
**UNITED STATES
SECURITIES AND EXCHANGE COMMISSION
WASHINGTON, DC 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): **November 26, 2018**

Idera Pharmaceuticals, Inc.

(Exact Name of Registrant as Specified in Charter)

Delaware
(State or Other
Jurisdiction of
Incorporation)

001-31918
(Commission File
Number)

04-3072298
(I.R.S. Employer
Identification No.)

505 Eagleview Blvd., Suite 212
Exton, Pennsylvania
(Address of Principal Executive Offices)

19341
(Zip Code)

Registrant's telephone number, including area code: **(484) 348-1600**

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 (see General Instruction A.2. below):

- 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 as defined in Rule 405 of the Securities Act of 1933 (§230.405 of this chapter) or Rule 12b-2 of the Securities Exchange Act of 1934 (§240.12b-2 of this chapter).

Emerging growth company

If an emerging growth company, indicate by check mark if the registrant has elected not to use the extended transition period for complying with any new or revised financial accounting standards provided pursuant to Section 13(a) of the Exchange Act.

Item 1.01 Entry Into a Material Definitive Agreement

On November 26, 2018, Idera Pharmaceuticals, Inc. (the “Company”) entered into an Equity Distribution Agreement (the “Agreement”) with JMP Securities LLC (“JMP”), pursuant to which the Company may issue and sell shares of its common stock, \$0.001 par value per share, having an aggregate offering price of up to \$50,000,000 (the “Shares”) through JMP as its agent.

Subject to the terms and conditions of the Agreement, JMP will use its commercially reasonable efforts to sell the Shares from time to time, based upon the Company’s instructions, by methods deemed to be an “at the market offering” as defined in Rule 415(a)(4) promulgated under the Securities Act of 1933, as amended (the “Securities Act”), or if specified by the Company, by any other method permitted by law, including but not limited to in negotiated transactions. The Company or JMP may suspend or terminate the offering of Shares upon notice to the other party and subject to other conditions.

The Company has agreed to pay JMP commissions for its services in acting as agent in the sale of the Shares in the amount of 3.0% of gross proceeds from the sale of the Shares pursuant to the Agreement. The Company also has agreed to provide JMP with customary indemnification and contribution rights.

The foregoing description of the Agreement does not purport to be complete and is qualified in its entirety by reference to the full text of the Agreement, which is attached hereto as Exhibit 1.1 and incorporated by reference herein.

Morgan, Lewis & Bockius LLP, counsel to the Company, has issued a legal opinion relating to the legality of the issuance and the sale of the Shares. A copy of such legal opinion, including the consent included therein, is attached as Exhibit 5.1 hereto.

The Shares to be sold under the Agreement, if any, will be issued and sold pursuant to the Company’s Registration Statement on Form S-3 (File No. 333-219851), previously filed with the Securities and Exchange Commission (“SEC”) on August 10, 2017, amended September 1, 2017 and September 8, 2017, and declared effective by the SEC on September 8, 2017. A prospectus supplement related to the offering is being filed with the SEC on November 26, 2018. This Current Report on Form 8-K shall not constitute an offer to sell or the solicitation of an offer to buy the Shares nor shall there be any sale of the Shares in any state in which such offer, solicitation or sale would be unlawful prior to registration or qualification under the securities laws of any such state.

Item 9.01. Financial Statements and Exhibits.

(d) Exhibits.

See the Exhibit Index below, which is incorporated by reference herein.

Exhibit Index

<u>Exhibit No.</u>	<u>Exhibit Name</u>
1.1	<u>Equity Distribution Agreement, dated November 26, 2018, by and between Idera Pharmaceuticals, Inc. and JMP Securities LLC.</u>
5.1	<u>Opinion of Morgan, Lewis & Bockius LLP.</u>
23.1	<u>Consent of Morgan, Lewis & Bockius LLP (contained in Exhibit 5.1).</u>

SIGNATURES

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

IDERA PHARMACEUTICALS, INC.

By: /s/ Vincent J. Milano
Vincent J. Milano
Chief Executive Officer

Dated: November 26, 2018

Idera Pharmaceuticals, Inc.

\$50,000,000

Common Stock

EQUITY DISTRIBUTION AGREEMENT

Dated: November 26, 2018

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IDERA PHARMACEUTICALS, INC.

\$50,000,000

Common Stock

EQUITY DISTRIBUTION AGREEMENT

November 26, 2018

JMP Securities LLC
600 Montgomery Street, Suite 1100
San Francisco, California 94111

Ladies and Gentlemen:

Idera Pharmaceuticals, Inc., a Delaware corporation (the "Company"), confirms its agreement (this "Agreement") with JMP Securities LLC (the "Placement Agent"), as follows:

SECTION 1. Description of Securities.

The Company agrees that, from time to time during the term of this Agreement, on the terms and subject to the conditions set forth herein, it may issue and sell through the Placement Agent, acting as agent and/or principal, shares (the "Securities") of the Company's common stock, par value \$0.001 per share (the "Common Stock"), having an aggregate offering amount of up to \$50,000,000. Notwithstanding anything to the contrary contained herein, except as set forth in a Placement Notice (as defined below), the parties hereto agree that compliance with the limitations set forth in this Section 1 on the number of Securities issued and sold under this Agreement shall be the sole responsibility of the Company, and the Placement Agent shall have no obligation in connection with such compliance, provided that the Placement Agent follows the trading instructions provided pursuant to any Placement Notice (as defined below) in all material respects. The issuance and sale of the Securities through the Placement Agent will be effected pursuant to the Registration Statement (as defined below) filed by the Company and declared effective by the Securities and Exchange Commission (the "Commission"), although nothing in this Agreement shall be construed as requiring the Company to offer, sell or issue the Securities.

The Company has filed, in accordance with the provisions of the Securities Act of 1933, as amended, and the rules and regulations thereunder (collectively, the "Securities Act"), with the Commission a registration statement on Form S-3 (File No. 333-219851), including a base prospectus relating to certain securities, including the Securities, to be issued from time to time by the Company, and which incorporates by reference documents that the Company has filed or will file in accordance with the provisions of the Securities Exchange Act of 1934, as amended, and the rules and regulations promulgated thereunder (collectively, the "Exchange Act"). The Company has prepared a prospectus or a prospectus supplement to the base prospectus included as part of such registration statement specifically relating to the Securities (the "Prospectus Supplement"). The Company will furnish to the Placement Agent, for use by the Placement Agent, copies of the base prospectus included as part of such registration statement, as supplemented by the Prospectus Supplement, relating to the Securities and the Common Stock. The Company may file one or more additional registration statements from time to time that will contain a base prospectus and related prospectus or prospectus supplement (which shall be a Prospectus Supplement) with respect to the Placement Securities (as defined below). Except where the context otherwise requires, such registration statement, as amended when it became effective, including all documents filed as part thereof or incorporated by reference therein, and including any information

contained in a Prospectus (as defined below) subsequently filed with the Commission pursuant to Rule 424(b) under the Securities Act or deemed to be a part of such registration statement pursuant to Rule 430B of the Securities Act, as well as any comparable successor registration statement filed by the Company for the sale of shares of its Common Stock, collectively are herein called the "Registration Statement." The base prospectus, including all documents incorporated therein by reference, included in the Registration Statement, as it may be supplemented by the Prospectus Supplement, in the form in which such prospectus and/or Prospectus Supplement have most recently been filed by the Company with the Commission pursuant to Rule 424(b) under the Securities Act, together with the then issued Issuer Free Writing Prospectus(es) (as defined herein), is herein called the "Prospectus." Any reference herein to the Registration Statement, the Prospectus or any amendment or supplement thereto shall be deemed to refer to and include the documents incorporated by reference therein, and any reference herein to the terms "amend," "amendment" or "supplement" with respect to the Registration Statement or the Prospectus shall be deemed to refer to and include the filing after the execution hereof of any document with the Commission deemed to be incorporated by reference therein. Any reference herein to financial statements and schedules and other information that is "contained," "included" or "stated" in the Registration Statement or the Prospectus (and all other references of like import) shall be deemed to mean and include all such financial statements and schedules and other information that is incorporated by reference in the Registration Statement or the Prospectus, as the case may be. Any reference herein to the Registration Statement, any Rule 462(b) Registration Statement, the Prospectus or any amendment or supplement to any of the foregoing shall be deemed to include the copy filed with the Commission pursuant to the Commission's Electronic Data Gathering, Analysis and Retrieval system ("EDGAR"); all references in this Agreement to any Issuer Free Writing Prospectus (other than any Issuer Free Writing Prospectuses that, pursuant to Rule 433 under the Securities Act, are not required to be filed with the Commission) shall be deemed to include the copy thereof filed with the Commission pursuant to EDGAR.

SECTION 2. Placements.

Each time that the Company wishes to issue and sell the Securities hereunder (each, a "Placement"), it will notify the Placement Agent by email notice (or other method mutually agreed to in writing by the parties) containing the parameters in accordance with which it desires the Securities to be sold, which shall, at a minimum, include the number of Securities to be sold (the "Placement Securities"), the time period during which sales are requested to be made, any limitation on the number of Securities that may be sold in any one Trading Day (as defined in Section 3) and any minimum price below which sales may not be made (a "Placement Notice"), a form of which containing such minimum sales parameters necessary is attached hereto as Exhibit A. The Placement Notice shall originate from any of the individuals from the Company set forth on Exhibit B (with a copy to each of the other individuals from the Company listed on such exhibit), and shall be addressed to each of the individuals from the Placement Agent set forth on Exhibit B, as such Exhibit B may be amended from time to time. If the Placement Agent wishes to accept such proposed terms included in the Placement Notice (which it may decline to do so for any reason in its sole discretion) or, following discussion with the Company, wishes to accept amended terms, the Placement Agent will, prior to 4:30 p.m. (Eastern Time) on the Business Day (as defined below) following the Business Day on which such Placement Notice is delivered to the Placement Agent, issue to the Company a notice by email (or other method mutually agreed to in writing by the parties) addressed to all of the individuals from the Company and the Placement Agent set forth on Exhibit B setting forth the terms that the Placement Agent is willing to accept. Where the terms provided in the Placement Notice are amended as provided for in the immediately preceding sentence, such terms will not be binding on the Company or the Placement Agent until the Company delivers to the Placement Agent an acceptance by email (or other method mutually agreed to in writing by the parties) of all of the terms of such Placement Notice, as amended (the "Acceptance"), which email shall be addressed to all of the individuals from the Company and the Placement Agent set forth on Exhibit B.

The Placement Notice (as amended by the corresponding Acceptance, if applicable) shall be effective upon receipt by the Company of the Placement Agent's acceptance of the terms of the Placement Notice or upon receipt by the Placement Agent of the Company's Acceptance, as the case may be, and shall continue in effect unless and until (i) the entire amount of the Placement Securities have been sold, (ii) in accordance with the Placement Notice requirements set forth in the second sentence of this paragraph, the Company terminates the Placement Notice, (iii) the Company issues a subsequent Placement Notice with parameters superseding those on the earlier dated Placement Notice, (iv) this Agreement has been terminated under the provisions of Section 9 or Section 12 or (v) either party shall have suspended the sale of the Placement Securities in accordance with Section 4 below. The amount of any discount, commission or other compensation to be paid by the Company to the Placement Agent in connection with the sale of the Placement Securities shall be calculated in accordance with the terms set forth in Exhibit C. It is expressly acknowledged and agreed that neither the Company nor the Placement Agent will have any obligation whatsoever with respect to a Placement or any Placement Securities unless and until the Company delivers a Placement Notice to the Placement Agent and either (i) the Placement Agent accepts the terms of such Placement Notice or (ii) where the terms of such Placement Notice are amended, the Company accepts such amended terms by means of an Acceptance pursuant to the terms set forth above, and then only upon the terms specified in the Placement Notice (as amended by the corresponding Acceptance, if applicable) and herein. In the event of a conflict between the terms of this Agreement and the terms of a Placement Notice (as amended by the corresponding Acceptance, if applicable), the terms of the Placement Notice (as amended by the corresponding Acceptance, if applicable) will control. The term "Business Day" means each Monday, Tuesday, Wednesday, Thursday or Friday that is not a day on which banking institutions in New York are generally authorized or obligated by law or executive order to close.

