not, and as of each Time of Delivery will not, include any untrue statement of a material fact or omit to state any material fact necessary in order to make the statements therein, in the light of the circumstances under which they were made, not misleading; provided, however, that this representation and warranty shall not apply to statements or omissions made in an Issuer Free Writing Prospectus in reliance upon and in conformity with the Underwriter Information;

(iv) The documents incorporated by reference in the Pricing Prospectus and the Prospectus, when they became effective or were filed with the Commission, as the case may be, conformed in all material respects to the requirements of the Act or the Exchange Act, as applicable, and the rules and regulations of the Commission thereunder, and none of such documents contained an untrue statement of a material fact or omitted to state a material fact required to be stated therein or necessary to make the statements therein not misleading; any further documents so filed and incorporated by reference in the Pricing Prospectus and the Prospectus or any further amendment or supplement thereto, when such documents become effective or are filed with the Commission, as the case may be, will conform in all material respects to the requirements of the Act or the Exchange Act, as applicable, and the rules and regulations of the Commission thereunder and will not contain an untrue statement of a material fact or omit to state a material fact required to be stated therein or necessary to make the statements therein not misleading; provided, however, that this representation and warranty shall not apply to any statements or omissions made in reliance upon and in conformity with the Underwriter Information; and no such documents were filed with the Commission since the Commission’s close of business on the business day immediately prior to the date of this Agreement and prior to the execution of this Agreement, except as set forth on Schedule II(b) hereto;

(v) The Registration Statement conforms, and the Prospectus and any further amendments or supplements to the Registration Statement and the Prospectus, on their respective dates and at the Time of Delivery, will conform, in all material respects to the requirements of the Act and the rules and regulations of the Commission thereunder and do not and will not, as of the applicable effective date as to each part of the Registration Statement, as of the applicable filing date as to the Prospectus and any amendment or supplement thereto, and as of each Time of Delivery, contain an untrue statement of a material fact or omit to state a material fact required to be stated therein or necessary to make the statements therein not misleading; provided, however, that this representation and warranty shall not apply to any statements or omissions made in reliance upon and in conformity with the Underwriter Information;

(vi) Neither the Company nor any of its subsidiaries has, since the date of the latest audited financial statements included or incorporated by reference in the Pricing Prospectus (i) sustained any material loss or interference with its business from fire, explosion, flood or other calamity, whether or not covered by insurance, or from any labor dispute or court or governmental action, order or decree or (ii) entered into any transaction or agreement (whether or not in the ordinary course of business) that is material to the Company and its subsidiaries taken as a whole or incurred any liability or obligation, direct or contingent, that is material to the Company and its subsidiaries taken as a whole, in each case otherwise than as set forth or contemplated in the Pricing Prospectus; and, since the respective dates as of which information is given in the Registration Statement and the Pricing Prospectus, there has not been (x) any change in the capital stock (other than as a result of (i) the exercise, if any, of stock options or the award, if any, of stock options or restricted stock in the ordinary course of business pursuant to the Company's equity plans that are described in the Pricing Prospectus and the Prospectus or (ii) the issuance, if any, of stock upon conversion of Company securities as described in the Pricing Prospectus and the Prospectus) or material increase in the long term debt of the Company or any of its subsidiaries or (y) any Material Adverse Effect (as defined below); as used in this Agreement, "Material Adverse Effect" shall mean any material adverse change or effect, or any development involving a prospective material adverse change or effect, in or affecting (i) the business, properties, general affairs, management, financial position, stockholders' equity or results of operations of the Company and its subsidiaries, taken as a whole, except as set forth or contemplated in the Pricing Prospectus, or (ii) the ability of the Company to perform its obligations under this Agreement, including the issuance and sale of the Offered Securities, or to consummate the transactions contemplated in the Pricing Prospectus and the Prospectus;

(vii) The Company and its subsidiaries have good and marketable title in fee simple to all real property and good and marketable title to all personal property owned by them (other than with respect to Company Intellectual Property, which is addressed exclusively in subsection (xxv)), in each case free and clear of all liens, encumbrances and defects except such as are described in the Pricing Prospectus or such as do not materially affect the value of such property and do not materially interfere with the use made and proposed to be made of such property by the Company and its subsidiaries; and any real property and buildings held under lease by the Company and its subsidiaries are held by them under valid, subsisting and, to the Company's knowledge, enforceable leases with such exceptions as are not material and do not materially interfere with the use made and proposed to be made of such property and buildings by the Company and its subsidiaries;

(viii) Each of the Company and its subsidiaries has been (i) duly organized and is validly existing and in good standing under the laws of its jurisdiction of organization, with power and authority (corporate and other) to own its properties and conduct its business as described in the Pricing Prospectus, and (ii) duly qualified as a foreign corporation for the transaction of business and is in good standing (where such concept exists) under the laws of each other jurisdiction in which it owns or leases properties or conducts any business so as to require such qualification, except, in the case of clauses (i) and (ii), where the failure to be so qualified or in good standing would not, individually or in the aggregate, have a Material Adverse Effect; and each subsidiary of the Company has been listed in the Registration Statement;

(ix) The Company has an authorized capitalization as set forth in the Pricing Prospectus and all of the issued shares of capital stock of the Company have been duly and validly authorized and issued and are fully paid and non-assessable and conform in all material respects to the description of the Common Stock and Preferred Stock contained in the Pricing Disclosure Package and the Prospectus; and all of the issued shares of capital stock of each subsidiary of the Company have been duly and validly authorized and issued, are fully paid and non-assessable and (except, in the case of any foreign subsidiary, for directors' qualifying shares) are owned directly or indirectly by the Company, free and clear of all liens, encumbrances, equities or claims, except for such liens or encumbrances described in the Pricing Prospectus and the Prospectus; and the Shares and the Pre-Funded Warrants to be issued and sold by the Company to the Underwriters hereunder and the Warrant Shares to be issued upon the exercise of the Pre-Funded Warrants have been duly and validly authorized and, when issued and delivered against payment therefor as provided herein, will be duly and validly issued and fully paid and non-assessable and will conform in all material respects to the descriptions of the Common Stock and Pre-Funded Warrants, as applicable, contained in the Pricing Disclosure Package and the Prospectus; and the issuance of the Offered Securities is not subject to any preemptive or similar rights. There are no debt securities or preferred stock of, or guaranteed by, the Company or any of its subsidiaries that are rated by a "nationally recognized statistical rating organization," as such term is defined in Section 3(a)(62) of the Exchange Act;

(x) The issue and sale of the Offered Securities and the compliance by the Company with this Agreement and the consummation of the transactions contemplated in this Agreement and the Pricing Prospectus will not conflict with or result in a breach or violation of any of the terms or provisions of, or constitute a default under, (A) any indenture, mortgage, deed of trust, loan agreement, lease or other agreement or instrument to which the Company or any of its subsidiaries is a party or by which the Company or any of its subsidiaries is bound or to which any of the property or assets of the Company or any of its subsidiaries is subject, except, in the case of this clause (A) for such defaults, breaches, or violations that would not, individually or in the aggregate, have a Material Adverse Effect, (B) the certificate of incorporation or by-laws (or other applicable organizational document) of the Company or any of its subsidiaries, or (C) any statute or any judgment, order, rule or regulation of any court or governmental agency or body having jurisdiction over the Company or any of its subsidiaries or any of their properties; and no consent, approval, authorization, order, registration or qualification of or with any such court or governmental agency or body is required for the issuance and sale of the Offered Securities or the consummation by the Company of the transactions contemplated by this Agreement, except such as have been obtained under the Act and for such consents, approvals, authorizations, orders, registrations or qualifications as may be required under state securities or Blue Sky laws in connection with the purchase and distribution of the Offered Securities by the Underwriters;

(xi) There are no legal or governmental proceedings pending to which the Company or any of its subsidiaries or, to the Company's knowledge, any officer or director of the Company is a party or of which any property owned or leased by the Company or any of its subsidiaries or, to the Company's knowledge, any officer or director of the Company is the subject which, if determined adversely to the Company or any of its subsidiaries (or such officer or director), would individually or in the aggregate have a Material Adverse Effect; and, to the Company's knowledge, no such proceedings are threatened or contemplated by governmental authorities or others;

(xii) Neither the Company nor any of its subsidiaries is (i) in violation of its certificate of incorporation or by-laws (or other applicable organizational document), (ii) in violation of any statute or any judgment, order, rule or regulation of any court or governmental agency or body having jurisdiction over the Company or any of its subsidiaries or any of their properties, or (iii) in default in the performance or observance of any obligation, agreement, covenant or condition contained in any indenture, mortgage, deed of trust, loan agreement, lease or other agreement or instrument to which it is a party or by which it or any of its properties may be bound, except, in the case of the foregoing clauses (ii) and (iii), for such defaults as would not, individually or in the aggregate, have a Material Adverse Effect;

(xiii) The statements set forth in the Pricing Prospectus and Prospectus under the caption “Description of Capital Stock”, insofar as they purport to constitute a summary of the terms of the Common Stock and the Preferred Stock, are accurate, complete and fair in all material respects;

(xiv) The Company is not and, after giving effect to the offering and sale of the Offered Securities and the application of the proceeds thereof, will not be an “investment company”, as such term is defined in the Investment Company Act of 1940, as amended (the “Investment Company Act”);

(xv) (A) (i) At the time of filing the Registration Statement, (ii) at the time of the most recent amendment thereto for the purposes of complying with Section 10(a)(3) of the Act (whether such amendment was by post-effective amendment, incorporated report filed pursuant to Section 13 or 15(d) of the Exchange Act or form of prospectus), and (iii) at the time the Company or any person acting on its behalf (within the meaning, for this clause only, of Rule 163(c) under the Act) made any offer relating to the Offered Securities in reliance on the exemption of Rule 163 under the Act, the Company was a “well-known seasoned issuer” as defined in Rule 405 under the Act; and (B) at the time of filing the Registration Statement and any post-effective amendment thereto, at the earliest time thereafter that the Company or any offering participant made a bona fide offer (within the meaning of Rule 164(h)(2) under the Act) of the Offered Securities, and at the date hereof, the Company was not and is not an “ineligible issuer,” as defined in Rule 405 under the Act;

(xvi) PricewaterhouseCoopers LLP, who have certified certain financial statements of the Company and its subsidiaries, and have audited the Company’s internal control over financial reporting and management’s assessment thereof, are independent public accountants as required by the Act and the rules and regulations of the Commission thereunder;

(xvii) The Company maintains a system of internal control over financial reporting (as such term is defined in Rule 13a-15(f) under the Exchange Act that (i) complies with the requirements of the Exchange Act, (ii) has been designed by the Company’s principal executive officer and principal financial officer, or under their supervision, to provide reasonable assurance regarding the reliability of financial reporting and the preparation of financial statements for external purposes in accordance with generally accepted accounting principles and (iii) is sufficient to provide reasonable assurance that (A) transactions are executed in accordance with management’s general or specific authorization, (B) transactions are recorded as necessary to permit preparation of financial statements in conformity with generally accepted accounting principles and to maintain accountability for assets, (C) access to assets is permitted only in accordance with management’s general or specific authorization and (D) the recorded accountability for assets is compared with the existing assets at reasonable intervals and appropriate action is taken with respect to any differences; and except as disclosed in the Pricing Prospectus, the Company’s internal control over financial reporting is effective and the Company is not aware of any material weaknesses in its internal control over financial reporting;