SECTION 3. Sale of Placement Securities by the Placement Agent.

Subject to the provisions of Section 6(a), the Placement Agent, for the period specified in the Placement Notice, will use its commercially reasonable efforts consistent with its normal trading and sales practices and applicable laws and regulations to sell the Placement Securities up to the amount specified in the Placement Notice, and otherwise in accordance with the terms of such Placement Notice (as amended by the corresponding Acceptance, if applicable). The Placement Agent will provide written confirmation to the Company no later than the opening of each Trading Day (as defined below) immediately following the Trading Day on which it has made sales of Placement Securities hereunder setting forth the number of Placement Securities sold on such day, the compensation payable by the Company to the Placement Agent pursuant to Section 2 with respect to such sales, and the Net Proceeds (as defined below) payable to the Company, with an itemization of the deductions made by the Placement Agent (as set forth in Section 6(b)) from the gross proceeds that it receives from such sales. Subject to the terms of the Placement Notice (as amended by the corresponding Acceptance, if applicable), the Placement Agent may sell Placement Securities by any method permitted by law deemed to be an "at the market" offering as defined in Rule 415(a)(4) under the Securities Act including without limitation sales made directly on the Nasdaq Capital Market (the "Nasdaq"), or any other existing trading market for the Common Stock. If expressly authorized by the Company in a Placement Notice (as amended by the corresponding Acceptance, if applicable), the Placement Agent may also sell Placement Securities by any other method permitted by law, including, but not limited to, negotiated transactions. For the purposes hereof, "Trading Day" means any day on which shares of Common Stock are purchased and sold on the principal market on which the Common Stock is listed or quoted and during which there has been no market disruption of, unscheduled closing of or suspension of trading on such principal market.

SECTION 4. Suspension of Sales. The Company or the Placement Agent may, upon notice (a "Suspension Notice") to the other party in writing (including by email correspondence to each of the individuals of the other party set forth on Exhibit B, if receipt of such correspondence is actually

acknowledged by any of the individuals to whom the notice is sent, other than via auto-reply) or by telephone (confirmed immediately by verifiable facsimile transmission or email correspondence to each of the individuals of the other party set forth on Exhibit B), suspend any sale of Placement Securities (a "Suspension"); *provided, however*, that such suspension shall not affect or impair either party's obligations with respect to any Placement Securities sold hereunder prior to the receipt of such notice. Each of the parties agrees that no such notice under this Section 4 shall be effective against the other unless it is made to one of the individuals named on Exhibit B hereto, as such Exhibit B may be amended from time to time. While a Suspension is in effect any obligations under Sections 7(o), 7(p), 7(q) and 7(r) with respect to the delivery of certificates, opinions, or comfort letters to the Placement Agent, shall be waived.

SECTION 5. Representations and Warranties.

(a) *Representations and Warranties by the Company.* The Company represents and warrants to the Placement Agent as of the date hereof and as of each Representation Date (as defined herein) on which a certificate is required to be delivered pursuant to Section 7(o) of this Agreement and as of the time of each sale of any Securities pursuant to this Agreement (the "Applicable Time"), and agrees with the Placement Agent, as follows:

(1) Compliance with Registration Requirements. The Registration Statement has been filed with the Commission under the Securities Act and declared effective by the Commission under the Securities Act. With respect to any registration statement to be filed to register the offer and sale of the Securities pursuant to Rule 462(b) under the Securities Act, including the documents incorporated by reference therein, (a "Rule 462(b) Registration Statement"), such Rule 462(b) Registration Statement will be filed with the Commission and become effective under the Securities Act no later than 10:00 P.M., Eastern Time, on the date required to increase the dollar amount of Securities available to be offered and sold under the Registration Statement. No stop order suspending the effectiveness of the Registration Statement or any Rule 462(b) Registration Statement and no proceedings for such purpose have been instituted or are pending or, to the knowledge of the Company, are threatened by the Commission. The Company has complied with all requests of the Commission for additional or supplemental information.

At the respective times each of the Registration Statement, any Rule 462(b) Registration Statement and any post-effective amendments thereto became or becomes effective and as of the date hereof, the Registration Statement, any Rule 462(b) Registration Statement and any amendments and supplements thereto complied and will comply in all material respects with the requirements of the Securities Act. The conditions for the use of Form S-3, as set forth in the General Instructions thereto, have been complied with and the Registration Statement meets, and the offering and sale of the Securities as contemplated hereby complies with, the requirements of Rule 415(a)(1)(x) under the Securities Act (including without limitation, Rule 415(a)(5)). The Company satisfies the pre-1992 eligibility requirements for the use of a registration statement on Form S-3 in connection with this offering (the pre-1992 eligibility requirements for the use of the registration statement on Form S-3 include (i) having a non-affiliate, public common equity float of at least \$150 million or a non-affiliate, public common equity float of at least \$100 million and annual trading volume of at least three million shares and (ii) having been subject to the Exchange Act reporting requirements for a period of 36 months).

The Registration Statement, as of the time it became or it becomes effective and each effective date with respect thereto, did not or 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. Neither the Prospectus nor any amendments or supplements thereto, as of their respective dates, and at each Applicable Time and Settlement Date (as defined below), as the case may be, included or will include an untrue statement of a material fact or omitted or will omit to state a material fact necessary in order to make the statements therein, in the light of the circumstances under which they were made, not misleading.

The representations and warranties set forth in the immediately preceding paragraph shall not apply to statements in or omissions from the Registration Statement or the Prospectus, as amended or supplemented, made in reliance upon and in conformity with information furnished to the Company in writing by the Placement Agent expressly for use therein.

The copies of the Registration Statement and any Rule 462(b) Registration Statement and any amendments thereto, any other preliminary prospectus, each Issuer Free Writing Prospectus (as defined below) that is required to be filed with the Commission pursuant to Rule 433 under the Securities Act and the Prospectus and any amendments or supplements thereto delivered and to be delivered to the Placement Agent (electronically or otherwise) in connection with the offering of the Securities were and will be identical to the electronically transmitted copies thereof filed with the Commission pursuant to EDGAR, except to the extent permitted by Regulation S-T. “Issuer Free Writing Prospectus” means any “issuer free writing prospectus,” as defined in Rule 433 under the Securities Act, relating to the Securities that (i) is required to be filed with the Commission by the Company, (ii) is a “road show” that is a “written communication” within the meaning of Rule 433(d)(8)(i) under the Securities Act whether or not required to be filed with the Commission, or (iii) is exempt from filing pursuant to Rule 433(d)(5)(i) under the Securities Act because it contains a description of the Securities or of the offering that does not reflect the final terms, and all free writing prospectuses that are listed in Exhibit E hereto, as such Exhibit E may be modified from time to time, in each case in the form furnished (electronically or otherwise) to the Placement Agent for use in connection with the offering of the Securities.

Each Issuer Free Writing Prospectus relating to the Securities, as of its issue date and as of each Applicable Time and Settlement Date (as defined below), did not, does not and will not include any information that conflicted, conflicts or will conflict with the information contained in the Registration Statement or the Prospectus, including any incorporated document deemed to be a part thereof that has not been superseded or modified; each Issuer Free Writing Prospectus, as supplemented by and taken together with the Prospectus, as of the Applicable Time and Settlement Date (as defined below), will not include an untrue statement of a material fact or omit to state a material fact necessary in order to make the statements therein, in light of the circumstances under which they were made, not misleading. The foregoing sentence does not apply to statements in or omissions from any issuer free writing prospectus made in reliance upon and in conformity with written information furnished to the Company by the Placement Agent specifically for use therein.

Each document incorporated by reference in the Registration Statement or the Prospectus heretofore filed, when it was filed (or, if any amendment with respect to any such document was filed, when such amendment was filed), conformed in all material respects with the requirements of the Exchange Act, and any further documents so filed and incorporated after the date of this Agreement will, when they are filed, conform in all material respects with the requirements of the Exchange Act; no such document when it was filed (or, if an amendment with respect to any such document was filed, when such amendment was filed), contained an untrue statement of a material fact or omitted to state a material fact required to be stated therein or necessary in order to make the statements therein not misleading; and no such document, when it is filed, will

contain an untrue statement of a material fact or will omit to state a material fact required to be stated therein or necessary in order to make the statements therein not misleading.

(2) Company Capitalization. The Company has an authorized capitalization as set forth in the Prospectus; the outstanding shares of capital stock of the Company have been duly and validly authorized and issued and are fully paid and nonassessable.

(3) Disclosure Regarding Outstanding Securities. Except as disclosed in the Prospectus, there are no outstanding (A) securities or obligations of the Company or the subsidiaries of the Company required to be set forth in Exhibit 21.1 to the Company's Form 10-K for the most recent fiscal year, if any (each, a "Subsidiary," and together, the "Subsidiaries") convertible into or exchangeable for any capital stock of or partnership interests, membership interests or other equity interests, as the case may be, in the Company or any such Subsidiary, (B) warrants, rights or options to subscribe for or purchase from the Company or any Subsidiary any such capital stock or any such convertible or exchangeable securities or obligations, or (C) obligations of the Company or any Subsidiary to issue any securities or obligations, any such convertible or exchangeable securities or obligations, or any such warrants, rights or options the existence of which, in each case (A), (B) and (C), is required to be disclosed in the Registration Statement and the Prospectus and are not so disclosed.

(4) Good Standing. Each of the Company and the Subsidiaries has been duly incorporated or organized and is validly existing as a corporation, general or limited partnership or limited liability company, as the case may be, except to the extent that the failure to be so organized or in good standing would not, individually or in the aggregate, reasonably be expected to have any material adverse effect on, or change with respect to, the assets, business operation, earnings, prospects, properties or financial condition, present or prospective, of the Company and its Subsidiaries taken as a whole (a "Material Adverse Effect" or "Material Adverse Change") and is in good standing under the laws of its respective jurisdiction of incorporation or organization except to the extent that the failure to be so qualified or in good standing would not, individually or in the aggregate, reasonably be expected to have a Material Adverse Effect.

(5) Corporate Power. Each of the Company and the Subsidiaries have the corporate, partnership or limited liability company power, as the case may be, and authority to own their respective properties and conduct their respective businesses, each as described in each of the Registration Statement and the Prospectus except to the extent that the failure to have such power or authority would not, individually or in the aggregate, reasonably be expected to have a Material Adverse Effect, and, in the case of the Company, to execute and deliver this Agreement and to consummate the transactions described in this Agreement.

(6) Foreign Qualifications. The Company and the Subsidiaries are duly qualified or licensed and in good standing in each jurisdiction where such qualification or license is required except where the failure, individually or in the aggregate, to be so qualified or licensed would not reasonably be expected to have a Material Adverse Effect.