(xviii) Except as disclosed in the Pricing Prospectus, since the date of the latest audited financial statements included or incorporated by reference in the Pricing Prospectus, there has been no change in the Company’s internal control over financial reporting that has materially affected, or is reasonably likely to materially affect, the Company’s internal control over financial reporting;

(xix) The Company maintains disclosure controls and procedures (as such term is defined in Rule 13a-15(e) under the Exchange Act) that comply with the requirements of the Exchange Act; such disclosure controls and procedures have been designed to ensure that material information relating to the Company and its subsidiaries is made known to the Company’s principal executive officer and principal financial officer by others within those entities; and such disclosure controls and procedures are effective in all material respects;

(xx) None of the Company or any of its subsidiaries nor, any director or officer thereof, or, to the knowledge of the Company, agent, employee, affiliate or other person associated with or acting on behalf of the Company or any of its subsidiaries has (i) made, offered, promised or authorized any unlawful contribution, gift, entertainment or other unlawful expense; (ii) made, offered, promised or authorized any direct or indirect unlawful payment; or (iii) violated or is in violation of any provision of the Foreign Corrupt Practices Act of 1977, as amended, or the rules and regulations thereunder, the Bribery Act 2010 of the United Kingdom or any other applicable anti-corruption, anti-bribery or related law, statute or regulation (collectively, “Anti-Corruption Laws”); the Company and its subsidiaries have conducted their businesses in compliance with Anti-Corruption Laws and have instituted and maintained and will continue to maintain policies and procedures reasonably designed to promote and achieve compliance with such laws and with the representations and warranties contained herein; neither the Company nor any of its subsidiaries will use, directly or indirectly, the proceeds of the offering in furtherance of an offer, payment, promise to pay, or authorization of the payment or giving of money, or anything else of value, to any person in violation of Anti-Corruption Laws.

(xxi) The operations of the Company and its subsidiaries are and have been conducted at all times in compliance with the requirements of applicable anti-money laundering laws, including, but not limited to, the Bank Secrecy Act of 1970, as amended by the USA PATRIOT ACT of 2001, and the rules and regulations promulgated thereunder, and the anti-money laundering laws of the various jurisdictions in which the Company and its subsidiaries conduct business, the rules and regulations thereunder and any related or similar rules, regulation or guidelines issued, administered or enforced by any governmental agency (collectively, the “Money Laundering Laws”) and no action, suit or proceeding by or before any court or governmental agency, authority or body or any arbitrator involving the Company or any of its subsidiaries with respect to the Money Laundering Laws is pending or, to the knowledge of the Company, threatened;

(xxii) None of the Company or any of its subsidiaries nor any director or officer thereof, nor, to the knowledge of the Company, any agent, employee or affiliate of the Company or any of its subsidiaries, or any other person associated with or acting on behalf of the Company or its subsidiaries, is (i) currently the subject or the target of any sanctions administered or enforced by the U.S. Government, including, without limitation, the Office of Foreign Assets Control of the U.S. Department of the Treasury, or the U.S. Department of State and including, without limitation, the designation as a “specially designated national” or “blocked person,” the European Union, His Majesty’s Treasury, the United Nations Security Council, or other relevant sanctions authority (collectively, “Sanctions”), or (ii) located, organized, or resident in a country or territory that is the subject or target of Sanctions (currently, so-called Donetsk People’s Republic, or so-called Luhansk People’s Republic or any other Covered Region of Ukraine identified pursuant to Executive Order 14065, and the Crimea region, Cuba, Iran, North Korea and Syria) (a “Sanctioned Jurisdiction”), and the Company will not directly or indirectly use the proceeds of the offering of the Offered Securities hereunder, or lend, contribute or otherwise make available such proceeds to any subsidiary, joint venture partner or other person or entity (i) to fund or facilitate any activities of or business with any person, or in a Sanctioned Jurisdiction, that, at the time of such funding, is the subject or the target of Sanctions or (ii) in any other manner that will result in a violation by any person (including any person participating in the transaction, whether as underwriter, advisor, investor or otherwise) of Sanctions; neither the Company nor any of its subsidiaries is engaged in, or has, at any time in the past five years, engaged in, any dealings or transactions with or involving any individual or entity that was or is, as applicable, at the time of such dealing or transaction, the subject or target of Sanctions or with any Sanctioned Jurisdiction;

(xxiii) This Agreement has been duly authorized, executed and delivered by the Company;

(xxiv) The financial statements included in the Registration Statement, the Pricing Prospectus and the Prospectus, together with the related schedules and notes, present fairly, in all material respects, the financial position of the Company and its subsidiaries at the dates indicated and the statement of operations, stockholders' equity and cash flows of the Company and its subsidiaries for the periods specified; said financial statements have been prepared in conformity with U.S. generally accepted accounting principles ("GAAP") applied on a consistent basis throughout the periods involved. The supporting schedules, if any, present fairly in all material respects in accordance with GAAP the information required to be stated therein. The selected financial data and the summary financial information included in the Registration Statement, the Pricing Prospectus and the Prospectus present fairly in all material respects the information shown therein and have been compiled on a basis consistent with that of the audited financial statements included therein. Except as included therein, no historical or pro forma financial statements or supporting schedules are required to be included in the Registration Statement, the Pricing Prospectus or the Prospectus under the Act or the rules and regulations promulgated thereunder;

(xxv) The Company and its subsidiaries own, co-own or have valid, binding and enforceable licenses or other rights under the patents and patent applications, copyrights, trademarks, trademark registrations, service marks, service mark registrations, trade names, service names and know-how (including trade secrets and other unpatented and/or unpatentable proprietary or confidential information, systems or procedures) and all other technology and intellectual property rights necessary for, or material for the conduct or the proposed conduct, of the business of the Company and its subsidiaries in the manner described in the Pricing Prospectus and the Prospectus (collectively, the "Company Intellectual Property"), and the Company owns or has valid, binding and enforceable licenses or other rights to practice such Company Intellectual Property; except as disclosed in the Pricing Prospectus and Prospectus, the intellectual property owned by the Company or any of its subsidiaries is free and clear of all material liens and encumbrances; to the knowledge of the Company, the patents, trademarks and copyrights owned or licensed by the Company or any of its subsidiaries are valid, enforceable and subsisting; the Company and its subsidiaries have complied in all material respects with the terms of each agreement pursuant to which Company Intellectual Property has been licensed to the Company or any subsidiary, and all such agreements are in full force and effect. Other than as disclosed in the Pricing Prospectus and the Prospectus, (i) neither the Company nor any of its subsidiaries is obligated to pay a material royalty, grant a license or provide other material consideration to any third party in connection with the Company Intellectual Property (ii) no material action, suit, claim or other proceeding is pending, or, to the knowledge of the Company, has been threatened, alleging that the Company or any of its subsidiaries is infringing, misappropriating, diluting or otherwise violating any rights of others with respect to any of the Company's or any of its subsidiaries' product candidates, processes or intellectual property, and the Company is unaware of any facts which would form a reasonable basis for any such action, suit, proceeding or claim, (iii) no material action, suit, claim or other proceeding is pending, or, to the knowledge of the Company, has been threatened, challenging the validity, enforceability, scope, registration, ownership or use of any of the patents or patent applications included in the Company Intellectual Property, or challenging the Company's or any of its subsidiaries' rights in or to any Company Intellectual Property, and the Company is unaware of any facts which would form a reasonable basis for any such action, suit, proceeding or claim, (iv) neither the Company nor any of its subsidiaries has

received notice of any material claim of infringement, misappropriation or conflict with any asserted rights of others with respect to any of the Company's or any of its subsidiaries' product candidates, technology, processes or Company Intellectual Property, (v) to the knowledge of the Company, the development, manufacture, sale, and any currently proposed use of any of the product candidates or processes of the Company or any of its subsidiaries referred to in the Pricing Prospectus or the Prospectus do not currently, and will not upon commercialization, to the knowledge of the Company, materially infringe any right or valid patent claim of any third party, (vi) no third party has any ownership right in or to any Company Intellectual Property that is owned by the Company or any of its subsidiaries, and, to the knowledge of the Company, no third party has any ownership right in or to any Company Intellectual Property licensed to the Company or any of its subsidiaries, other than any licensor to the Company or such subsidiary of such Company Intellectual Property, (vii) the Company and its subsidiaries have taken reasonable measures to protect their confidential information and trade secrets and to maintain and safeguard the Company Intellectual Property, including the execution of appropriate nondisclosure and confidentiality agreements, (viii) to the knowledge of the Company, no employee, consultant or independent contractor of the Company or any of its subsidiaries is in violation in any material respect of any term of any employment contract, patent disclosure agreement, invention assignment agreement, non-competition agreement, non-solicitation agreement, nondisclosure agreement or, based on any written notice, any restrictive covenant to or with a former employer or independent contractor where the basis of such violation relates to such employee's employment or independent contractor's engagement with the Company or any of its subsidiaries while employed or engaged with the Company or any of its subsidiaries, and (ix) to the knowledge of the Company, there is no infringement by third parties of any Company Intellectual Property;

(xxvi) All patents and patent applications owned by or licensed to the Company or any of its subsidiaries or under which the Company or any of its subsidiaries has rights have, to the knowledge of the Company, been duly and properly filed and maintained; to the knowledge of the Company, no person having a duty of candor to the U.S. Patent and Trademark Office ("USPTO") with respect to the prosecution of such patents and patent applications has breached such duty; and the Company is not aware of any facts required to be disclosed to the USPTO that were not disclosed to the USPTO and which would preclude the grant of a patent in connection with any such application or would reasonably be expected to form the basis of a finding of invalidity with respect to any patents that have issued with respect to such applications;

(xxvii) Except as described in the Registration Statement, the Pricing Disclosure Package and the Prospectus, and except as would not, singly or in the aggregate, result in a Material Adverse Effect, the Company and each of its subsidiaries (i) is and has been in compliance with applicable statutes, rules, regulations, and policies applicable to the ownership, testing, development, registration, premarket clearance, licensure, application approval, product listing, quotas, manufacture, packaging, labeling, processing, use, distribution, marketing, advertising, promotion, sale, offer for sale, recordkeeping, filing of reports, storage, import, export or disposal of any product developed, manufactured, distributed, or any other activity by the Company or such subsidiary, including, without limitation, the Federal Food, Drug and Cosmetic Act (21 U.S.C. § 301 et seq.), the federal Anti-kickback Statute (42 U.S.C. § 1320a-7b(b)), the Civil Monetary Penalties Law (42 U.S.C. § 1320a-7a), the civil False Claims Act (31 U.S.C. § 3729 et seq.), the administrative False Claims Law (42 U.S.C. § 1320a-7b(a)), all criminal laws relating to health care fraud and abuse, the exclusion laws (42 U.S.C. § 1320a-7), all applicable federal, state, and local laws governing scope and permissible interactions between pharmaceutical manufacturers and health care providers, the Health Insurance Portability and Accountability Act of 1996, as amended by the Health Information Technology for Economic and Clinical Health Act of 2009 ("HIPAA"), and the