(7) Absence of Defaults. Except as disclosed in the Prospectus, neither the Company nor any Subsidiary is in breach of or in default under (nor has any event occurred which with notice, lapse of time, or both would constitute a breach of, or default under), its respective organizational documents, or in the performance or observance of any obligation, agreement, covenant or condition contained in any license, indenture, mortgage, deed of trust, loan or credit agreement or other agreement or instrument to which the Company or any

Subsidiary is a party or by which any of them or their respective properties or assets is bound, except for such breaches or defaults which would not reasonably be expected to have a Material Adverse Effect.

(8) Absence of Conflicts. The execution, delivery and performance of this Agreement and consummation of the transactions contemplated herein will not (A) conflict with, or result in any breach of, or constitute a default under (nor constitute any event which with notice, lapse of time, or both would constitute a breach of, or default under): (1) any provision of the organizational documents of the Company or any Subsidiary, or (2) any provision of any license, indenture, mortgage, deed of trust, loan or credit agreement or other agreement or instrument to which the Company or any Subsidiary is a party or by which any of them or their respective assets or properties is bound or affected, or under any federal, state, local or foreign law, regulation or rule or any decree, judgment or order applicable to the Company or any Subsidiary, except in the case of clause (2) for such conflicts, breaches or defaults which would not reasonably be expected to have a Material Adverse Effect; or (B) result in the creation or imposition of any lien, charge, claim or encumbrance upon any property or asset of the Company or any Subsidiary, except for such liens, charges, claims or encumbrances which would not reasonably be expected to have a Material Adverse Effect.

(9) Authorization of Agreement. This Agreement has been duly authorized, executed and delivered by the Company and is a legal, valid and binding agreement of the Company enforceable against the Company in accordance with its terms, except as may be limited by bankruptcy, insolvency, reorganization, moratorium or similar laws affecting creditors' rights generally, and by general equitable principles, and except to the extent that the indemnification and contribution provisions of Section 10 hereof may be limited by federal or state securities laws and public policy considerations in respect thereof.

(10) Absence of Further Requirements. No approval, authorization, consent or order of or filing with any federal, state or foreign governmental or regulatory commission, board, body, authority or agency is required in connection with the Company's execution, delivery and performance of this Agreement, the consummation of the transactions contemplated herein by the Company, including the Company's issuance, sale and delivery of the Securities, other than (A) such as have been obtained, or will have been obtained at the Settlement Date (as defined below), as the case may be, under the Securities Act and the Exchange Act, (B) any necessary qualification under the securities or "blue sky" laws of the various jurisdictions in which the Securities are being offered by the Placement Agent, (C) any required filings or approvals under the rules and regulations of FINRA and Nasdaq or (D) any such approvals, authorizations, consents, orders, or filings that if not obtained or made, would not, individually or in the aggregate, reasonably be expected to have a Material Adverse Effect or which would not reasonably be expected to have a material adverse effect on the Company's ability to perform its agreed upon obligations under this Agreement.

(11) Possession of Licenses and Permits. Each of the Company and the Subsidiaries has all necessary, authorizations, consents and approvals and has made all necessary filings required under any federal, state or foreign law, regulation or rule, and has obtained all necessary authorizations, consents and approvals from other persons, required in order to conduct their respective businesses as it is currently conducted as described in the Prospectus, except to the extent that any failure to have any such authorizations, consents or approvals, to make any such filings or to obtain any such authorizations, consents or approvals would not, individually or in the aggregate, reasonably be expected to have a Material Adverse Effect; neither the Company nor any of the Subsidiaries is in violation of, in default under, or has

received any notice regarding a possible violation, default or revocation of any such authorization, consent or approval or any federal, state or foreign law, regulation or rule or any decree, order or judgment applicable to the Company or any of the Subsidiaries the effect of which would reasonably be expected to have a Material Adverse Effect.

(12) Permitted Free Writing Prospectuses. Except for the Issuer Free Writing Prospectuses identified in Exhibit E hereto, the Company has not prepared, used or referred to, and will not, without the prior consent of the Placement Agent, prepare, use or refer to, any Free Writing Prospectus.

(13) Company Not an Ineligible Issuer. (i) At the earliest time after the filing of the Registration Statement that the Company or another offering participant made a bona fide offer (within the meaning of Rule 164(h)(2) of the Securities Act) of the Securities and (ii) as of the date hereof, the Company was not and is not an Ineligible Issuer (as defined in Rule 405 of the Securities Act Regulations), without taking account of any determination by the Commission pursuant to Rule 405 of the Securities Act that it is not necessary that the Company be considered an Ineligible Issuer.

(14) Absence of Proceedings. Except as disclosed in the Registration Statement and the Prospectus, there are no actions, suits, proceedings, inquiries or investigations pending or, to the knowledge of the Company, threatened against the Company or any Subsidiary or, to the extent that such proceeding affects the properties or assets of the Company or any Subsidiary, any of their respective officers and directors or to which the properties, assets or rights of any such entity are subject, at law or in equity, before or by any federal, state, local or foreign governmental or regulatory commission, board, body, authority, arbitral panel or agency which would reasonably be expected to have a Material Adverse Effect.

(15) Financial Statements. The financial statements of the Company and its Subsidiaries filed with the Commission as a part of or incorporated within the Registration Statement and included in the Prospectus present fairly, in all material respects, the financial position of the Company and its Subsidiaries, as of the dates indicated and results of operations and changes in financial position and cash flows for the periods specified; such financial statements and supporting schedules have been prepared in conformity with generally accepted accounting principles in the United States applied on a consistent basis during the periods involved (except as otherwise noted therein). No other financial statements or supporting schedules are required to be included in or incorporated in the Registration Statement. The interactive data in eXtensible Business Reporting Language included or incorporated by reference in the Registration Statement and the Prospectus fairly presents the information called for in all material respects and has been prepared in accordance with the Commission's rules and guidelines applicable thereto.

(16) Independent Accountants. Ernst & Young LLP, whose reports on the historical financial statements of the Company and its Subsidiaries constitute part of the Prospectus, is, and was during the periods covered by its reports, independent as required by the Securities Act.

(17) No Material Adverse Change. Except as otherwise disclosed in the Prospectus, subsequent to the respective dates of the most recent financial statements in the Prospectus, there has not been (A) any Material Adverse Change or any development or transaction that would reasonably be expected to result in a Material Adverse Change, whether or not arising in the ordinary course of business, (B) any transaction that is material to the Company

and the Subsidiaries taken as a whole, contemplated or entered into by the Company or any of the Subsidiaries, (C) any obligation, contingent or otherwise, directly or indirectly incurred by the Company or any Subsidiary that is material to the Company and the Subsidiaries taken as a whole or (D) any dividend or distribution of any kind declared, paid or made by the Company on any class of its capital stock or any Subsidiary on any of its equity interests.

(18) Description of Securities. The Common Stock, conforms in all material respects to the descriptions thereof contained in the Prospectus.

(19) Absence of Registration Rights. Except as disclosed in the Registration Statement and the Prospectus, there are no persons with registration or other similar rights to have any equity or debt securities of the Company or the Subsidiaries, including securities which are convertible into or exchangeable or redeemable for equity securities of the Company or the Subsidiaries, registered pursuant to the Registration Statement or otherwise registered by the Company under the Securities Act.

(20) Authorization of Securities. The Securities to be sold by the Placement Agent have been duly authorized and, when issued and duly delivered against payment therefor as contemplated by this Agreement, will be validly issued, fully paid and non-assessable, free and clear of any pledge, lien, encumbrance, security interest or other claim, and the issuance and sale of the Securities by the Company is not subject to preemptive or other similar rights arising by operation of law, under the organizational documents of the Company or any Subsidiary or under any agreement to which the Company or any Subsidiary is a party.

(21) Nasdaq. The Common Stock has been registered under Section 12(b) of the Exchange Act and the Company will provide us with written notice of the approval of the Securities for listing on Nasdaq, and, upon such notice, the Securities will be approved for listing on Nasdaq, subject to official notice of issuance;

(22) Absence of Stabilization and Manipulation. The Company has not taken, directly or indirectly, any action which is designed to or which has constituted or which would reasonably be expected to cause or result in stabilization or manipulation of the price of any security of the Company to facilitate the sale or resale of the Securities.

(23) Absence of Registration Requirements. Neither the Company nor any of its affiliates (A) is required to register as a “broker” or “dealer” in accordance with the provisions of the Exchange Act, or (B) directly, or indirectly through one or more intermediaries, controls or has any other association with (within the meaning of Article I of the By-laws of the Financial Industry Regulatory Authority (“FINRA”)) any member firm of FINRA.

(24) Title to Property. The Company and the Subsidiaries have good and marketable title in fee simple to all real property, if any, and good title to all personal property (other than Intellectual Property which is addressed in Section 5(a)(26)), if any, owned by them, in each case free and clear of all liens, encumbrances and defects in such title (collectively, the “Encumbrances”), except such Encumbrances that are disclosed in the Prospectus or would not, individually or in the aggregate, reasonably be expected to have a Material Adverse Effect; any real leased by the Company or any Subsidiary is held under a lease which is a valid and binding agreement, enforceable against the Company or such Subsidiary (to the extent a party thereto) and, to the Company’s knowledge, the other parties thereto, except (A) as may be limited by bankruptcy, insolvency, reorganization, moratorium or similar laws affecting creditors’ rights generally, and by general principles of equity, and except to the extent that the indemnification

and contribution provisions of Section 10 hereof may be limited by federal or state securities laws and public policy considerations in respect thereof, (B) as otherwise disclosed in the Prospectus or (C) for such Encumbrances that would not, individually or in the aggregate, reasonably be expected to have a Material Adverse Effect.

(25) Description of Legal Proceedings. The descriptions of legal or governmental proceedings, contracts, leases and other legal documents in the Registration Statement and the Prospectus constitute fair and accurate summaries of such proceedings or documents, and there are no legal or governmental proceedings, contracts, leases or other documents that are known to the Company of a character required to be described in the Prospectus or filed as exhibits to the Registration Statement which are not so described or filed; all agreements between the Company or any of the Subsidiaries, on the one hand, and third parties, on the other, expressly referenced in the Prospectus are legal, valid and binding obligations of the Company or the Subsidiaries, to the extent a party thereto, and, to the knowledge of the Company, of the other parties thereto, enforceable against the Company or Subsidiaries in accordance with their respective terms, except to the extent enforceability may be limited by bankruptcy, insolvency, reorganization, moratorium or similar laws affecting creditors' rights generally and by general equitable principles and neither the Company nor any Subsidiary is in breach or default under any such agreements, except to the extent that the indemnification and contribution may be limited by federal or state securities laws and public policy considerations in respect thereof.

(26) Possession of Intellectual Property. Except as set forth in the Registration Statement and the Prospectus, the Company or the Subsidiaries own or possess adequate licenses or other rights to use all material patents, trademarks, service marks, trade names, copyrights, software licenses, trade secrets, other intangible property rights and know-how (collectively, "Intellectual Property") necessary for the Company and the Subsidiaries taken together as a whole (the "Consolidated Company") to conduct the business of the Consolidated Company as described in the Prospectus, and neither the Company nor any Subsidiary has received notice of infringement of or conflict with (and the Company and the Subsidiaries know of no such infringement of or conflict with) asserted rights of others with respect to any Intellectual Property which would reasonably be expected to have a Material Adverse Effect.