Patient Protection and Affordable Care Act of 2010, as amended by the Health Care and Education Affordability Reconciliation Act of 2010, the regulations promulgated pursuant to such laws, including, without limitation, 21 C.F.R. Parts 50, 54, 56, 58 and 312, and any successor government programs, and comparable state laws, the U.S. Animal Welfare Act, regulations relating to good clinical practices and good laboratory practices and all other local, state, federal, national, supranational and foreign laws, rules, regulations, manual provisions, policies and administrative guidance applicable to the Company or any of its subsidiaries and any and all other health care laws and regulations applicable to the company or its subsidiaries or their respective businesses, each as currently conducted (collectively, the “Applicable Laws”); (ii) has not received any notice from any court or arbitrator or governmental or regulatory authority or third party alleging or asserting non-compliance with any Applicable Laws or any licenses, exemptions, certificates, approvals, clearances, authorizations, permits, registrations and supplements or amendments thereto required by any such Applicable Laws (“Authorizations”); (iii) possesses all applicable Authorizations and such Authorizations are valid and in full force and effect and is not in violation of any term of any such Authorizations; (iv) has not received written notice of any claim, action, suit, proceeding, hearing, enforcement, investigation, arbitration or similar action, or any Form FDA 483, written notice of adverse finding, warning letter, untitled letter or similar communication, from any court or arbitrator or governmental or regulatory authority or third party alleging or asserting that any product development operation or other activity is in violation of any Applicable Laws or Authorizations nor, to the knowledge of the Company, is any such claim, action, suit, proceeding, hearing, enforcement, investigation or arbitration threatened; (v) has not received written notice that any court or arbitrator or governmental or regulatory authority has taken, is taking or intends to take action to limit, suspend, modify or revoke any Authorizations nor, to the knowledge of the Company, is any such limitation, suspension, modification or revocation threatened; (vi) has filed, obtained, maintained or submitted all material reports, documents, forms, notices, applications, records, claims, submissions and supplements or amendments as required by any Applicable Laws or Authorizations and that all such reports, documents, forms, notices, applications, records, claims, submissions and supplements or amendments were complete and accurate on the date filed in all material respects (or were corrected or supplemented by a subsequent submission); (vii) is not a party to any corporate integrity agreements, monitoring agreements, consent decrees, settlement orders, or similar agreements with or imposed by any governmental or regulatory authority; (viii) maintains an operational health care compliance program that is designed to detect effectively non-compliance with Applicable Laws, governs all employees and contractors, including sales representatives, is materially consistent with the U.S. Department of Health and Human Services Office of Inspector General Compliance Program Guidance for Pharmaceutical Manufacturers, and addresses compliance with Applicable Laws¹; and (ix) is neither a “covered entity” nor a “business associate” as defined under HIPAA and has not entered into any “business associate agreements” as defined under HIPAA.

(xxviii) (i) The clinical and pre-clinical trials conducted by or on behalf of or sponsored by the Company or any of its subsidiaries, or, to the best of the Company’s knowledge, in which the Company or any of its subsidiaries has participated, that are described in the Pricing Prospectus and the Prospectus or the results of which are referred to in the Pricing Prospectus or the Prospectus, or are intended to be submitted to the U.S. Food and Drug Administration (“FDA”) or similar foreign, state, and local governmental or regulatory authorities (collectively, the “Regulatory Authorities”) as a basis for product approval, were and, if still pending, are being conducted in all material respects in accordance with the protocols established for each such clinical or pre-clinical trial, with standard medical and scientific research procedures, and with all Applicable Laws; (ii) the descriptions in the Pricing Prospectus and the

¹ Note to draft: Given PDUFA, compliance program rep has been updated to reflect commercialization.

Prospectus of the results of such trials and tests are accurate and complete in all material respects and fairly present the data derived from such trials; (iii) the Company has no knowledge of any other trials the results of which are inconsistent with or otherwise could reasonably be expected to discredit or call into question the results described or referred to in the Pricing Prospectus or the Prospectus; (iv) neither the Company nor any of its subsidiaries has received any written notices, correspondence or other communication from any Regulatory Authority or any other governmental agency or any institutional review board or other similar entity which would reasonably be expected to lead to the termination or suspension of any clinical or pre-clinical trials that are described in the Pricing Prospectus or the Prospectus or the results of which are referred to in the Pricing Prospectus or the Prospectus; and, (v) to the knowledge of the Company, there are no reasonable grounds for same;

(xxix) The Company and each of its subsidiaries has filed and received approval of all Authorizations issued by, and has made all declarations and filings with, the applicable Regulatory Authorities that are necessary for the ownership or lease of its properties or the conduct of its business as described in the Pricing Prospectus and the Prospectus, or to permit all clinical and nonclinical studies and trials conducted by or on behalf of the Company or any of its subsidiaries, including, without limitation, all necessary FDA and applicable foreign regulatory agency approvals; the Company and each of its subsidiaries is in material compliance with and is not in violation of, or in default under, any such Authorization; and, to the knowledge of the Company, no event has occurred which would reasonably be expected to result in, or after notice or lapse of time would reasonably be expected to result in, revocation, termination or modification of any such Authorization or result in any other material impairment of the rights of the holder of any such Authorization and does not have any reason to believe that any such Authorization will not be renewed in the ordinary course. All such Authorizations are in full force and effect;

(xxx) Neither the Company nor any of its subsidiaries, nor, to the knowledge of the Company, any of its or any of its subsidiaries' officers, directors or managing employees (as defined in 42 U.S.C. § 1320a-5(b)), is or has been excluded, suspended or debarred from participation in any state or federal health care program, debarred by the FDA or comparable authorities pursuant to 21 U.S.C. § 335a or similar laws, declared ineligible for government contracting, listed on the list of parties excluded from federal procurement programs and non-procurement programs as maintained in the Government Services Administration's System for Award Management or other federal agencies, or made subject to any pending or, to the knowledge of the Company, threatened or contemplated action which could reasonably be expected to result in such exclusion, suspension or debarment, and the Company periodically conducts screening of such persons to confirm such persons are not excluded, suspended or debarred from participation;

(xxxix) To the knowledge of the Company, the manufacturing facilities and operations of its suppliers are operated in compliance in all material respects with all Applicable Laws;

(xxxixi) Except as described in the Registration Statement, the Pricing Disclosure Package and the Prospectus, none of the Company's or any of its subsidiaries' product candidates has received marketing approval from any Regulatory Authority;

(xxxiii) Except as would not reasonably be expected to, individually or in the aggregate, result in a Material Adverse Effect: (i) neither the Company nor any subsidiary is in violation of any federal, state, local or foreign law or regulation relating to pollution or protection of human health or the environment (including, without limitation, ambient air, surface water, groundwater, land surface or subsurface strata) or wildlife, including without limitation, laws and regulations relating to emissions, discharges, releases or threatened releases of chemicals, pollutants, contaminants, wastes, toxic substances, hazardous substances, petroleum and petroleum products (collectively, “Materials of Environmental Concern”), or otherwise relating to the manufacture, processing, distribution, use, treatment, storage, disposal, transport or handling of Materials of Environmental Concern (collectively, “Environmental Laws”), which violation includes, but is not limited to, noncompliance with any permits or other governmental authorizations required for the operation of the business of the Company or its Subsidiaries under applicable Environmental Laws, or noncompliance with the terms and conditions thereof, nor has the Company or any subsidiary received any written communication, whether from a governmental authority, citizens group, employee or otherwise, that alleges that the Company or any subsidiary is in violation of any Environmental Law; (ii) there is no claim, action or cause of action filed with a court or government authority, no investigation with respect to which the Company has received written notice, and no written notice by any person or entity alleging potential liability for investigatory costs, cleanup costs, governmental responses costs, natural resources damages, property damages, personal injuries, attorneys’ fees or penalties arising out of, based on or resulting from the presence, or release into the environment, of any Material of Environmental Concern at any location owned, leased or operated by the Company or any subsidiary, now or in the past (collectively, “Environmental Claims”), pending or, to the Company’s knowledge, threatened against the Company or any subsidiary or any Person whose liability for any Environmental Claim the Company or any subsidiary has retained or assumed either contractually or by operation of law; and (iii) to the Company’s knowledge, there are no past or present actions, activities, circumstances, conditions, events or incidents, including, without limitation, the release, emission, discharge, presence or disposal of any Material of Environmental Concern, that reasonably would be expected to result in a material violation of any Environmental Law or form the basis of an Environmental Claim against the Company or any subsidiary or against any person or entity whose liability for any Environmental Claim the Company or any Subsidiary has retained or assumed either contractually or by operation of law;

(xxxiv) The Company and its subsidiaries are, and at all prior times were, in material compliance with all applicable data privacy and security laws and regulations, including, without limitation, to the extent applicable, if any, HIPAA, as amended by the Health Information Technology for Economic and Clinical Health Act (42 U.S.C. Section 17921 et seq.); and the Company and its subsidiaries have taken all necessary actions to comply in all material respects with the European Union General Data Protection Regulation (“GDPR”) (EU 2016/679), in each case, to the extent applicable (collectively, “Privacy Laws”). To the extent required by applicable Privacy Laws, the Company and its subsidiaries have in place, comply with, and take appropriate steps reasonably designed to ensure compliance in all material respects with their policies and procedures relating to data privacy and security and the collection, storage, use, disclosure, handling and analysis of Personal Data (the “Policies”). To the extent required by applicable Privacy Laws, the Company provides accurate notice of its Policies to its customers, employees, third party vendors and representatives, as applicable. The Policies provide accurate and sufficient notice of the Company’s then-current privacy practices relating to its subject matter and such Policies do not contain any material omissions of the Company’s then-current privacy practices. “Personal Data” means: (i) a natural person’s name, street address, telephone number, email address, photograph, social security number, bank information, or customer or account number; (ii) any information which would qualify as “personally identifying information” under the Federal Trade Commission Act, as amended; (iii) Protected Health Information as defined by HIPAA; (iv) “personal data” as defined by GDPR; and (v) any other piece of information that allows the identification of such natural person, or his or her family, or permits the collection or analysis of any data related to an identified person’s health or sexual orientation. None of such disclosures made or contained in any of the Policies have been

inaccurate, misleading, deceptive or in violation of any Privacy Laws or Policies in any material respect. The execution, delivery and performance of this Agreement or any other agreement referred to in this Agreement will not result in a material breach of any Privacy Laws or Policies. Neither the Company nor any subsidiary: (x) to the Company's knowledge, has received notice of any actual or reasonably likely potential material liability under or relating to, or actual or reasonably likely potential material violation of, any of the Privacy Laws, and, except as disclosed in both the Preliminary Prospectus and Pricing Disclosure Package, has no knowledge of any event or condition that would reasonably be expected to result in any such notice; or (y) is a party to any order, decree, or agreement that imposed any obligation or liability under any Privacy Law;

(xxxv) (i)(x) To the Company's knowledge, there has been no material security breach, attack or other compromise of or relating to any of the Company's and its subsidiaries' information technology and computer systems, networks, hardware, software, data (including the data of their respective customers, employees, suppliers, vendors and any third party data maintained by or on behalf of them), equipment or technology ("IT Systems and Data"), and (y) the Company and its subsidiaries have not been notified of, and, except as disclosed in the Pricing Prospectus have no knowledge of any event or condition that would reasonably be expected to result in any material security breach, attack or compromise to their IT Systems and Data, (ii) except as disclosed in the Pricing Prospectus, the Company and each subsidiary has complied in all material respects, and are presently in compliance with, in all material respects, all applicable laws, statutes or any judgment, order, rule or regulation of any court or arbitrator or governmental or regulatory authority and all binding industry guidelines, internal policies and contractual obligations relating to the privacy and security of IT Systems and Data and to the protection of such IT Systems and Data from unauthorized use, access, misappropriation or modification and (iii) the Company and each subsidiary has implemented backup and disaster recovery technology consistent with industry standards and practice in all material respects;

(xxxvi) The Company is not and during the past three years neither the Company nor any predecessor was: (i) a blank check company as defined in Rule 419(a)(2) of the Act, (ii) a shell company, other than a business combination related shell company, each as defined in Rule 405 of the Act, or (iii) an issuer for an offering of penny stock as defined in Rule 3a51-1 of the Exchange Act; and

(xxxvii) (i) At the time of filing the Registration Statement and (ii) at the date of this Agreement, the Company was not and is not an ineligible issuer, as defined in Rule 405 under the Act.

(xxxviii) The Pre-Funded Warrants have been duly authorized by the Company and, when executed and delivered by the Company, will be valid and binding agreements of the Company, enforceable against the Company in accordance with their terms, except as the enforcement thereof may be limited by bankruptcy, insolvency, reorganization, moratorium or other similar laws relating to or affecting the rights and remedies of creditors or by general equitable principles. The Warrant Shares have been duly authorized and validly reserved for issuance upon exercise of the Pre-Funded Warrants in a number sufficient to meet the current exercise requirements. The Warrant Shares, when issued and delivered upon exercise of the Pre-Funded Warrants in accordance therewith, will be validly issued, fully paid and nonassessable, and the issuance of the Warrant Shares is not subject to any preemptive rights, rights of first refusal or other similar rights to subscribe for or purchase the Warrant Shares.

2. Subject to the terms and conditions herein set forth, (a) the Company agrees to issue and sell to each of the Underwriters, and each of the Underwriters agrees, severally and not jointly, to purchase from the Company, at a purchase price per Share of \$248.3000 and a purchase price per Pre-Funded Warrant of \$248.2999, the number of Firm Shares and Pre-Funded Warrants set forth opposite the name of such Underwriter in Schedule I hereto and (b) in the event and to the extent that the Underwriters shall exercise the election to purchase Optional Shares as provided below, the Company agrees to issue and sell to each of the Underwriters, and each of the Underwriters agrees, severally and not jointly, to purchase from the Company, at the purchase price per share set forth in clause (a) of this Section 2 (provided that the purchase price per Optional Share shall be reduced by an amount per share equal to any dividends or distributions declared by the Company and payable on the Firm Shares but not payable on the Optional Shares), that portion of the number of Optional Shares as to which such election shall have been exercised (to be adjusted by you so as to eliminate fractional shares) determined by multiplying such number of Optional Shares by a fraction, the numerator of which is the maximum number of Optional Shares which such Underwriter is entitled to purchase as set forth opposite the name of such Underwriter in Schedule I hereto and the denominator of which is the maximum number of Optional Shares that all of the Underwriters are entitled to purchase hereunder.

The Company hereby grants to the Underwriters the right to purchase at their election up to 346,153 Optional Shares, in whole or in part and from time to time, at the purchase price per share set forth in the paragraph above, provided that the purchase price per Optional Share shall be reduced by an amount per share equal to any dividends or distributions declared by the Company and payable on the Firm Shares but not payable on the Optional Shares. Any such election to purchase Optional Shares may be exercised only by written notice from you to the Company, given within a period of 30 calendar days after the date of this Agreement, setting forth the aggregate number of Optional Shares to be purchased and the date on which such Optional Shares are to be delivered, as determined by you but in no event earlier than the First Time of Delivery (as defined in Section 4 hereof) or, unless you and the Company otherwise agree in writing, earlier than two or later than ten business days after the date of such notice.

3. Upon the authorization by you of the release of the Offered Securities, the several Underwriters propose to offer the Offered Securities for sale upon the terms and conditions set forth in the Pricing Prospectus and the Prospectus.

4. (a) The Shares to be purchased by each Underwriter hereunder, in definitive or book-entry form, and in such authorized denominations and registered in such names as the Representatives may request upon at least forty-eight hours' prior notice to the Company shall be delivered by or on behalf of the Company to the Representatives, through the facilities of the Depository Trust Company ("DTC"), for the account of such Underwriter, against payment by or on behalf of such Underwriter of the purchase price therefor by wire transfer of Federal (same-day) funds to the account specified by the Company to the Representatives at least forty-eight hours in advance. The Company will cause the certificates, if any, representing the Offered Securities to be made available for checking and packaging at least twenty-four hours prior to the Time of Delivery (as defined below) with respect thereto at the office of DTC or its designated custodian (the "Designated Office"). The time and date of such delivery and payment shall be, with respect to the Firm Securities, 9:30 a.m., New York City time, on March 21, 2024 or such other time and date as the Representatives and the Company may agree upon in writing, and, with respect to the Optional Shares, 9:30 a.m., New York time, on the date specified by the Representatives in the written notice given by the Representatives of the Underwriters' election to purchase such Optional Shares, or such other time and date as the Representatives and the Company may agree upon in writing. Such time and date for delivery of the Firm Securities is herein called the "First Time of Delivery", each such time and date for delivery of the Optional Shares, if not the First Time of Delivery, is herein called a "Second Time of Delivery", and each such time and date for delivery is herein called a "Time of Delivery". The Company shall deliver, or cause to be delivered, the Pre-Funded Warrants at the First Time of Delivery, against the irrevocable release of a wire transfer of immediately available funds for the amount of the purchase price therefor.

(b) The documents to be delivered at each Time of Delivery by or on behalf of the parties hereto pursuant to Section 8 hereof, including the cross receipt for the Offered Securities and any additional documents requested by the Underwriters pursuant to Section 8(n) hereof, will be delivered at the offices of Ropes & Gray LLP, 800 Boylston Street Boston, MA 02199 (the "Closing Location"), and the Offered Securities will be delivered at the Designated Office, all at such Time of Delivery. A meeting will be held at the Closing Location at 4:00 p.m., New York City time, on the New York Business Day next preceding such Time of Delivery, at which meeting the final drafts of the documents to be delivered pursuant to the preceding sentence will be available for review by the parties hereto. For the purposes of this Section 4, "New York Business Day" shall mean each Monday, Tuesday, Wednesday, Thursday and Friday which is not a day on which banking institutions in New York are generally authorized or obligated by law or executive order to close.

(c) Notwithstanding the foregoing, the Company and the Representatives shall instruct purchasers of the Pre-Funded Warrants to make payment for the Pre-Funded Warrants on the First Time of Delivery to Goldman Sachs & Co. LLC by wire transfer in immediately available funds to the account specified by Goldman Sachs & Co. LLC at a purchase price of \$259.9999 per Pre-Funded Warrant, and the Company shall deliver the Pre-Funded Warrants to such purchasers on the Closing Date in definitive form against such payment, in lieu of the Company's obligation to deliver such Pre-Funded Warrants to the Underwriters; provided, that, upon receipt by Goldman Sachs & Co. LLC of payment for the Pre-Funded Warrants, Goldman Sachs & Co. LLC shall promptly (but in no event later than the Closing Date), pay \$248.2999 per such Pre-Funded Warrant to the Company by wire transfer in immediately available funds to the account specified by the Company. In the event that the purchasers of the Pre-Funded Warrants fail to make payment to the Representatives for all or part of the Pre-Funded Warrants on the Closing Date, the Representatives may elect, by written notice to the Company, to purchase additional Shares in lieu of all or a portion of such Pre-Funded Warrants, to be delivered to the Underwriters under this Agreement at the price per Share listed in Section 2.

5. The Company agrees with each of the Underwriters:

(a) To prepare the Prospectus in a form approved by you and to file such Prospectus pursuant to Rule 424(b) under the Act not later than the Commission's close of business on the second business day following the date of this Agreement; to make no further amendment or any supplement to the Registration Statement, the Basic Prospectus or the Prospectus prior to the last Time of Delivery which shall be disapproved by you promptly after reasonable notice thereof; to advise you, promptly after it receives notice thereof, of the time when any amendment to the Registration Statement has been filed or becomes effective or any amendment or supplement to the Prospectus has been filed and to furnish you with copies thereof; to file promptly all other material required to be filed by the Company with the Commission pursuant to Rule 433(d) under the Act; to file promptly all reports and any definitive proxy or information statements required to be filed by the Company with the Commission pursuant to Section 13(a), 13(c), 14 or 15(d) of the Exchange Act subsequent to the date of the Prospectus and for so long as the delivery of a prospectus (or in lieu thereof, the notice referred to in Rule 173(a) under the Act) is required in connection with the offering or sale of the Offered Securities; to advise you, promptly after it receives notice thereof, of the issuance by the Commission of any stop order or of any order preventing or suspending the use of any Preliminary Prospectus or other prospectus in respect of the Offered Securities of any notice of objection of the Commission to the use of the Registration Statement or any post-effective amendment thereto pursuant to Rule 401(g)(2) under the Act, of the suspension of the qualification of the Offered Securities for offering or sale in any jurisdiction, of the initiation or threatening of any proceeding for any such purpose, or of any request by the Commission for the amending or supplementing of the Registration Statement or the Prospectus or for additional information; and, in the event of the issuance of any stop order or of any order preventing or suspending the use of any Preliminary Prospectus or other prospectus or suspending any such qualification, to promptly use its best efforts to obtain the withdrawal of such order; and in the event of any such issuance of a notice of objection, promptly to take such steps including, without limitation, amending the Registration Statement or filing a new registration statement, at its own expense, as may be necessary to permit offers and sales of the Offered Securities by the Underwriters (references herein to the Registration Statement shall include any such amendment or new registration statement);

(b) If required by Rule 430B(h) under the Act, to prepare a form of prospectus in a form approved by you and to file such form of prospectus pursuant to Rule 424(b) under the Act not later than may be required by Rule 424(b) under the Act; and to make no further amendment or supplement to such form of prospectus which shall be disapproved by you promptly after reasonable notice thereof;

(c) If by the third anniversary (the "Renewal Deadline") of the initial effective date of the Registration Statement, any of the Offered Securities remain unsold by the Underwriters, the Company will file, if it has not already done so and is eligible to do so, a new automatic shelf registration statement relating to the Offered Securities, in a form satisfactory to you. If at the Renewal Deadline the Company is no longer eligible to file an automatic shelf registration statement, the Company will, if it has not already done so, file a new shelf registration statement relating to the Offered Securities, in a form satisfactory to you and will use its best efforts to cause such registration statement to be declared effective within 180 days after the Renewal Deadline. The Company will take all other action necessary or appropriate to permit the public offering and sale of the Offered Securities to continue as contemplated in the expired registration statement relating to the Offered Securities. References herein to the Registration Statement shall include such new automatic shelf registration statement or such new shelf registration statement, as the case may be;