(27) FDA. As to each product subject to the jurisdiction of the U.S. Food and Drug Administration ("FDA") under the Federal Food, Drug and Cosmetic Act, as amended, and the regulations thereunder ("FDCA") that is manufactured, packaged, labeled, tested, distributed, sold, and/or marketed by the Company or any of its Subsidiaries (each such product, a "Product"), such Product is being manufactured, packaged, labeled, tested, distributed, sold and/or marketed by the Company in compliance with all applicable requirements under FDCA and similar laws, rules and regulations relating to registration, investigational use, premarket clearance, licensure, or application approval, good manufacturing practices, good laboratory practices, good clinical practices, product listing, quotas, labeling, advertising, record keeping and filing of reports, except where the failure to be in compliance would not have a Material Adverse Effect. There is no pending, completed or, to the Company's knowledge, threatened, action (including any lawsuit, arbitration, or legal or administrative or regulatory proceeding, charge, complaint, or investigation) against the Company or any of its Subsidiaries, and none of the Company or any of its Subsidiaries has received any written notice, warning letter or other communication from the FDA or any other governmental entity, which (i) contests the premarket clearance, licensure, registration, or approval of, the uses of, the distribution of, the manufacturing or packaging of, the testing of, the sale of, or the labeling and promotion of any Product, (ii) withdraws its approval of, requests the recall, suspension, or seizure of, or withdraws

or orders the withdrawal of advertising or sales promotional materials relating to, any Product, (iii) imposes a clinical hold on any clinical investigation by the Company or any of its Subsidiaries, (iv) enjoins production at any facility of the Company or any of its Subsidiaries, (v) enters or proposes to enter into a consent decree of permanent injunction with the Company or any of its Subsidiaries, or (vi) otherwise alleges any violation of any laws, rules or regulations by the Company or any of its Subsidiaries, and which, either individually or in the aggregate, would have a Material Adverse Effect. The properties, business and operations of the Company have been and are being conducted in all material respects in accordance with all applicable laws, rules and regulations of the FDA. The Company has not been informed by the FDA that the FDA will prohibit the marketing, sale, license or use in the United States of any product proposed to be developed, produced or marketed by the Company nor, the knowledge of the Company, has the FDA expressed any concern as to approving or clearing for marketing any product being developed or proposed to be developed by the Company.

(28) Clinical Studies. The preclinical studies and tests and clinical trials described in the Prospectus were, and, if still pending, are being conducted in all material respects in accordance with the experimental protocols, procedures and controls pursuant to, where applicable, accepted professional and scientific standards for products or product candidates comparable to those being developed by the Company; the descriptions of such studies, tests and trials, and the results thereof, contained in the Prospectus are accurate and complete in all material respects; the Company is not aware of any tests, studies or trials not described in the Prospectus, the results of which reasonably call into question the results of the tests, studies and trials described in the Prospectus; and the Company has not received any written notice or correspondence from the FDA or any foreign, state or local Governmental Authority exercising comparable authority or any institutional review board or comparable authority requiring the termination, suspension, clinical hold or material modification of any tests, studies or trials.

(29) Accounting Controls. The Company maintains a system of internal accounting controls sufficient to provide reasonable assurance that, with respect to the Consolidated Company, (A) transactions are executed in accordance with management's general or specific authorizations; (B) transactions are recorded as necessary to permit preparation of the historical financial statements of the Company in conformity with generally accepted accounting principles as applied in the United States and to maintain asset accountability; (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.

(30) Disclosure Controls. (A) the Company has established and maintains disclosure controls and procedures (as such term is defined in Rule 13a-15(e) under the Exchange Act), which (1) are designed to ensure that material information relating to the Company, including its consolidated Subsidiaries, is made known to the Company's principal executive officer and its principal financial officer by others within those entities, particularly during the periods in which the periodic reports required under the Exchange Act are being prepared, (2) have been evaluated for effectiveness as of the end of the Company's last fiscal year, and (3) are effective in all material respects to perform the functions for which they were established, and (B) based on the evaluation of the Company's disclosure controls and procedures described above, the Company is not aware of (1) any material weakness in the design or operation of internal control over financial reporting which is reasonably likely to adversely affect the Company's ability to record, process, summarize and report financial information, or (2) any fraud, whether or not material, that involves management or other employees who have a significant role in the Company's internal control over financial reporting. Since the most recent evaluation of the

Company's disclosure controls and procedures described above, there have been no significant changes in internal control over financial reporting or in other factors that could materially affect internal control over financial reporting.

(31) ERISA. The Company and the Subsidiaries are in compliance in all material respects with all presently applicable provisions of the Employee Retirement Income Security Act of 1974, as amended, including the regulations and published interpretations thereunder ("ERISA"); no "reportable event" (as defined in ERISA) has occurred with respect to any "pension plan" (as defined in ERISA) for which the Company or any of the Subsidiaries would have any material liability; neither the Company nor any of the Subsidiaries has incurred and none of them expect to incur any material liability under (A) Title IV of ERISA with respect to termination of, or withdrawal from, any "pension plan" or (B) Section 412 or 4971 of the Internal Revenue Code of 1986, as amended, including the regulations and published interpretations thereunder ("Code"); each "pension plan" for which the Company or any of the Subsidiaries would have any liability that is intended to be qualified under Section 401(a) of the Code is so qualified in all material respects and nothing has occurred, whether by action or by failure to act, which would cause the loss of such qualification.

(32) Tax Returns. The Company and each of the Subsidiaries has filed on a timely basis all material federal, state and foreign tax returns required to be filed through the date hereof or have properly requested extensions thereof, and have paid all material taxes required to be paid, including any tax assessment, fine or penalty levied against the Company or any of the Subsidiaries except as may be being contested in good faith and by appropriate proceedings; and no material tax deficiency has been asserted against any such entity, nor does any such entity know of any tax deficiency which is likely to be asserted against any such entity which, individually or in the aggregate, if determined adversely to any such entity, could reasonably be expected to have a Material Adverse Effect; all material tax liabilities are adequately provided for in the applicable financial statements.

(33) Tax Advice. The Company has not relied upon the Placement Agent or legal counsel for the Placement Agent for any tax advice in connection with the offering and sale of the Securities.

(34) Insurance. Except as otherwise described in the Registration Statement and the Prospectus, the Company is insured by insurers of recognized financial responsibility with policies in such amounts and with such deductibles and covering such risks as the Company reasonably believes are prudent and customary for the business for which it is engaged including, but not limited to, directors and officers liability insurance, policies covering real and personal property owned or leased by the Company and the Subsidiaries against theft, damage, destruction, acts of vandalism and earthquakes.

(35) Environmental Laws. The Company and the Subsidiaries have received all permits, licenses or other approvals required of them under applicable federal and state occupational safety and health and environmental laws, regulations and rules to conduct the business of the Consolidated Company, and the Company and the Subsidiaries are in compliance with all terms and conditions of any such permits, licenses or approvals, except for any failure to have required permits, licenses or other approvals or to comply with the terms and conditions of such permits, licenses or approvals which would not, individually or in the aggregate, reasonably be expected to have a Material Adverse Effect.

(36) Absence of Impermissible Transactions. None of the Company, any of the Subsidiaries or, to the knowledge of the Company, any officer, director, employee or agent purporting to act on behalf of the Company or any of the Subsidiaries has at any time (A) made any contributions to any candidate for political office, or failed to disclose fully any such contributions, in violation of law, (B) made any payment of funds or received or retained any funds in violation of any law, rule or regulation or of a character required to be disclosed in the Prospectus, or (C) engaged in any material transactions, maintained any bank account or used any material corporate funds except for transactions, bank accounts and funds which have been or are, as applicable, reflected in the books and records of the Company and the Subsidiaries.

(37) Absence of Indebtedness. Except as disclosed in the Prospectus, there are no material outstanding loans, advances or guarantees of indebtedness by the Company or any of the Subsidiaries to or for the benefit of any of the officers or directors of the Company or any officers and or directors of the Subsidiaries or any of the members of the immediate families of any such officers or directors.

(38) Hazardous Materials. To the Company's knowledge neither the Company nor any of the Subsidiaries has any liability under any applicable environmental, health, safety or similar law or otherwise relating to any Hazardous Material (as hereinafter defined) and there are no notices of potential liability or claims pending or, to the knowledge of the Company, threatened against the Company or any of the Subsidiaries or concerning any of the Properties under any applicable environmental, health, safety or similar law or otherwise relating to any Hazardous Material, except for such liabilities or claims which would not reasonably be expected to have a Material Adverse Effect; neither the Company nor any of the Subsidiaries or, to the knowledge of the Company, any other person, has contaminated or caused conditions that threaten to contaminate any of the Properties with Hazardous Materials, except for such contamination or threats of contamination which would not reasonably be expected to have a Material Adverse Effect; neither the Properties nor any other land ever owned by the Company or any of the Subsidiaries is included on or, to the knowledge of the Company, is proposed for inclusion on the National Priorities List pursuant to the Comprehensive Environmental Response, Compensation, and Liability Act, 42 U.S.C. §. 9601 et seq., or any similar list or inventory of contaminated properties. As used herein, "Hazardous Material" shall mean any hazardous material, hazardous waste, hazardous substance, hazardous constituent, toxic substance, pollutant, contaminant, asbestos, petroleum, petroleum waste, radioactive material, biohazardous material, explosive or any other material, the presence of which in the environment is prohibited, regulated, or serves as the basis of liability, as defined, listed, or regulated by any applicable federal or state environmental law, ordinance, rule, or regulation.

(39) Compliance with Securities Laws. In connection with the offer and sale of the Placement Securities, the Company has not offered shares of its Common Stock or any other securities convertible into or exchangeable or exercisable or redeemable for Common Stock in a manner in violation of the Securities Act, and the Company has not distributed and will not distribute any offering material in connection with the offer and sale of the Placement Securities except for the Prospectus and any Issuer Free Writing Prospectus or the Registration Statement.

(40) Lending Relationship. Except as disclosed in the Registration Statement and the Prospectus, neither the Company nor any of its Subsidiaries has any outstanding borrowings from, or is a party to any line of credit, credit agreement or other credit facility or otherwise has a borrowing relationship with, any bank or other lending institution affiliated with the Placement Agent, and the Company does not intend to use any of the proceeds from the sale of the Securities to repay any debt owed to the Placement Agent or any affiliate thereof.

(41) Absence of Finders' Fees. The Company has not incurred any liability for any finder's fees or similar payments in connection with the transactions herein contemplated.

(42) No Other Contracts. Other than this Agreement, there are no contracts, agreements or understandings between the Company or any of its Subsidiaries and any person that would give rise to a valid claim against the Company or any of its Subsidiaries or the Placement Agent for a brokerage commission, finder's fee or other like payment with respect to the consummation of the transactions contemplated by this Agreement.

(43) Proprietary Trading by the Placement Agent. The Company acknowledges and agrees that the Placement Agent has informed the Company that the Placement Agent may, to the extent permitted under applicable law, including but not limited to, the Securities Act and the Exchange Act, purchase and sell shares of Common Stock for its own account while this Agreement is in effect, and shall be under no obligation to purchase Securities on a principal basis pursuant to this Agreement, except as otherwise agreed by the Placement Agent in the Placement Notice (as amended by the corresponding Acceptance, if applicable); *provided*, that no such purchase or sales shall take place while a Placement Notice is in effect (except (i) as agreed by the Placement Agent in the Placement Notice (as amended by the corresponding Acceptance, if applicable) or (ii) to the extent the Placement Agent may engage in sales of Placement Securities purchased or deemed purchased from the Company as a "riskless principal" or in a similar capacity).

(44) FINRA Matters. All of the information provided to the Placement Agent or to counsel for the Placement Agent by the Company and, to the knowledge of the Company, its officers and directors and the holders of any securities of the Company in connection with letters, filings or other supplemental information provided to the FINRA pursuant to FINRA Conduct Rule 5110 or 5121 is true, complete and correct.