(d) Prior to 10:00 a.m., New York City time, on the New York Business Day next succeeding the date of this Agreement and from time to time, to furnish the Underwriters with written and electronic copies of the Prospectus in New York City in such quantities as you may reasonably request, and, if the delivery of a prospectus (or in lieu thereof, the notice referred to in Rule 173(a) under the Act) is required at any time prior to the expiration of nine months after the time of issue of the Prospectus in connection with the offering or sale of the Offered Securities and if at such time any event shall have occurred as a result of which the Prospectus as then amended or supplemented would include an untrue statement of a material fact or omit to state any material fact necessary in order to make the statements therein, in the light of the circumstances under which they were made when such Prospectus (or in lieu thereof, the notice referred to in Rule 173(a) under the Act) is delivered, not misleading, or, if for any other reason it shall be necessary during such same period to amend or supplement the Prospectus or to file under the Exchange Act any document incorporated by reference in the Prospectus in order to comply with the Act or the Exchange Act, to notify you and upon your request to file such document and to prepare and furnish without charge to each Underwriter and to any dealer in securities as many written and electronic copies as you may from time to time reasonably request of an amended Prospectus or a supplement to the Prospectus which will correct such statement or omission or effect such compliance; and in case any Underwriter is required to deliver a prospectus (or in lieu thereof, the notice referred to in Rule 173(a) under the Act) in connection with sales of any of the Offered Securities at any time nine months or more after the time of issue of the Prospectus, upon your request but at the expense of such Underwriter, to prepare and deliver to such Underwriter as many written and electronic copies as you may request of an amended or supplemented Prospectus complying with Section 10(a)(3) of the Act;

(e) Promptly from time to time to take such action as you may reasonably request to qualify the Offered Securities for offering and sale under the securities laws of such jurisdictions as you may request and to comply with such laws so as to permit the continuance of sales and dealings therein in such jurisdictions for as long as may be necessary to complete the distribution of the Offered Securities, provided that in connection therewith the Company shall not be required to qualify as a foreign corporation or to file a general consent to service of process in any jurisdiction;

(f) To make generally available to its securityholders as soon as practicable (which may be satisfied by filing with the Commission's Electronic Data Gathering Analysis and Retrieval System), but in any event not later than sixteen months after the effective date of the Registration Statement (as defined in Rule 158(c) under the Act), an earnings statement of the Company and its subsidiaries (which need not be audited) complying with Section 11(a) of the Act and the rules and regulations of the Commission thereunder (including, at the option of the Company, Rule 158);

(g) During the period beginning from the date hereof and continuing to and including the date 60 days after the date of the Prospectus (the "Restricted Period"), not to (i) offer, sell, contract to sell, pledge, grant any option to purchase, make any short sale or otherwise transfer or dispose of, directly or indirectly, or file with the Commission a new registration statement under the Act relating to, any securities of the Company that are substantially similar to the Offered Securities, including but not limited to any options or warrants to purchase shares of Common Stock or any securities that are convertible into or exchangeable for, or that represent the right to receive, Common Stock or any such substantially similar securities, or publicly disclose the intention to make any offer, sale, pledge, disposition or filing or (ii) enter into any swap or other agreement that transfers, in whole or in part, any of the economic consequences of ownership of the Common Stock or any such other securities, whether any such transaction described in clause (i) or (ii) above is to be settled by delivery of Stock or such other securities, in cash or otherwise, without the prior written consent of Goldman Sachs & Co. LLC; provided, however, that the forgoing restrictions shall not apply to (i) the Shares to be sold hereunder, (ii) the issuance by the Company of Common Stock upon the exercise of options or restricted stock units outstanding as of the date of this Agreement or issued after the date of this Agreement pursuant to the Company's equity plans that are described in the Registration Statement, Pricing Prospectus and Prospectus, (iii) the issuance by the Company of Common Stock upon the conversion or exchange of convertible or exchangeable securities outstanding as of the date of this Agreement, (iv) the issuance by the Company of shares of Common Stock, stock options, restricted stock awards, restricted stock units, performance stock units or securities convertible into, exchangeable for or that represent the right to receive shares of Common Stock, in each case pursuant to the Company's equity plans that are described in the Registration Statement, Pricing Prospectus and Prospectus, or pursuant to Nasdaq Stock Market LLC's National Market ("Nasdaq") permitted inducements, (v) the issuance by the Company of shares of capital stock or securities convertible into, exchangeable for or that represent the right to receive capital stock in connection with any joint venture, commercial or collaborative relationship or the acquisition or license by the Company of the securities, businesses, property or other assets of another person or entity, (vi) the filing of any registration statement on Form S-8 relating to the securities granted or to be granted pursuant to (A) the Company's equity plans that are described in the Registration Statement, Pricing Prospectus and Prospectus or (B) any assumed employee benefit plan contemplated by clause (v), (vii) the issuance by the Company of rights, Common Stock, preferred stock or securities convertible into, exchangeable for or that represent the right to receive preferred stock or Common Stock in connection with any rights plan adopted by the Company, (viii) assisting any party subject to a "lock-up" agreement substantially in the form of Schedule B in the establishment of a new trading plan by such party pursuant to Rule 10b5-1 under the Exchange Act providing for dispositions or sales of such party's shares of Common Stock during the Restricted Period and no public announcement or filing under the Exchange Act regarding the establishment of such plan shall be required or voluntarily made during the Restricted Period, or (ix) the filing of a replacement automatic shelf registration statement on Form S-3 to the Company's existing Form S-3 (File No. 333-256666), and replacements of the applicable prospectus supplements relating to unsold securities thereunder, provided that any such registration statement is not filed within 30 days of the date of this Agreement and that no securities are issued pursuant to any such registration statement during the Restricted Period; provided, that the aggregate number of shares of Common Stock that the Company may sell or issue or agree to sell or issue pursuant to clauses (v) and (vi) shall not exceed 5% of the total number of shares of Common Stock of the Company outstanding as of the date of this Agreement;

(h) To pay the required Commission filing fees relating to the Offered Securities within the time required by Rule 456(b)(1) under the Act without regard to the proviso therein and otherwise in accordance with Rules 456(b) and 457(r) under the Act;

(i) Upon request of any Underwriter, to furnish, or cause to be furnished, to such Underwriter an electronic version of the Company's trademarks, servicemarks and corporate logo for use on the website, if any, operated by such Underwriter for the purpose of facilitating the on-line offering of the Offered Securities (the "License"); provided, however, that the License shall be used solely for the purpose described above, is granted without any fee and may not be assigned or transferred;

(j) To use the net proceeds received by it from the sale of the Offered Securities in the manner specified in the Pricing Prospectus under the caption "Use of Proceeds";

(j) To use its best efforts to list for quotation the Shares on the Nasdaq;

(k) The Company shall, at all times while the Company is subject to the reporting requirements of Section 13 or 15(d) of the Exchange Act and any Pre-Funded Warrants are outstanding, use its best efforts to maintain a registration statement covering the issuance and sale of the Warrant Shares.

(l) The Company shall, at all times while any Pre-Funded Warrants are outstanding, reserve and keep available out of the aggregate of its authorized but unissued and otherwise unreserved shares of Common Stock, solely for the purpose of enabling it to issue Warrant Shares upon exercise of such Pre-Funded Warrants, the number of Warrant Shares that are initially issuable and deliverable upon the exercise of the then-outstanding Pre-Funded Warrants.

6. (a) The Company represents and agrees that, without the prior consent of the Representatives, it has not made and will not make any offer relating to the Offered Securities that would constitute a "free writing prospectus" as defined in Rule 405 under the Act; each Underwriter represents and agrees that, without the prior consent of the Company and the Representatives, it has not made and will not make any offer relating to the Offered Securities that would constitute a free writing prospectus required to be filed with the Commission; any such free writing prospectus the use of which has been consented to by the Company and the Representatives is listed on Schedule II(a) or Schedule II(c) hereto;

(b) The Company has complied and will comply with the requirements of Rule 433 under the Act applicable to any Issuer Free Writing Prospectus, including timely filing with the Commission or retention where required and legending; and

(c) The Company agrees that if at any time following issuance of an Issuer Free Writing Prospectus or Written Testing-the-Waters Communication any event occurred or occurs as a result of which such Issuer Free Writing Prospectus or Written Testing-the-Waters Communication would conflict with the information in the Registration Statement, the Pricing Prospectus or the Prospectus or would include an untrue statement of a material fact or omit to state any material fact necessary in order to make the statements therein, in the light of the circumstances then prevailing, not misleading, the Company will give prompt notice thereof to the Representatives and, if requested by the Representatives, will prepare and furnish without charge to each Underwriter an Issuer Free Writing Prospectus, Written Testing-the-Waters Communication or other document which will correct such conflict, statement or omission; provided, however, that this representation and warranty shall not apply to any statements or omissions in an Issuer Free Writing Prospectus made in reliance upon and in conformity with the Underwriter Information.

(d) The Company represents and agrees that (i) it has not engaged in, or authorized any other person to engage in, any Testing-the-Waters Communications, other than Testing-the-Waters Communications with the prior consent of the Representatives with entities that the Company reasonably believes are qualified institutional buyers as defined in Rule 144A under the Act or institutions that are accredited investors as defined in Rule 501(a)(1), (a)(2), (a)(3), (a)(7) or (a)(8) under the Act; and (ii) it has not distributed, or authorized any other person to distribute, any Written Testing-the-Waters Communication, other than those distributed with the prior consent of the Representatives that are listed on Schedule II(d) hereto; and the Company reconfirms that the Underwriters have been authorized to act on its behalf in engaging in Testing-the-Waters Communications; and

(e) Each Underwriter represents and agrees that any Testing-the-Waters Communications undertaken by it were with entities that such Underwriter reasonably believes are qualified institutional buyers as defined in Rule 144A under the Act or institutions that are accredited investors as defined in Rule 501(a)(1), (a)(2), (a)(3), (a)(7) or (a)(8) under the Act.

7. The Company covenants and agrees with the several Underwriters that (a) the Company will pay or cause to be paid the following: (i) the fees, disbursements and expenses of the Company's counsel and accountants in connection with the registration of the Offered Securities under the Act and all other expenses in connection with the preparation, printing, reproduction and filing of the Registration Statement, the Basic Prospectus, any Preliminary Prospectus, any Written Testing-the-Waters Communication, any Issuer Free Writing Prospectus and the Prospectus and amendments and supplements thereto and the mailing and delivering of copies thereof to the Underwriters and dealers; (ii) the cost of printing or producing any agreement among Underwriters, this Agreement, any Blue Sky Memorandum, closing documents (including any compilations thereof) and any other documents in connection with the offering, purchase, sale and delivery of the Offered Securities; (iii) all expenses in connection with the qualification of the Offered Securities for offering and sale under state securities laws as provided in Section 5(b) hereof, including the fees and disbursements of counsel for the Underwriters in connection with such qualification and in connection with the Blue Sky survey(s); (iv) any filing fees incident to, and the fees and disbursements of counsel for the Underwriters in connection with, any required review by the Financial Industry Regulatory Authority, Inc. of the terms of the sale of the Offered Securities, such fees not to exceed \$25,000; and (b) the Company will pay or cause to be paid (i) the cost of preparing certificates for the Offered Securities; (ii) the cost and charges of any transfer agent or registrar, dividend disbursing agent or conversion agent; (iii) all fees and expenses in connection with listing the Shares on Nasdaq; and (iv) all other costs and expenses incident to the performance of its obligations hereunder which are not otherwise specifically provided for in this Section 7. It is understood, however, that, except as provided in this Section 7, and Sections 9 and 12 hereof, the Underwriters will pay all of their own costs and expenses, including the fees of their counsel, transfer taxes on resale of any of the Offered Securities by them, and any advertising expenses connected with any offers they may make.