(45) Related Party Transactions. There are no related-party transactions reportable under Regulation S-K Item 404 promulgated under the Exchange Act involving the Company, the Subsidiaries or any other person required to be described in the Prospectus that have not been described as required.

(46) Compliance with Sarbanes-Oxley. The Company and the Subsidiaries and, to the knowledge of the Company, the officers and directors of the Company and the Subsidiaries, in their capacities as such, are, and at the Settlement Date (as defined below) and any Applicable Time will be, in compliance in all material respects with the provisions of the Sarbanes-Oxley Act of 2002 and the rules and regulations promulgated thereunder or implementing the provisions thereof (the "Sarbanes-Oxley Act").

(47) Investment Company Act. The Company is not and, after giving effect to the offering and sale of the Securities, will not be an "investment company", as such terms are defined in the Investment Company Act of 1940, as amended (the "Investment Company Act").

(48) Statistical and Market Data. The statistical and market related data included in the Prospectus are based on or derived from sources that the Company reasonably believes to be reliable and accurate.

(b) Certificates. Any certificate signed by any officer of the Company delivered to the Placement Agent or to counsel for the Placement Agent pursuant to the terms or provisions of this

Agreement shall be deemed a representation and warranty by the Company to the Placement Agent as to the matters covered thereby.

SECTION 6. Sale and Delivery to the Placement Agent; Settlement.

(a) *Sale of Placement Securities.* On the basis of the representations and warranties herein contained and subject to the terms and conditions herein set forth, upon the Placement Agent's acceptance of the terms of a Placement Notice or upon receipt by the Placement Agent of an Acceptance, as the case may be, and unless the sale of the Placement Securities described therein has been declined, suspended, or otherwise terminated in accordance with the terms of this Agreement, the Placement Agent, for the period specified in the Placement Notice, will use its commercially reasonable efforts consistent with its normal trading and sales practices and applicable laws and regulations to sell such Placement Securities up to the amount specified, and otherwise in accordance with the terms of such Placement Notice. The Company acknowledges and agrees that (i) there can be no assurance that the Placement Agent will be successful in selling Placement Securities, (ii) the Placement Agent will incur no liability or obligation to the Company or any other person or entity if it does not sell Placement Securities for any reason other than a failure by the Placement Agent to use its commercially reasonable efforts consistent with its normal trading and sales practices and applicable laws and regulations to sell such Placement Securities as required under this Section 6, and (iii) the Placement Agent shall be under no obligation to purchase Securities on a principal basis pursuant to this Agreement, except as otherwise agreed by the Placement Agent in the Placement Notice (as amended by the corresponding Acceptance, if applicable).

(b) *Settlement of Placement Securities.* Unless otherwise specified in the applicable Placement Notice, settlement for sales of Placement Securities will occur on the second (2nd) Trading Day (or such earlier day as is industry practice for regular-way trading) following the date on which such sales are made (each, a "Settlement Date"). The amount of proceeds to be delivered to the Company on a Settlement Date against receipt of the Placement Securities sold (the "Net Proceeds") will be equal to the aggregate sales price received by the Placement Agent at which such Placement Securities were sold, after deduction for (i) the Placement Agent's commission, discount or other compensation for such sales payable by the Company pursuant to Section 2 hereof and (ii) any other amounts due and payable by the Company to the Placement Agent hereunder pursuant to Section 8(a) hereof.

(c) *Delivery of Placement Securities.* On or before each Settlement Date, concurrently with the receipt by the Company of the Net Proceeds due to the Company in respect of such Settlement Date, the Company will, or will cause its transfer agent to, electronically transfer the Placement Securities being sold by crediting the Placement Agent's or its designee's account (provided the Placement Agent shall have given the Company written notice of such designee prior to the Settlement Date) at The Depository Trust Company through its Deposit and Withdrawal at Custodian System or by such other means of delivery through the facilities of The Depository Trust Company as may be mutually agreed upon by the parties hereto which in all cases shall be freely tradable, transferable, registered shares in good deliverable form. On each Settlement Date, the Placement Agent will deliver the related Net Proceeds in same day funds to an account designated by the Company on, or prior to, the Settlement Date. The Company agrees that if the Company, or its transfer agent (if applicable), defaults in its obligation to deliver Placement Securities on a Settlement Date, the Company agrees that, in addition to and in no way limiting the rights and obligations set forth in Section 10(a) hereto, it will (i) hold the Placement Agent harmless against any loss, claim, damage, or expense (including reasonable legal fees and expenses), as incurred, arising out of or in connection with such default by the Company and (ii) pay to the Placement Agent any commission, discount, or other compensation to which it would otherwise have been entitled absent such default.

(d) *Denominations; Registration.* If requested by the Placement Agent at least two Business Days prior to the Settlement Date, then in lieu of electronic transfer, certificates for the Securities shall be in such denominations and registered in such names as the Placement Agent shall have specified in such request. The certificates for the Securities, if any, will be made available for examination and packaging by the Placement Agent in The City of New York not later than noon (New York time) on the Business Day prior to the Settlement Date.

SECTION 7. Covenants of the Company. The Company covenants with the Placement Agent as follows:

(a) *Registration Statement Amendment.* After the date of this Agreement and during any period in which a Prospectus relating to any Placement Securities is required to be delivered by the Placement Agent under the Securities Act (including in circumstances where such requirement may be satisfied pursuant to Rule 172 under the Securities Act or similar rule), (i) the Company will notify the Placement Agent promptly of the time when any subsequent amendment to the Registration Statement, other than documents incorporated by reference, has been filed with the Commission and/or has become effective or any subsequent supplement to the Prospectus has been filed and of any comment letter from the Commission or any request by the Commission for any amendment or supplement to the Registration Statement or Prospectus or for additional information; (ii) the Company will prepare and file with the Commission, promptly upon the Placement Agent's reasonable request, any amendments or supplements to the Registration Statement or Prospectus that, in the Placement Agent's reasonable opinion, may be necessary or advisable in connection with the distribution of the Placement Securities by the Placement Agent (*provided, however*, that the failure of the Placement Agent to make such request shall not relieve the Company of any obligation or liability hereunder, or affect the Placement Agent's right to rely on the representations and warranties made by the Company in this Agreement and, *provided further*, that the only remedy the Placement Agent shall have with respect to the failure to make such filing shall be to cease making any sales under this Agreement until such amendment or supplement is filed); (iii) the Company will not file any amendment or supplement to the Registration Statement or Prospectus, other than documents incorporated by reference, relating to the Placement Securities or a security convertible into the Placement Securities unless a copy thereof has been submitted to the Placement Agent within a reasonable period of time before the filing and the Placement Agent has not reasonably objected thereto within a reasonable period of time (*provided, however*, that the failure of the Placement Agent to make such objection shall not relieve the Company of any obligation or liability hereunder, or affect the Placement Agent's right to rely on the representations and warranties made by the Company in this Agreement and the Company has no obligation to provide the Placement Agent any advance copy of such filing or to provide the Placement Agent any opportunity to object to such filing if such filing does not name the Placement Agent and does not relate to the transactions contemplated by this Agreement, and *provided, further*, that the only remedy the Placement Agent shall have with respect to the failure by the Company to obtain such consent shall be to cease making sales under this Agreement); (iv) the Company will furnish to the Placement Agent at the time of filing thereof a copy of any document that upon filing is deemed to be incorporated by reference into the Registration Statement or Prospectus, except for those documents available via EDGAR; and (v) the Company will cause each amendment or supplement to the Prospectus, other than documents incorporated by reference, to be filed with the Commission as required pursuant to the applicable paragraph of Rule 424(b) of the Securities Act (without reliance on Rule 424(b)(8) of the Securities Act).

(b) *Notice of Commission Stop Orders.* The Company will advise the Placement Agent, promptly after it receives notice or obtains knowledge thereof, of the issuance or threatened issuance by the Commission of any stop order suspending the effectiveness of the Registration Statement, or of the suspension of the qualification of the Placement Securities for offering or sale in any jurisdiction, or of the initiation or threatening of any proceedings for any of such purposes, or of any examination pursuant

to Section 8(e) of the Securities Act concerning the Registration Statement or if the Company becomes the subject of a proceeding under Section 8A of the Securities Act in connection with the offering of the Securities. The Company will use commercially reasonable efforts to prevent the issuance of any stop order or to obtain its withdrawal if such a stop order should be issued.

(c) *Delivery of Registration Statement and Prospectus.* Except to the extent such documents have been publicly filed with the Commission pursuant to EDGAR, the Company will furnish to the Placement Agent and its counsel (at the expense of the Company) copies of the Registration Statement, the Prospectus (including all documents incorporated by reference therein) and all amendments and supplements to the Registration Statement or Prospectus, and any Issuer Free Writing Prospectuses, that are filed with the Commission during any period in which the Prospectus is required to be delivered under the Securities Act (including all documents filed with the Commission during such period that are deemed to be incorporated by reference therein), in each case as soon as reasonably practicable and in such quantities and at such locations as the Placement Agent may from time to time reasonably request.

(d) *Continued Compliance with Securities Laws.* If at any time when a Prospectus is required by the Securities Act to be delivered in connection with a pending sale of the Placement Securities (including, without limitation, pursuant to Rule 172 under the Securities Act or similar rule), any event shall occur or condition shall exist as a result of which it is necessary to amend the Registration Statement together with the Prospectus in order that the Prospectus will not include any untrue statement of a material fact or omit to state a material fact necessary in order to make the statements therein not misleading in the light of the circumstances existing at the time it is delivered to a purchaser, or if it shall be necessary at any such time to amend the Registration Statement together with the Prospectus in order to comply with the requirements of the Securities Act, the Company will promptly notify the Placement Agent to suspend the offering of Placement Securities during such period and the Company will promptly prepare and file with the Commission such amendment or supplement as may be necessary to correct such statement or omission or to make the Registration Statement and the Prospectus comply with such requirements, and the Company will furnish to the Placement Agent such number of copies of such amendment or supplement as the Placement Agent may reasonably request. If at any time following the issuance of an Issuer Free Writing Prospectus there occurred or occurs an event or development as a result of which such Issuer Free Writing Prospectus conflicted, conflicts or would conflict with the information contained in the Registration Statement or the Prospectus or included, includes or would include an untrue statement of a material fact or together with the Prospectus omitted, omits or would omit to state a material fact necessary in order to make the statements therein, in the light of the circumstances, prevailing at that subsequent time, not misleading, the Company will promptly notify the Placement Agent to suspend the offering of Placement Securities during such period and the Company will, subject to Section 7(a) hereof, promptly amend or supplement such Issuer Free Writing Prospectus to eliminate or correct such conflict, untrue statement or omission. Notwithstanding the foregoing, the Company may delay any amendment or supplement required by this Section 7(d) if, in the reasonable judgment of the Company, it is in the best interests of the Company to do so.

(e) *Blue Sky and Other Qualifications.* The Company will use its commercially reasonable efforts, in cooperation with the Placement Agent, to qualify the Placement Securities for offering and sale, or to obtain an exemption for the Securities to be offered and sold, under the applicable securities laws of such states and other jurisdictions (domestic or foreign) as the Placement Agent may designate and to maintain such qualifications and exemptions in effect for so long as required for the distribution of the Securities (but in no event for less than one year from the date of this Agreement); *provided, however*, that the Company shall not be obligated to file any general consent to service of process or to qualify as a foreign corporation or as a dealer in securities in any jurisdiction in which it is not so qualified or to subject itself to taxation in respect of doing business in any jurisdiction in which it is not otherwise so subject. In each jurisdiction in which the Placement Securities have been so qualified or exempt, the

Company will file such statements and reports as may be required by the laws of such jurisdiction to continue such qualification or exemption, as the case may be, in effect for so long as required for the distribution of the Placement Securities (but in no event for less than one year from the date of this Agreement).

(f) *Rule 158.* The Company will timely file such reports pursuant to the Exchange Act as are necessary in order to make generally available to its securityholders as soon as practicable an earnings statement for the purposes of, and to provide to the Placement Agent the benefits contemplated by, the last paragraph of Section 11(a) of the Securities Act.

(g) *Use of Proceeds.* The Company will use the net proceeds received by it from the sale of the Securities in the manner specified in the Prospectus under "Use of Proceeds."

(h) *Listing.* During any period in which the Prospectus is required to be delivered by the Placement Agent under the Securities Act with respect to a pending sale of the Placement Securities (including in circumstances where such requirement may be satisfied pursuant to Rule 172 under the Securities Act or similar rule), the Company will use its commercially reasonable efforts to cause the Placement Securities to be listed on the Nasdaq.

(i) *Filings with the Nasdaq.* The Company will timely seek to file with the Nasdaq all material documents and notices required by the Nasdaq.

(j) *Reporting Requirements.* The Company, during any period when the Prospectus is required to be delivered under the Securities Act and the Exchange Act (including in circumstances where such requirement may be satisfied pursuant to Rule 172 under the Securities Act or similar rule), will file all documents required to be filed with the Commission pursuant to the Exchange Act within the time periods required by the Exchange Act.

(k) *Notice of Other Sales.* Upon the issuance and during the pendency of any Placement Notice given hereunder, the Company shall provide the Placement Agent notice as promptly as reasonably practicable before it offers to sell, contracts to sell, sells, grants any option to sell or otherwise disposes of any shares of Common Stock (other than Placement Securities offered pursuant to the provisions of this Agreement) or securities convertible into or exchangeable for Common Stock, warrants or any rights to purchase or acquire Common Stock; *provided*, that such notice shall not be required in connection with the (i) issuance, grant or sale of restricted stock, Common Stock, options to purchase shares of Common Stock, restricted stock or other stock awards or Common Stock issuable upon the exercise or vesting of options or other equity awards pursuant to any stock option, stock bonus or other stock or compensatory plan or arrangement described in the Registration Statement or the Prospectus, (ii) the issuance of shares of Common Stock upon conversion of securities or the exercise of warrants, options or other rights in effect or outstanding as of the date of this Agreement, and disclosed in filings by the Company available on EDGAR or otherwise in writing to the Placement Agent, (iii) the issuance of securities in connection with an acquisition, merger, sale or purchase of assets, other business combination, or strategic alliance occurring after the date of this Agreement and conducted in a manner so as to not be integrated with the offering of Securities hereby, or (iv) the issuance or sale of Common Stock pursuant to any dividend reinvestment plan that the Company has in effect or may adopt from time to time, *provided* the implementation of such new plan is disclosed to the Placement Agent in advance. Notwithstanding the foregoing provisions, nothing herein shall be construed to restrict the Company's ability, or require the Company to provide notice to the Placement Agent, to file a registration statement under the Securities Act.

(l) *Change of Circumstances.* The Company will, at any time upon the issuance and during the pendency of a Placement Notice, advise the Placement Agent promptly after it shall have received notice or obtained knowledge thereof, of any information or fact that would alter or affect in any material respect any opinion, certificate, letter or other document provided to the Placement Agent pursuant to this Agreement.

(m) *Due Diligence Cooperation.* During the term of this Agreement, the Company will cooperate with any reasonable due diligence review conducted by the Placement Agent or its agents in connection with the transactions contemplated hereby, including, without limitation, providing information and making available documents and senior corporate officers, during regular business hours and at the Company's principal offices, as the Placement Agent may reasonably request.

(n) *Disclosure of Sales.* The Company will, if applicable, disclose in its quarterly reports on Form 10-Q and in its annual report on Form 10-K the number of Placement Securities sold through the Placement Agent during the most recent completed fiscal quarter and the Net Proceeds to the Company with respect to such Placement Securities.

(o) *Representation Dates; Certificate.* On or prior to the date that the Securities are first sold pursuant to the terms of this Agreement and:

(i) each time the Company files the Prospectus relating to the Placement Securities or amends or supplements the Registration Statement or the Prospectus (relating to the Placement Securities other than amendments or supplements that are filed solely to report sales of the Placement Securities pursuant to this Agreement) by means of a post-effective amendment, sticker, or supplement but not by means of incorporation of documents by reference into the Registration Statement or the Prospectus relating to the Placement Securities;

(ii) each time the Company files an annual report on Form 10-K under the Exchange Act;

(iii) each time the Company files its quarterly reports on Form 10-Q under the Exchange Act; or

(iv) each time the Company files a report on Form 8-K containing amended financial information (other than an earnings release, to "furnish" information pursuant to Items 2.02 or 7.01 of Form 8-K or to provide disclosure pursuant to Item 8.01 of Form 8-K relating to the reclassifications of certain properties as discontinued operations in accordance with Statement of Financial Accounting Standards No. 144) under the Exchange Act (each date of filing of one or more of the documents referred to in clauses (i) through (iv) shall be a "Representation Date");

the Company shall furnish the Placement Agent with a certificate, in the form attached hereto as Exhibit D, within three (3) Trading Days of any Representation Date if required by the Placement Agent. The requirement to provide a certificate under this Section 7(o) shall be waived for any Representation Date occurring at a time at which no Placement Notice is pending, which waiver shall continue until the date the Company delivers a Placement Notice hereunder (which for such calendar quarter shall be considered a Representation Date); *provided, however*, that such waiver shall not apply for any Representation Date on which the Company files its annual report on Form 10-K. Notwithstanding the foregoing, if the Company subsequently decides to sell Placement Securities following a Representation Date when the Company relied on such waiver and did not provide the Placement Agent with a certificate under this Section 7(o), then before the Company delivers the Placement Notice or the Placement Agent sells any

Placement Securities, the Company shall provide the Placement Agent with a certificate, in the form attached hereto as Exhibit D, dated the date of the Placement Notice.

(p) *Legal Opinions.* On or prior to the date that the Securities are first sold pursuant to the terms of this Agreement and within five (5) Trading Days after each Representation Date (excluding Representation Dates with regard to the time the Company files its quarterly reports on Form 10-Q) with respect to which the Company is obligated to deliver a certificate in the form attached hereto as Exhibit D for which no waiver is applicable, the Company shall cause to be furnished to the Placement Agent (i) a written opinion of Morgan, Lewis & Bockius LLP, corporate counsel to the Company (“Company Corporate Counsel”), or other counsel reasonably satisfactory to the Placement Agent, in form and substance reasonably satisfactory to the Placement Agent and its counsel, dated the date that the opinion is required to be delivered, in form and substance satisfactory to the Placement Agent, and (ii), unless waived by the Placement Agent, a written opinion of Cooley LLP, counsel to the Placement Agent (“Counsel to the Placement Agent”), or other counsel reasonably satisfactory to the Placement Agent, in form and substance reasonably satisfactory to the Placement Agent, dated the date that the opinion is required to be delivered; *provided, however*, that in lieu of such opinions for subsequent Representation Dates, counsel may furnish the Placement Agent with a letter (a “Reliance Letter”) to the effect that the Placement Agent may rely on a prior opinion delivered under this Section 7(p) to the same extent as if it were dated the date of such letter (except that statements in such prior opinion shall be deemed to relate to the Registration Statement and the Prospectus as amended or supplemented at such Representation Date).

(q) *Comfort Letter.* On or prior to the date that the Securities are first sold pursuant to the terms of this Agreement and within five (5) Trading Days after each Representation Date (excluding Representation Dates with regard to any time the Company files a quarterly report on Form 10-Q) with respect to which the Company is obligated to deliver a certificate in the form attached hereto as Exhibit D for which no waiver is applicable, the Company shall cause its independent accountants (and any other independent accountants whose report is included in the Prospectus) to furnish the Placement Agent letters (the “Comfort Letters”), dated the date the Comfort Letter is delivered, in form and substance satisfactory to the Placement Agent, (i) confirming that they are an independent registered public accounting firm within the meaning of the Securities Act, the Exchange Act and the PCAOB, and (ii) stating, as of such date, the conclusions and findings of such firm with respect to the financial information and other matters ordinarily covered by accountants’ “comfort letters” to underwriters in connection with registered public offerings.

(r) *CFO Certificate.* Within five (5) Trading Days after each Representation Date pursuant to Section 7(o)(iii), the Chief Financial Officer shall furnish to Placement Agent a certificate certifying the information included in the most recent quarterly report on Form 10-Q to the extent not previously delivered with respect to such Form 10-Q (the “CFO Certificate”), dated the date that the certificate is required to be delivered, in form and substance reasonably satisfactory to Placement Agent.

(s) *Market Activities.* The Company will not, directly or indirectly, (i) take any action designed to cause or result in, or that constitutes or would reasonably be expected to constitute, the stabilization or manipulation of the price of any security of the Company to facilitate the sale or resale of the Securities or (ii) sell, bid for, or purchase the Securities shares of Common Stock in violation of Regulation M, or pay anyone any compensation for soliciting purchases of the Securities to be issued and sold pursuant to this Agreement other than the Placement Agent; *provided, however*, that the Company may bid for and purchase shares of its Common Stock in accordance with Rule 10b-18 under the Exchange Act.

(t) *Securities Act and Exchange Act.* The Company will use its best efforts to comply with all requirements imposed upon it by the Securities Act and the Exchange Act as from time to time in

force, so far as necessary to permit the continuance of sales of, or dealings in, the Placement Securities as contemplated by the provisions hereof and the Prospectus.

(u) *No Offer to Sell.* Other than a free writing prospectus (as defined in Rule 405 under the Securities Act) approved in advance in writing by the Company and the Placement Agent in its capacity as principal or agent hereunder, neither the Placement Agent nor the Company (including its agents and representatives, other than the Placement Agent in its capacity as such) will make, use, prepare, authorize, approve or refer to any written communications (as defined in Rule 405 under the Securities Act), required to be filed with the Commission, that constitutes an offer to sell or solicitation of an offer to buy shares of Common Stock hereunder.

(v) *Sarbanes-Oxley Act.* The Company and its Subsidiaries will use commercially reasonable efforts to comply with all effective applicable provisions of the Sarbanes-Oxley Act of 2002.

SECTION 8. Payment of Expenses. The Company will pay the following expenses incident to the performance of its obligations under this Agreement, including (i) the preparation, printing and filing of the Registration Statement (including financial statements and exhibits) as originally filed and of each amendment and supplement thereto, (ii) the word processing, printing and delivery to the Placement Agent of this Agreement and such other documents as may be required in connection with the offering, purchase, sale, issuance or delivery of the Placement Securities, (iii) the preparation, issuance and delivery of the certificates for the Placement Securities to the Placement Agent, including any stock or other transfer taxes and any capital duties, stamp duties or other duties or taxes payable upon the sale, issuance or delivery of the Placement Securities to the Placement Agent, (iv) the fees and disbursements of the counsel, accountants and other advisors to the Company, (v) the qualification or exemption of the Placement Securities under securities laws in accordance with the provisions of Section 7(e) hereof, including filing fees and the reasonable fees and disbursements of counsel for the Placement Agent in connection therewith and in connection with the preparation of the Blue Sky Survey and any supplements thereto, (vi) the printing and delivery to the Placement Agent of copies of any permitted Free Writing Prospectus and the Prospectus and any amendments or supplements thereto and any costs associated with electronic delivery of any of the foregoing by the Placement Agent to investors, (vii) the fees and expenses of the transfer agent and registrar for the Securities, (viii) the filing fees incident to, and the reasonable fees and disbursements of counsel to the Placement Agent in connection with, the review by FINRA of the terms of the sale of the Securities, (ix) the fees and expenses incurred in connection with the listing of the Placement Securities on the Nasdaq and (x) the reasonable fees and disbursements of Counsel to the Placement Agent, including the fees set forth in Subsection (v) and (viii) of this Section 8, which shall not exceed \$50,000 in the aggregate and up to \$10,000 per year in connection with the review and preparation of the deliverables set forth in Sections 7(o), (p) and (q).