8. The obligations of the Underwriters hereunder, as to the Offered Securities to be delivered at each Time of Delivery, shall be subject, in their discretion, to the condition that all representations and warranties of the Company set forth in Section 1 herein are, at and as of the Applicable Time and such Time of Delivery, true and correct, the condition that the Company shall have performed all of its obligations hereunder theretofore to be performed, and the following additional conditions:

(a) The Prospectus shall have been filed with the Commission pursuant to Rule 424(b) under the Act within the applicable time period prescribed for such filing by the rules and regulations under the Act and in accordance with Section 5(a) hereof; all material required to be filed by the Company pursuant to Rule 433(d) under the Act shall have been filed with the Commission within the applicable time period prescribed for such filings by Rule 433; no stop order suspending the effectiveness of the Registration Statement or any part thereof shall have been issued and no proceeding for that purpose or pursuant to Section 8A of the Act shall have been initiated or, to the knowledge of the Company or the Underwriter, threatened by the Commission and no notice of objection of the Commission to the use of the Registration Statement or any post-effective amendment thereto pursuant to Rule 401(g)(2) under the Act shall have been received; no stop order suspending or preventing the use of the Preliminary Prospectus, Prospectus or any Issuer Free Writing Prospectus shall have been initiated or threatened by the Commission; and all requests for additional information on the part of the Commission shall have been complied with to your reasonable satisfaction;

(b) Ropes & Gray LLP, counsel for the Underwriters, shall have furnished to you their written opinion and negative assurance letter, dated such Time of Delivery, in form and substance reasonably satisfactory to you;

(c) Hogan Lovells US LLP, counsel for the Company, shall have furnished to you their written opinion and negative assurance letter, dated such Time of Delivery, in form and substance reasonably satisfactory to you;

(d) Venable LLP, intellectual property counsel for the Company, shall have furnished to you their written opinion and negative assurance letter, dated such Time of Delivery, in form and substance reasonably satisfactory to you;

(e) On the date of the Prospectus at a time prior to the execution of this Agreement, on the effective date of any post-effective amendment to the Registration Statement filed subsequent to the date of this Agreement and also at each Time of Delivery, PricewaterhouseCoopers LLP shall have furnished to you a letter or letters, dated the respective dates of delivery thereof, in form and substance satisfactory to you;

(f) On the date of the Prospectus at a time prior to the execution of this Agreement, on the effective date of any post-effective amendment to the Registration Statement filed subsequent to the date of this Agreement and also at each Time of Delivery, the Chief Financial Officer of the Company shall have furnished to you a certificate, in form and substance satisfactory to you, with respect to certain financial information incorporated into the Prospectus, dated the respective dates of delivery thereof;

(g) (i) Neither the Company nor any of its subsidiaries shall have sustained since the date of the latest audited financial statements included or incorporated by reference in the Pricing Prospectus any loss or interference with its business from fire, explosion, flood or other calamity, whether or not covered by insurance, or from any labor dispute or court or governmental action, order or decree, otherwise than as set forth or contemplated in the Pricing Prospectus, and (ii) since the respective dates as of which information is given in the Pricing Prospectus there shall not have been any change in the capital stock (other than as a result of (A) the exercise of stock options (including any "net" or "cashless" exercises), or the award of stock options or restricted stock in the ordinary course of business pursuant to the Company's equity plans described in the Registration Statement, Pricing Prospectus and Prospectus, or (B) the issuance, if any, of capital stock upon exercise or conversion of Company securities as described in the Registration Statement, Pricing Prospectus and Prospectus) or material increase in the long term debt of the Company or any of its subsidiaries or any change or effect, or any development involving a prospective change or effect, in or affecting (x) the business, properties, general affairs, management, financial position, stockholders' equity or results of operations of the Company and its subsidiaries, taken as a whole, except as set forth or contemplated in the Pricing Prospectus and the Prospectus, or (y) the

ability of the Company to perform its obligations under this Agreement, including the issuance and sale of the Offered Securities, or to consummate the transactions contemplated in the Pricing Prospectus and the Prospectus, the effect of which, in any such case described in clause (i) or (ii), is in your judgment so material and adverse as to make it impracticable or inadvisable to proceed with the public offering or the delivery of the Offered Securities being delivered at such Time of Delivery on the terms and in the manner contemplated in the Pricing Prospectus and the Prospectus;

(h) On or after the Applicable Time there shall not have occurred any of the following: (i) a suspension or material limitation in trading in securities generally on Nasdaq; (ii) a suspension or material limitation in trading in the Company's securities on Nasdaq; (iii) a general moratorium on commercial banking activities declared by either Federal or New York or State authorities or a material disruption in commercial banking or securities settlement or clearance services in the United States; (iv) the outbreak or escalation of hostilities involving the United States or the declaration by the United States of a national emergency or war or (v) the occurrence of any other calamity or crisis or any change in financial, political or economic conditions in the United States or elsewhere; if the effect of any such event specified in clause (iv) or (v) in your judgment makes it impracticable or inadvisable to proceed with the public offering or the delivery of the Offered Securities being delivered at such Time of Delivery on the terms and in the manner contemplated in the Pricing Prospectus and the Prospectus;

(i) The Shares at each Time of Delivery shall have been duly listed for quotation on Nasdaq;

(j) The Company shall have obtained and delivered to the Underwriters executed copies of an agreement from each director and officer of the Company and each stockholder listed on Schedule A hereto, substantially in the form of Schedule B hereto.

(k) The Company shall have complied with the provisions of Section 5(d) hereof with respect to the furnishing of prospectuses on the New York Business Day next succeeding the date of this Agreement; and

(l) The Company shall have furnished or caused to be furnished to you at such Time of Delivery certificates of officers of the Company satisfactory to you as to the accuracy of the representations and warranties of the Company herein at and as of such Time of Delivery, as to the performance by the Company of all of its obligations hereunder to be performed at or prior to such Time of Delivery, as to the matters set forth in subsections (a) and (g) of this Section and as to such other matters as you may reasonably request.

9. (a) The Company will indemnify and hold harmless each Underwriter against any losses, claims, damages or liabilities, joint or several, to which such Underwriter may become subject, under the Act or otherwise, insofar as such losses, claims, damages or liabilities (or actions in respect thereof) arise out of or are based upon an untrue statement or alleged untrue statement of a material fact contained in the Registration Statement, the Basic Prospectus, any Preliminary Prospectus, the Pricing Prospectus or the Prospectus, or any amendment or supplement thereto, any Issuer Free Writing Prospectus, any "roadshow" as defined in Rule 433(h) under the Act (a "roadshow"), or any "issuer information" filed or required to be filed pursuant to Rule 433(d) under the Act or any Testing-the-Waters Communication, or arise out of or are based upon the omission or alleged omission to state therein a material fact required to be stated therein or necessary to make the statements therein not misleading, and will reimburse each Underwriter for any legal or other expenses reasonably incurred by such Underwriter in connection with investigating or defending any such action or claim as such expenses are incurred; provided, however, that the Company shall not be liable in any such case to the extent that any such loss, claim, damage or liability arises out of or is based upon an untrue statement or alleged untrue statement or omission or alleged omission made in the Registration Statement, the Basic Prospectus, any Preliminary Prospectus, the Pricing Prospectus or the Prospectus, or any amendment or supplement thereto, or any Issuer Free Writing Prospectus, or any Testing-the-Waters Communication, in reliance upon and in conformity with the Underwriter Information.

(b) Each Underwriter will indemnify and hold harmless the Company against any losses, claims, damages or liabilities to which the Company may become subject, under the Act or otherwise, insofar as such losses, claims, damages or liabilities (or actions in respect thereof) arise out of or are based upon an untrue statement or alleged untrue statement of a material fact contained in the Registration Statement, the Basic Prospectus, any Preliminary Prospectus, the Pricing Prospectus or the Prospectus, or any amendment or supplement thereto, or any Issuer Free Writing Prospectus, or any roadshow, or any Testing-the-Waters Communication, or arise out of or are based upon the omission or alleged omission to state therein a material fact required to be stated therein or necessary to make the statements therein not misleading, in each case to the extent, but only to the extent, that such untrue statement or alleged untrue statement or omission or alleged omission was made in the Registration Statement, the Basic Prospectus, any Preliminary Prospectus, the Pricing Prospectus or the Prospectus, or any amendment or supplement thereto, or any Issuer Free Writing Prospectus, or any roadshow or any Testing-the-Waters Communication, in reliance upon and in conformity with the Underwriter Information; and will reimburse the Company for any legal or other expenses reasonably incurred by the Company in connection with investigating or defending any such action or claim as such expenses are incurred. As used in this Agreement with respect to an Underwriter and an applicable document, "Underwriter Information" shall mean the written information furnished to the Company by such Underwriter through the Representatives expressly for use therein; it being understood and agreed upon that the only such information furnished by any Underwriter consists of the following information in the Prospectus furnished on behalf of each Underwriter: the concession figure appearing in the fifth paragraph under the caption "Underwriting", and the information contained in the eighth and ninth paragraphs under the caption "Underwriting".

(c) Promptly after receipt by an indemnified party under subsection (a) or (b) above of notice of the commencement of any action, such indemnified party shall, if a claim in respect thereof is to be made against the indemnifying party under such subsection, notify the indemnifying party in writing of the commencement thereof; provided that the failure to notify the indemnifying party shall not relieve it from any liability that it may have under the preceding paragraphs of this Section 9 except to the extent that it has been materially prejudiced (through the forfeiture of substantive rights or defenses) by such failure; and provided further that the failure to notify the indemnifying party shall not relieve it from any liability that it may have to an indemnified party otherwise than under the preceding paragraphs of this Section 9. In case any such action shall be brought against any indemnified party and it shall notify the indemnifying party of the commencement thereof, the indemnifying party shall be entitled to participate therein and, to the extent that it shall wish, jointly with any other indemnifying party similarly notified, to assume the defense thereof, with counsel reasonably satisfactory to such indemnified party (who shall not, except with the consent of the indemnified party, be counsel to the indemnifying party), and, after notice from the indemnifying party to such indemnified party of its election so to assume the defense thereof, the indemnifying party shall not be liable to such indemnified party under such subsection for any legal expenses of other counsel or any other expenses, in each case subsequently incurred by such indemnified party, in connection with the defense thereof other than reasonable costs of investigation. No indemnifying party shall, without the written consent of the indemnified party, effect the settlement or compromise of, or consent to the entry of any judgment with respect to, any pending or threatened action or claim in respect of which indemnification or contribution may be sought hereunder (whether or not the indemnified party is an actual or potential party to such action or claim) unless such settlement, compromise or judgment (i) includes an unconditional release of the indemnified party from all liability arising out of such action or claim and (ii) does not include any statement as to or an admission of fault, culpability or a failure to act, by or on behalf of any indemnified party.