SECTION 9. Conditions of the Placement Agent's Obligations. The obligations of the Placement Agent hereunder with respect to a Placement will be subject to the continuing accuracy and completeness of the representations and warranties of the Company contained in this Agreement or in certificates of any officer of the Company or any Subsidiary of the Company delivered pursuant to the provisions hereof, to the performance by the Company of its covenants and other obligations hereunder, and to the following further conditions:

(a) *Opinions of Company Corporate Counsel and Counsel to the Placement Agent.* On or prior to the date that Securities are first sold pursuant to the terms of this Agreement the Company shall furnish to the Placement Agent the opinions, each addressed to the Placement Agent, of (i) Morgan, Lewis & Bockius LLP, Company Corporate Counsel, or other counsel satisfactory to the Placement Agent, in form and substance reasonably satisfactory to the Placement Agent and its counsel, dated the date that the opinion is required to be delivered, in form and substance satisfactory to the Placement

Agent; and (ii), unless waived by the Placement Agent, Counsel to the Placement Agent, or other counsel satisfactory to the Placement Agent, in form and substance reasonably satisfactory to the Placement Agent dated the date that the opinion is required to be delivered.

(b) *Effectiveness of Registration Statement.* The Registration Statement and any Rule 462(b) Registration Statement shall have become effective and shall be available for (i) all sales of Placement Securities sold pursuant to all prior Placement Notices and (ii) the sale of all Placement Securities contemplated to be sold by any Placement Notice.

(c) *No Material Notices.* None of the following events shall have occurred and be continuing: (i) receipt by the Company or any of its Subsidiaries of any request for additional information from the Commission or any other federal or state governmental authority during the period of effectiveness of the Registration Statement, the response to which would require any post-effective amendments or supplements to the Registration Statement or the Prospectus; (ii) the issuance by the Commission or any other federal or state governmental authority of any stop order suspending the effectiveness of the Registration Statement or the initiation of any proceedings for that purpose; (iii) receipt by the Company of any notification with respect to the suspension of the qualification or exemption from qualification of any of the Placement Securities for sale in any jurisdiction or the initiation or threatening of any proceeding for such purpose; (iv) the occurrence of any event that makes any material statement made in the Registration Statement or the Prospectus, or any Issuer Free Writing Prospectus, or any material document incorporated or deemed to be incorporated therein by reference untrue in any material respect or that requires the making of any changes in the Registration Statement, the Prospectus, or any Issuer Free Writing Prospectus, or such documents so that, in the case of the Registration Statement, it will not contain any untrue statement of a material fact or omit to state any material fact required to be stated therein or necessary to make the statements therein not misleading and, that in the case of the Prospectus and any Issuer Free Writing Prospectus, it will not contain any untrue statement of a material fact or omit to state any 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.

(d) *No Misstatement or Material Omission.* The Placement Agent shall not have advised the Company that the Registration Statement contains an untrue statement of fact that in the Placement Agent's reasonable opinion is material, or omits to state a fact that in the Placement Agent's opinion is material and is required to be stated therein or is necessary to make the statements therein not misleading, or that the Prospectus, or any Issuer Free Writing Prospectus or any amendment or supplement thereto, contains an untrue statement of fact that in the Placement Agent's reasonable opinion is material, or omits to state a fact that in the Placement Agent's opinion is material and is required to be stated therein or is necessary to make the statements therein, in the light of the circumstances in which they were made, not misleading

(e) *Material Changes.* Except as contemplated in the Prospectus, or disclosed in the Company's reports filed with the Commission, there shall not have been any material adverse change in the condition, financial or otherwise, or in the earnings, business affairs or business prospects of the Company and its Subsidiaries considered as one enterprise, whether or not arising in the ordinary course of business that, in the reasonable judgment of the Placement Agent, is so material as to make it impracticable or inadvisable to proceed with the offering of the Placement Securities on the terms and in the manner contemplated in the Prospectus.

(f) *Representation Certificate.* The Placement Agent shall have received the certificate required to be delivered pursuant to Section 7(o) on or before the date on which delivery of such certificate is required pursuant to Section 7(o).

(g) *Legal Opinions.* The Placement Agent shall have received the opinions of Company Corporate Counsel required to be delivered pursuant to Section 7(p) on or before the date on which delivery of such opinion is required pursuant to Section 7(p).

(h) *Accountant's Comfort Letter.* The Placement Agent shall have received the Comfort Letter required to be delivered pursuant to Section 7(q) on or before the date on which such delivery of such letter is required pursuant to Section 7(q).

(i) *CFO Certificate.* The Placement Agent shall have received the CFO Certificate required to be delivered pursuant to Section 7(r) on or before the date on which such delivery of such certificate is required pursuant to Section 7(r).

(j) *Secretary's Certificate.* On or before the date on which delivery of a legal opinion is required pursuant to Section 7(p), the Placement Agent shall have received a certificate, signed on behalf of the Company by its corporate Secretary, in form and substance reasonably satisfactory to the Placement Agent and its counsel.

(k) *Approval for Listing.* The Placement Securities shall either have been (i) approved for listing on Nasdaq, subject only to notice of issuance, or (ii) the Company shall have submitted a notification of listing of the Placement Securities on Nasdaq at, or prior to, the issuance of any Placement Notice.

(l) *No Suspension.* Trading in the Securities shall not have been suspended on the Nasdaq.

(m) *Additional Documents.* On each date on which the Company is required to deliver a certificate pursuant to Section 7(o), counsel for the Placement Agent shall have been furnished with such documents and opinions as they shall have reasonably requested for the purpose of enabling them to pass upon the issuance and sale of the Securities as herein contemplated, or in order to evidence the accuracy of any of the representations or warranties, or the fulfillment of any of the conditions, contained in this Agreement.

(n) *Securities Act Filings Made.* All filings with the Commission required by Rule 424 under the Securities Act to have been filed prior to the issuance of any Placement Notice hereunder shall have been made within the applicable time period prescribed for such filing by Rule 424 under the Securities Act.

(o) *Termination of Agreement.* If any condition specified in this Section 9 shall not have been fulfilled when and as required to be fulfilled, this Agreement may be terminated by the Placement Agent by notice to the Company, and such termination shall be without liability of any party to any other party except as provided in Section 7 hereof and except that, in the case of any termination of this Agreement, Sections 5, 8, 10, 11 and 19 hereof shall survive such termination and remain in full force and effect.

SECTION 10. Indemnity and Contribution by the Company and the Placement Agent.

(a) *Indemnification by the Company.* The Company agrees to indemnify, defend and hold harmless the Placement Agent and any person who controls the Placement Agent within the meaning of Section 15 of the Securities Act or Section 20 of the Exchange Act, from and against any loss, expense, liability, damage or claim (including the reasonable cost of investigation) which, jointly or severally, the Placement Agent or any controlling person may incur under the Securities Act, the Exchange Act or otherwise, insofar as such loss, expense, liability, damage or claim arises out of or is based upon (1) any

untrue statement or alleged untrue statement of a material fact contained in the Registration Statement (or any amendment thereof), any Issuer Free Writing Prospectus that the Company has filed or was required to file with the Commission or the Prospectus (the term Prospectus for the purpose of this Section 10 being deemed to include the Prospectus as of its date and as amended or supplemented by the Company), (2) any omission or alleged omission to state a material fact required to be stated in any such Registration Statement, or necessary to make the statements made therein not misleading, or (3) any omission or alleged omission from any such Issuer Free Writing Prospectus or Prospectus of a material fact necessary to make the statements made therein, in the light of the circumstances under which they were made, not misleading; *except*, in the case of each of clauses (1), (2) and (3), insofar as any such loss, expense, liability, damage or claim arises out of or is based upon any untrue statement or alleged untrue statement of a material fact or any omission or alleged omission of a material fact required to be stated therein or necessary to make the statements therein (in the case of the Prospectus and any Issuer Free Writing Prospectus, in the light of the circumstances under which they were made) not misleading, in each such case, to the extent contained in and in conformity with information furnished in writing the Placement Agent to the Company expressly for use therein (that information being limited to that described in Section 10(b) hereof). The indemnity agreement set forth in this Section 10(a) shall be in addition to any liability which the Company may otherwise have. If any action is brought against the Placement Agent or any controlling person in respect of which indemnity may be sought against the Company pursuant to the foregoing paragraph of this Section 10(a), the Placement Agent shall promptly notify the Company, as the case may be, in writing of the institution of such action, and the Company, as the case may be, shall if it so elects, assume the defense of such action, including the employment of counsel and payment of expenses; *provided, however*, that any failure or delay to so notify the Company, as the case may be, will not relieve the Company of any obligation hereunder, except to the extent that its ability to defend is materially prejudiced by such failure or delay. The Placement Agent or such controlling person shall have the right to employ its or their own counsel in any such case, but the fees and expenses of such counsel shall be at the expense of the Placement Agent or such controlling person unless the employment of such counsel shall have been authorized in writing by the Company, as the case may be, in connection with the defense of such action, or the Company shall not have employed counsel reasonably satisfactory to the Placement Agent or such controlling person, as the case maybe, to have charge of the defense of such action within a reasonable time or such indemnified party or parties shall have reasonably concluded (based on the advice of counsel) that there may be defenses available to it or them which are different from or additional to those available to the Company (in which case the Company shall not have the right to direct the defense of such action on behalf of the indemnified party or parties), in any of which events such fees and expenses shall be borne by the Company and paid as incurred (it being understood, however, that the Company shall not be liable for the expenses of more than one separate firm of attorneys for the Placement Agent or such controlling persons in any one action or series of related actions in the same jurisdiction (other than local counsel in any such jurisdiction) representing the indemnified parties who are parties to such action). Anything in this paragraph to the contrary notwithstanding, the Company shall not be liable for any settlement of any such claim or action effected without its consent.

(b) *Indemnification by the Placement Agent.* The Placement Agent agrees to indemnify, defend and hold harmless the Company, the Company's directors, the Company's officers that signed the Registration Statement, any person who controls the Company within the meaning of Section 15 of the Securities Act or Section 20 of the Exchange Act, from and against any loss, expense, liability, damage or claim (including the reasonable cost of investigation) which, jointly or severally, the Company or any such person may incur under the Securities Act, the Exchange Act or otherwise, insofar as such loss, expense, liability, damage or claim arises out of or is based upon (1) any untrue statement or alleged untrue statement of a material fact contained in the Registration Statement (or any amendment thereof), any Issuer Free Writing Prospectus that the Company has filed or was required to file with the Commission, the Prospectus, (2) any omission or alleged omission to state a material fact required to be

stated in any such Registration Statement, or necessary to make the statements made therein not misleading, or (3) any omission or alleged omission from any such Issuer Free Writing Prospectus or the Prospectus of a material fact necessary to make the statements made therein, in the light of the circumstances under which they were made, not misleading, but in each case only insofar as such untrue statement or alleged untrue statement or omission or alleged omission was made in such Registration Statement, Issuer Free Writing Prospectus or Prospectus in reliance upon and in conformity with information furnished in writing by the Placement Agent to the Company expressly for use therein. The statements set forth in the ninth paragraph under the caption "Plan of Distribution" in the Prospectus Supplement (to the extent such statements relate to the Placement Agent) constitute the only information furnished by or on behalf of the Placement Agent to the Company for the purposes of Section 5(a)(1) and this Section 10. The indemnity agreement set forth in this Section 10(b) shall be in addition to any liabilities that the Placement Agent may otherwise have.