(d) If the indemnification provided for in this Section 9 is unavailable to or insufficient to hold harmless an indemnified party under subsection (a) or (b) above in respect of any losses, claims, damages or liabilities (or actions in respect thereof) referred to therein, then each indemnifying party shall contribute to the amount paid or payable by such indemnified party as a result of such losses, claims, damages or liabilities (or actions in respect thereof) in such proportion as is appropriate to reflect the relative benefits received by the Company on the one hand and the Underwriters on the other from the offering of the Offered Securities. If, however, the allocation provided by the immediately preceding sentence is not permitted by applicable law, then each indemnifying party shall contribute to such amount paid or payable by such indemnified party in such proportion as is appropriate to reflect not only such relative benefits but also the relative fault of the Company on the one hand and the Underwriters on the other in connection with the statements or omissions which resulted in such losses, claims, damages or liabilities (or actions in respect thereof), as well as any other relevant equitable considerations. The relative benefits received by the Company on the one hand and the Underwriters on the other shall be deemed to be in the same proportion as the total net proceeds from the offering (before deducting expenses) received by the Company bear to the total underwriting discounts and commissions received by the Underwriters, in each case as set forth in the table on the cover page of the Prospectus. The relative fault shall be determined by reference to, among other things, whether the untrue or alleged untrue statement of a material fact or the omission or alleged omission to state a material fact relates to information supplied by the Company on the one hand or the Underwriters on the other and the parties' relative intent, knowledge, access to information and opportunity to correct or prevent such statement or omission. The Company and the Underwriters agree that it would not be just and equitable if contribution pursuant to this subsection (d) were determined by *pro rata* allocation (even if the Underwriters were treated as one entity for such purpose) or by any other method of allocation which does not take account of the equitable considerations referred to above in this subsection (d). The amount paid or payable by an indemnified party as a result of the losses, claims, damages or liabilities (or actions in respect thereof) referred to above in this subsection (d) shall be deemed to include any legal or other expenses reasonably incurred by such indemnified party in connection with investigating or defending any such action or claim. Notwithstanding the provisions of this subsection (d), no Underwriter shall be required to contribute any amount in excess of the amount by which the total price at which the Offered Securities underwritten by it and distributed to the public were offered to the public exceeds the amount of any damages which such Underwriter has otherwise been required to pay by reason of such untrue or alleged untrue statement or omission or alleged omission. No person guilty of fraudulent misrepresentation (within the meaning of Section 11(f) of the Act) shall be entitled to contribution from any person who was not guilty of such fraudulent misrepresentation. The Underwriters' obligations in this subsection (d) to contribute are several in proportion to their respective underwriting obligations and not joint.

(e) The obligations of the Company under this Section 9 shall be in addition to any liability which the Company may otherwise have and shall extend, upon the same terms and conditions, to each employee, officer and director of each Underwriter, each person, if any, who controls any Underwriter within the meaning of the Act and each broker-dealer or other affiliate of any Underwriter; and the obligations of the Underwriters under this Section 9 shall be in addition to any liability which the respective Underwriters may otherwise have and shall extend, upon the same terms and conditions, to each officer and director of the Company and to each person, if any, who controls the Company within the meaning of the Act.

10. (a) If any Underwriter shall default in its obligation to purchase the Offered Securities which it has agreed to purchase hereunder, you may in your discretion arrange for you or another party or other parties to purchase such Offered Securities on the terms contained herein. If within thirty six hours after such default by any Underwriter you do not arrange for the purchase of such Offered Securities, then the Company shall be entitled to a further period of thirty six hours within which to procure another party or other parties satisfactory to you to purchase such Offered Securities on such terms. In the event that, within the respective prescribed periods, you notify the Company that you have so arranged for the purchase of such Offered Securities, or the Company notifies

you that it has so arranged for the purchase of such Offered Securities, you or the Company shall have the right to postpone such Time of Delivery for a period of not more than seven days, in order to effect whatever changes may thereby be made necessary in the Registration Statement or the Prospectus, or in any other documents or arrangements, and the Company agrees to file promptly any amendments or supplements to the Registration Statement or the Prospectus which in your opinion may thereby be made necessary. The term "Underwriter" as used in this Agreement shall include any person substituted under this Section 10 with like effect as if such person had originally been a party to this Agreement with respect to such Offered Securities.

(b) If, after giving effect to any arrangements for the purchase of the Offered Securities of a defaulting Underwriter or Underwriters by you and the Company as provided in subsection (a) above, the aggregate number of such Offered Securities which remains unpurchased does not exceed one-eleventh of the aggregate number of all the Offered Securities to be purchased at such Time of Delivery, then the Company shall have the right to require each non-defaulting Underwriter to purchase the number of Offered Securities which such Underwriter agreed to purchase hereunder at such Time of Delivery and, in addition, to require each non-defaulting Underwriter to purchase its pro rata share (based on the number of Offered Securities which such Underwriter agreed to purchase hereunder) of the Offered Securities of such defaulting Underwriter or Underwriters for which such arrangements have not been made; but nothing herein shall relieve a defaulting Underwriter from liability for its default.

(c) If, after giving effect to any arrangements for the purchase of the Offered Securities of a defaulting Underwriter or Underwriters by you and the Company as provided in subsection (a) above, the aggregate number of such Offered Securities which remains unpurchased exceeds one-eleventh of the aggregate number of all the Offered Securities to be purchased at such Time of Delivery, or if the Company shall not exercise the right described in subsection (b) above to require non-defaulting Underwriters to purchase Offered Securities of a defaulting Underwriter or Underwriters, then this Agreement (or, with respect to a Second Time of Delivery, the obligations of the Underwriters to purchase and of the Company to sell the Optional Shares) shall thereupon terminate, without liability on the part of any non-defaulting Underwriter or the Company, except for the expenses to be borne by the Company and the Underwriters as provided in Section 7 hereof and the indemnity and contribution agreements in Section 9 hereof; but nothing herein shall relieve a defaulting Underwriter from liability for its default.

11. The respective indemnities, rights of contribution, agreements, representations, warranties and other statements of the Company and the several Underwriters, as set forth in this Agreement or made by or on behalf of them, respectively, pursuant to this Agreement, shall remain in full force and effect, regardless of any investigation (or any statement as to the results thereof) made by or on behalf of any Underwriter or any director, officer, employee, affiliate or controlling person of any Underwriter, or the Company, or any officer or director or controlling person of the Company, and shall survive delivery of and payment for the Offered Securities.

12. If this Agreement shall be terminated pursuant to Section 10 hereof, the Company shall not then be under any liability to any Underwriter except as provided in Sections 7 and 9 hereof; but, if for any other reason, any Offered Securities are not delivered by or on behalf of the Company as provided herein, the Company will reimburse the Underwriters through you for all out-of-pocket expenses approved in writing by you, including fees and disbursements of counsel, reasonably incurred by the Underwriters in making preparations for the purchase, sale and delivery of the Offered Securities not so delivered, but the Company shall then be under no further liability to any Underwriter except as provided in Sections 7 and 9 hereof.

13. In all dealings hereunder, the Representatives shall act on behalf of each of the Underwriters, and the parties hereto shall be entitled to act and rely upon any statement, request, notice or agreement on behalf of any Underwriter made or given by you jointly or by the Representatives on behalf of the Underwriters.

All statements, requests, notices and agreements hereunder shall be in writing, and if to the Underwriters shall be delivered or sent by mail, telex or facsimile transmission to you as the Representatives (i) in the care of Goldman Sachs & Co. LLC, 200 West Street, New York, New York 10282-2198, Attention: Registration Department; (ii) in care of Jefferies LLC, 520 Madison Avenue, New York, New York 10022, Attention: General Counsel; (iii) in the care of Cowen and Company, LLC, Attention: Head of Equity Capital Markets, Fax 646-562-1249, with a copy to the General Counsel, Fax: 646-562-1124; (iv) Evercore Group L.L.C., 55 East 52nd Street, New York, New York 10055, Facsimile: 888-474-0200, Attention: Equity Capital Markets, E-mail: ecm.prospectus@evercore.com; (v) in care of Piper Sandler & Co. 1251 Avenue of the Americas, 7th Floor New York, New York 10020, Fax: 612-313-3112 and to General Counsel at Piper Sandler & Co., 800 Nicollet Mall, Minneapolis, MN 55402, LegalCapMarkets@psc.com and if to the Company shall be delivered or sent by mail, telex or facsimile transmission to the address of the Company set forth in the Registration Statement, Attention: Secretary; provided, however, that any notice to an Underwriter pursuant to Section 9(c) hereof shall be delivered or sent by mail, telex or facsimile transmission to such Underwriter at its address set forth in its Underwriters' Questionnaire, or telex constituting such Questionnaire, which address will be supplied to the Company by you upon request. Any such statements, requests, notices or agreements shall take effect upon receipt thereof.

In accordance with the requirements of the USA Patriot Act (Title III of Pub. L. 107-56 (signed into law October 26, 2001)), the underwriters are required to obtain, verify and record information that identifies their respective clients, including the Company, which information may include the name and address of their respective clients, as well as other information that will allow the underwriters to properly identify their respective clients.

14. This Agreement shall be binding upon, and inure solely to the benefit of, the Underwriters, the Company and, to the extent provided in Sections 9 and 11 hereof, the officers and directors of the Company and each person who controls the Company or any Underwriter, or any director, officer, employee or affiliate of an Underwriter, and their respective heirs, executors, administrators, successors and assigns, and no other person shall acquire or have any right under or by virtue of this Agreement. No purchaser of any of the Offered Securities from any Underwriter shall be deemed a successor or assign by reason merely of such purchase.

15. Time shall be of the essence of this Agreement. As used herein, the term "business day" shall mean any day when the Commission's office in Washington, D.C. is open for business.

16. The Company acknowledges and agrees that (i) the purchase and sale of the Offered Securities pursuant to this Agreement is an arm's-length commercial transaction between the Company, on the one hand, and the several Underwriters, on the other, (ii) in connection therewith and with the process leading to such transaction each Underwriter is acting solely as a principal and not the agent or fiduciary of the Company, (iii) no Underwriter has assumed an advisory or fiduciary responsibility in favor of the Company with respect to the offering contemplated hereby or the process leading thereto (irrespective of whether such Underwriter has advised or is currently advising the Company on other matters) or any other obligation to the Company except the obligations expressly set forth in this Agreement, (iv) the Company has consulted its own legal and financial advisors to the extent it deemed appropriate, and (v) none of the activities of the Underwriters in connection with the transactions contemplated herein constitutes a recommendation, investment advice, or solicitation of any action by the Underwriters with respect to any entity or natural person. The Company agrees that it will not claim that the Underwriters, or any of them, has rendered advisory services of any nature or respect, or owes a fiduciary or similar duty to the Company, in connection with such transaction or the process leading thereto.

17. This Agreement supersedes all prior agreements and understandings (whether written or oral) between the Company and the Underwriters, or any of them, with respect to the subject matter hereof.

18. This Agreement and any transaction contemplated by this Agreement shall be governed by and construed in accordance with the laws of the State of New York without regard to principles of conflict of laws that would result in the application of any other law than the laws of the State of New York. The Company agrees that any suit or proceeding arising in respect of this Agreement or any transaction contemplated by this Agreement will be tried exclusively in the U.S. District Court for the Southern District of New York or, if that court does not have subject matter jurisdiction, in any state court located in The City and County of New York and the Company agrees to submit to the jurisdiction of, and to venue in, such courts.

19. The Company and each of the Underwriters hereby irrevocably waives, to the fullest extent permitted by applicable law, any and all right to trial by jury in any legal proceeding arising out of or relating to this Agreement or the transactions contemplated hereby.

20. Notwithstanding anything herein to the contrary, the Company is authorized to disclose to any persons the U.S. federal and state income tax treatment and tax structure of the potential transaction and all materials of any kind (including tax opinions and other tax analyses) provided to the Company relating to that treatment and structure, without the Underwriters imposing any limitation of any kind. However, any information relating to the tax treatment and tax structure shall remain confidential (and the foregoing sentence shall not apply) to the extent necessary to enable any person to comply with securities laws. For this purpose, "tax structure" is limited to any facts that may be relevant to that treatment.

21. This Agreement may be executed by any one or more of the parties hereto in any number of counterparts, each of which shall be deemed to be an original, but all such respective counterparts shall together constitute one and the same instrument. Counterparts may be delivered via facsimile, electronic mail (including any electronic signature covered by the U.S. federal ESIGN Act of 2000, Uniform Electronic Transactions Act, the Electronic Signatures and Records Act or other applicable law, e.g., www.docuSign.com) or other transmission method and any counterpart so delivered shall be deemed to have been duly and validly delivered and be valid and effective for all purposes.

22. Recognition of the U.S. Special Resolution Regimes.

(a) In the event that any Underwriter that is a Covered Entity becomes subject to a proceeding under a U.S. Special Resolution Regime, the transfer from such Underwriter of this Agreement, and any interest and obligation in or under this Agreement, will be effective to the same extent as the transfer would be effective under the U.S. Special Resolution Regime if this Agreement, and any such interest and obligation, were governed by the laws of the United States or a state of the United States.

(b) In the event that any Underwriter that is a Covered Entity or a BHC Act Affiliate of such Underwriter becomes subject to a proceeding under a U.S. Special Resolution Regime, Default Rights under this Agreement that may be exercised against such Underwriter are permitted to be exercised to no greater extent than such Default Rights could be exercised under the U.S. Special Resolution Regime if this Agreement were governed by the laws of the United States or a state of the United States.

(c) As used in this section:

"BHC Act Affiliate" has the meaning assigned to the term "affiliate" in, and shall be interpreted in accordance with, 12 U.S.C. § 1841(k).

"Covered Entity" means any of the following:

- (i) a "covered entity" as that term is defined in, and interpreted in accordance with, 12 C.F.R. § 252.82(b);
- (ii) a "covered bank" as that term is defined in, and interpreted in accordance with, 12 C.F.R. § 47.3(b); or
- (iii) a "covered FSI" as that term is defined in, and interpreted in accordance with, 12 C.F.R. § 382.2(b).

“Default Right” has the meaning assigned to that term in, and shall be interpreted in accordance with, 12 C.F.R. §§ 252.81, 47.2 or 382.1, as applicable.

“U.S. Special Resolution Regime” means each of (i) the Federal Deposit Insurance Act and the regulations promulgated thereunder and (ii) Title II of the Dodd-Frank Wall Street Reform and Consumer Protection Act and the regulations promulgated thereunder.

If the foregoing is in accordance with your understanding, please indicate your acceptance of this Agreement by signing below, and upon the acceptance hereof by you, on behalf of each of the Underwriters, this Agreement and such acceptance hereof shall constitute a binding agreement between each of the Underwriters and the Company. It is understood that your acceptance of this letter on behalf of each of the Underwriters is pursuant to the authority set forth in a form of Agreement among Underwriters, the form of which shall be submitted to the Company for examination upon request, but without warranty on your part as to the authority of the signers thereof.

Very truly yours,

Madrigal Pharmaceuticals, Inc.

By: /s/ Mardi Dier

Name: Mardi C. Dier

Title: Senior Vice President and
Chief Financial Officer

Accepted as of the date hereof:

Goldman Sachs & Co. LLC

By: /s/ Gabe Gelman

Name: Gabe Gelman

Title: Managing Director

Jefferies LLC

By: /s/ Kevin Sheridan

Name: Kevin Sheridan

Title: Managing Director, Joint Global Head of
Healthcare Investment Banking

Cowen and Company, LLC

By: /s/ Brian Hagerty

Name: Brian Hagerty

Title: Managing Director

Evercore Group L.L.C.

By: /s/ Sachin Aggarwal

Name: Sachin Aggarwal

Title: Senior Managing Director

Piper Sandler & Co.

By: /s/ Paul Scansaroli

Name: Paul Scansaroli

Title: Managing Director

On behalf of each of the Underwriters

SCHEDULE I

<u>Underwriter</u>	<u>Number of Firm Shares to be Purchased</u>	<u>Number of Pre-Funded Warrants to be Purchased</u>	<u>Maximum Number of Optional Shares Which May be Purchased</u>
Goldman Sachs & Co. LLC	266,250	552,981	122,884
Jefferies LLC	135,000	280,385	62,308
Cowen and Company, LLC	123,750	257,019	57,115
Evercore Group L.L.C.	75,000	155,769	34,615
Piper Sandler & Co.	75,000	155,769	34,615
UBS Securities LLC	31,875	66,202	14,712
Citizens JMP Securities, LLC	31,875	66,202	14,712
H.C. Wainwright & Co., LLC	11,250	23,365	5,192
Total	750,000	1,557,692	346,153

SCHEDULE II

(a) Issuer Free Writing Prospectuses not included in the Pricing Disclosure Package:

Electronic roadshow dated March 18, 2024

(b) Additional Documents Incorporated by Reference:

None

(c) Information other than the Pricing Prospectus that comprise the Pricing Disclosure Package:

The initial public offering price per share for the Shares is \$260.0000.

The initial public offering price per Pre-Funded Warrant is \$259.9999.

The number of Firm Shares purchased by the Underwriters is 750,000.

The number of Pre-Funded Warrants purchased by the Underwriters is 1,557,692.

(d) Written Testing-the-Waters Communications

None

Bill Sibold

Kenneth M. Bate

Fred Craves, Ph.D.

James Daly

Paul A. Friedman, M.D.

Richard S. Levy, M.D.

Julian Baker

Raymond Cheong

Rebecca Taub, M.D.

Mardi C. Dier

Robert Waltermire, Ph.D.



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March 20, 2024

Board of Directors
Madrigal Pharmaceuticals, Inc.
Four Tower Bridge
200 Barr Harbor Drive, Suite 200
West Conshohocken, PA 19428

Ladies and Gentlemen:

We are acting as counsel to Madrigal Pharmaceuticals, Inc., a Delaware corporation (the “**Company**”), in connection with the public offering of up to (i) 1,096,153 shares of the Company’s common stock, \$0.0001 par value per share (the “**Common Stock**”) (including up to 346,153 shares that may be sold upon the exercise of an option to purchase additional shares granted to you) (the “**Shares**”) of the Company and (ii) pre-funded warrants to purchase up to 1,557,692 shares of Common Stock (the “**Pre-Funded Warrants**” and the shares of Common Stock issuable upon the exercise of the Pre-Funded Warrants, the “**Pre-Funded Warrant Shares**”), pursuant to the terms of the Underwriting Agreement dated March 18, 2024, between the Company and Goldman Sachs & Co. LLC, Jefferies LLC, Cowen and Company, LLC, Evercore Group L.L.C. and Piper Sandler & Co., as representatives of the underwriters named therein (the “**Underwriting Agreement**”). The offering of the Shares is being made pursuant to the prospectus supplement, dated March 18, 2024 (the “**Prospectus Supplement**”) and the accompanying base prospectus dated June 1, 2021 (together with the Prospectus Supplement, the “**Prospectus**”) that form part of the company’s effective registration statement on Form S-3 (File No. 333-256666) (the “**Registration Statement**”) filed with the Securities and Exchange Commission under the Securities Act of 1933, as amended (the “**Act**”). This opinion letter is furnished to you at your request to enable you to fulfill the requirements of Item 601(b)(5) of Regulation S-K, 17 C.F.R. § 229.601(b)(5), in connection with the Registration Statement.

For purposes of this opinion letter, we have examined copies of such agreements, instruments and documents as we have deemed an appropriate basis on which to render the opinions hereinafter expressed. In our examination of the aforesaid documents, we have assumed the genuineness of all signatures, the legal capacity of all natural persons, the accuracy and completeness of all documents submitted to us, the authenticity of all original documents, and the conformity to authentic original documents of all documents submitted to us as copies (including pdfs). As to all matters of fact, we have relied on the representations and statements of fact made in the documents so reviewed, and we have not independently established the facts so relied on. This opinion letter is given, and all statements herein are made, in the context of the foregoing.

This opinion letter is based as to matters of law solely on the Delaware General Corporation Law, as amended. We express no opinion herein as to any other statutes, rules or regulations.

Hogan Lovells US LLP is a limited liability partnership registered in the state of Delaware. “Hogan Lovells” is an international legal practice that includes Hogan Lovells US LLP and Hogan Lovells International LLP, with offices in: Alicante Amsterdam Baltimore Berlin Beijing Birmingham Boston Brussels Colorado Springs Denver Dubai Dusseldorf Frankfurt Hamburg Hanoi Ho Chi Minh City Hong Kong Houston Johannesburg London Los Angeles Luxembourg Madrid Mexico City Miami Milan Minneapolis Monterrey Munich New York Northern Virginia Paris Philadelphia Riyadh Rome San Francisco São Paulo Shanghai Silicon Valley Singapore Sydney Tokyo Warsaw Washington, D.C. Associated Offices: Budapest Jakarta Shanghai FTZ. Business Service Centers: Johannesburg Louisville. For more information see www.hoganlovells.com

Based upon, subject to and limited by the foregoing, we are of the opinion that:

- (a) The shares of Common Stock have been duly authorized for issuance and, when sold, issued and paid for in accordance with the Underwriting Agreement, will have been validly issued, fully paid and nonassessable.
- (b) Upon (1) execution and delivery by the Company of the Pre-Funded Warrants pursuant to the terms of the Underwriting Agreement and (2) receipt by the Company of the consideration for the Pre-Funded Warrants specified in the resolutions of the Pricing Committee of the Company, the Pre-Funded Warrants will constitute valid and binding obligations of the Company.
- (c) Following (1) execution and delivery by the Company of the Pre-Funded Warrants pursuant to the terms of the Underwriting Agreement, (2) receipt by the Company of the consideration for the Pre-Funded Warrants specified in the resolutions of the Pricing Committee, and (3) exercise of the Pre-Funded Warrants pursuant to their terms, including receipt by the Company of the consideration for the Pre-Funded Warrant Shares specified therein, and issuance of the Pre-Funded Warrant Shares thereunder, the Pre-Warrant Shares will be duly authorized, validly issued, fully paid, and nonassessable.

This opinion letter has been prepared for use in connection with the filing by the Company of a Current Report on Form 8-K relating to the offer and sale of the Shares, which Form 8-K will be incorporated by reference into the Registration Statement and Prospectus, and speaks as of the date hereof. We assume no obligation to advise of any changes in the foregoing subsequent to the delivery of this letter.

We hereby consent to the filing of this opinion letter as Exhibit 5.1 to the above-described Form 8-K and to the reference to this firm under the caption "Legal Matters" in the Prospectus. In giving this consent, we do not thereby admit that we are an "expert" within the meaning of the Act.

Very truly yours,

/s/ Hogan Lovells US LLP