If any action is brought against the Company or any such person in respect of which indemnity may be sought against the Placement Agent pursuant to the foregoing paragraph, the Company or such person shall promptly notify the Placement Agent in writing of the institution of such action and the Placement Agent shall if it so elects assume the defense of such action, including the employment of counsel and payment of expenses; *provided, however*, that any failure or delay to so notify the Placement Agent will not relieve the Placement Agent of any obligation hereunder, except to the extent that its ability to defend is materially prejudiced by such failure or delay. The Company or such person shall have the right to employ its or their own counsel in any such case, but the fees and expenses of such counsel shall be at the expense of the Company or such person unless the employment of such counsel shall have been authorized in writing by the Placement Agent in connection with the defense of such action or the Placement Agent shall not have employed counsel reasonably satisfactory to the Company or such person, as the case may be, to have charge of the defense of such action within a reasonable time or such indemnified party or parties shall have reasonably concluded (based on the advice of counsel) that there may be defenses available to it or them which are different from or additional to those available to (in which case the Placement Agent shall not have the right to direct the defense of such action on behalf of the indemnified party or parties), in any of which events such fees and expenses shall be borne by the Placement Agent and paid as incurred (it being understood, however, that the Placement Agent shall not be liable for the expenses of more than one separate firm of attorneys in any one action or series of related actions in the same jurisdiction (other than local counsel in any such jurisdiction) representing the indemnified parties who are parties to such action). Anything in this paragraph to the contrary notwithstanding, the Placement Agent shall not be liable for any settlement of any such claim or action effected without its written consent.

(c) *Contribution.* If the indemnification provided for in this Section 10 is unavailable or insufficient to hold harmless an indemnified party under subsections (a) and (b) of this Section 10 in respect of any losses, expenses, liabilities, damages or claims referred to therein, then each applicable indemnifying party, in lieu of indemnifying such indemnified party, shall contribute to the amount paid or payable by such indemnified party as a result of such losses, expenses, liabilities, damages or claims (i) in such proportion as is appropriate to reflect the relative benefits received by the Company and by the Placement Agent, each from the offering of the Securities, or (ii) if (but only if) the allocation provided by clause (i) above is not permitted by applicable law, in such proportion as is appropriate to reflect not only the relative benefits referred to in clause (i) above but also the relative fault of the Company and the Placement Agent in connection with the statements or omissions which resulted in such losses, expenses, liabilities, damages or claims, as well as any other relevant equitable considerations. The relative benefits received by the Company shall be deemed to be equal to the gross proceeds from the offering of Securities (before deducting discounts and expenses) received by each of them and benefits received by the Placement Agent shall be deemed to be equal to the discounts and commissions received by the Placement Agent. The relative fault of the Company and of the Placement Agent shall be determined by

reference to, among other things, whether the untrue statement or alleged untrue statement of a material fact or omission or alleged omission relates to information supplied by the Company or by the Placement Agent and the intent of the parties and their relative knowledge, access to information and opportunity to correct or prevent such statement or omission. The amount paid or payable by a party as a result of the losses, claims, damages and liabilities referred to above shall be deemed to include any legal or other fees or expenses reasonably incurred by such party in connection with investigating or defending any claim or action.

(d) The Company and the Placement Agent agree that it would not be just and equitable if contribution pursuant to this Section 10 were determined by *pro rata* allocation or by any other method of allocation which does not take account of the equitable considerations referred to in clause (i) and, if applicable, clause (ii) of subsection (c) above. Notwithstanding the provisions of this Section 10, the Placement Agent shall not be required to contribute any amount in excess of the discounts and commissions applicable to the Securities sold by the Placement Agent and the liability of the Company pursuant to this Section 10 shall not exceed the gross proceeds received by the Company (before deducting discounts and expenses). No person guilty of fraudulent misrepresentation (within the meaning of Section 11(f) of the Securities Act) shall be entitled to contribution from any person who was not guilty of such fraudulent misrepresentation.

SECTION 11. Representations, Warranties and Agreements to Survive Delivery. All representations, warranties and agreements contained in this Agreement or in certificates of officers of the Company or any of its Subsidiaries submitted pursuant hereto, shall remain operative and in full force and effect, regardless of any investigation made by or on behalf of the Placement Agent or controlling person, or by or on behalf of the Company, and shall survive delivery of the Securities to the Placement Agent.

SECTION 12. Termination of Agreement.

(a) *Termination; General.* the Placement Agent may terminate this Agreement, by notice to the Company, as hereinafter specified at any time (i) if there has been, since the time of execution of this Agreement or since the date as of which information is given in the Prospectus, any material adverse change in the condition, financial or otherwise, or in the earnings, business affairs or business prospects of the Company and its Subsidiaries considered as one enterprise, whether or not arising in the ordinary course of business, or (ii) if there has occurred any material adverse change in the financial markets in the United States or the international financial markets, any outbreak of hostilities or escalation thereof or other calamity or crisis or any change or development involving a prospective change in national or international political, financial or economic conditions, in each case the effect of which is such as to make it, in the judgment of the Placement Agent, impracticable or inadvisable to market the Securities or to enforce contracts for the sale of the Securities, or (iii) if trading in the Placement Securities has been suspended or limited by the Commission or the Nasdaq, or if trading generally on the American Stock Exchange, the NYSE or the Nasdaq has been suspended or limited, or minimum or maximum prices for trading have been fixed, or maximum ranges for prices have been required, by any of said exchanges or by order of the Commission, the FINRA or any other governmental authority, or a material disruption has occurred in commercial banking or securities settlement or clearance services in the United States, or (iv) if a banking moratorium has been declared by either Federal or New York State authorities.

(b) *Termination by the Company.* The Company shall have the right, by giving one (1) day notice as hereinafter specified to terminate this Agreement in its sole discretion at any time after the date of this Agreement. Upon termination of this Agreement pursuant to this Section 12(b), any outstanding Placement Notices shall also be terminated.

(c) *Termination by the Placement Agent.* The Placement Agent shall have the right, by giving one (1) day notice as hereinafter specified to terminate this Agreement in its sole discretion at any time after the date of this Agreement.

(d) *Automatic Termination.* Unless earlier terminated pursuant to this Section 12, this Agreement shall automatically terminate upon the issuance and sale of all of the Placement Securities through the Placement Agent on the terms and subject to the conditions set forth herein.

(e) *Continued Force and Effect.* This Agreement shall remain in full force and effect unless terminated pursuant to Sections 12(a), (b), (c), or (d) above or otherwise by mutual agreement of the parties.

(f) *Effectiveness of Termination.* Any termination of this Agreement shall be effective on the date specified in such notice of termination; *provided, however,* that such termination shall not be effective until the close of business on the date of receipt of such notice by the Placement Agent or the Company, as the case may be. If such termination shall occur prior to the Settlement Date for any sale of Placement Securities, such Placement Securities shall settle in accordance with the provisions of this Agreement.

(g) *Liabilities.* If this Agreement is terminated pursuant to this Section 12, such termination shall be without liability of any party to any other party except as provided in Section 8 hereof, and except that, in the case of any termination of this Agreement, Section 5, Section 10, Section 11 and Section 19 hereof shall survive such termination and remain in full force and effect.

SECTION 13. Notices. Except as otherwise provided in this Agreement, all notices and other communications hereunder shall be in writing and shall be deemed to have been duly given if mailed or transmitted by any standard form of telecommunication. Notices to the Placement Agent shall be directed to the Placement Agent at JMP Securities LLC, 600 Montgomery Street, Suite 1100, San Francisco, California 94111, Facsimile: (415) 835-8920, Attention: Equity Securities, with a copy Cooley LLP, 1114 Avenue of the Americas, New York, New York 10036, Facsimile: (212) 479-6275, Attention: Daniel I. Goldberg, email: dgoldberg@cooley.com and notices to the Company shall be directed to it at the offices of the Company at 167 Sidney Street, Cambridge, Massachusetts 02139, Attention: Bryant D. Lim, email: blim@iderapharma.com, , with a copy to Morgan, Lewis & Bockius LLP, 1701 Market St., Philadelphia, Pennsylvania, 19103, Attention Justin W. Chairman, email: justin.chairman@morganlewis.com.

SECTION 14. Parties. This Agreement shall inure to the benefit of and be binding upon the Placement Agent, the Company and their respective successors. Nothing expressed or mentioned in this Agreement is intended or shall be construed to give any person, firm or corporation, other than the Placement Agent, the Company and their respective successors and the controlling persons and officers and directors referred to in Section 10 and their heirs and legal representatives, any legal or equitable right, remedy or claim under or in respect of this Agreement or any provision herein contained. This Agreement and all conditions and provisions hereof are intended to be for the sole and exclusive benefit of the Placement Agent, the Company and their respective successors, and said controlling persons and officers and directors and their heirs and legal representatives, and for the benefit of no other person, firm or corporation. No purchaser of Securities from the Placement Agent shall be deemed to be a successor by reason merely of such purchase.

SECTION 15. Adjustments for Stock Splits. The parties acknowledge and agree that all stock-related numbers contained in this Agreement shall be adjusted to take into account any stock split, stock dividend or similar event effected with respect to the Securities.

SECTION 16. Governing Law and Time. THIS AGREEMENT SHALL BE GOVERNED BY AND CONSTRUED IN ACCORDANCE WITH THE LAWS OF THE STATE OF NEW YORK. SPECIFIED TIMES OF DAY REFER TO NEW YORK CITY TIME.

SECTION 17. Effect of Headings. The Section and Exhibit headings herein are for convenience only and shall not affect the construction hereof.

SECTION 18. Permitted Free Writing Prospectuses. The Company represents, warrants and agrees that, unless it obtains the prior consent of the Placement Agent, which consent shall not be unreasonably withheld, conditioned or delayed, and the Placement Agent represents, warrants and agrees that, unless it obtains the prior consent of the Company, which consent shall not be unreasonably withheld, conditioned or delayed, it has not made and will not make any offer relating to the Securities that would constitute an Issuer Free Writing Prospectus, or that would otherwise constitute a “free writing prospectus,” as defined in Rule 405 under the Securities Act, required to be filed with the Commission. Any such free writing prospectus consented to by the Placement Agent or by the Company, as the case may be, is hereinafter referred to as a “Permitted Free Writing Prospectus.” The Company represents and warrants that it has treated and agrees that it will treat each Permitted Free Writing Prospectus as an “issuer free writing prospectus,” as defined in Rule 433 under the Securities Act, and has complied and will comply with the requirements of Rule 433 under the Securities Act applicable to any Permitted Free Writing Prospectus, including timely filing with the Commission where required, legending and record keeping. For the purposes of clarity, the parties hereto agree that all free writing prospectuses, if any, listed in Exhibit E hereto, as modified from time to time, are Permitted Free Writing Prospectuses.

SECTION 19. Absence of Fiduciary Relationship. The Company acknowledges and agrees that:

(a) the Placement Agent is acting solely as agent and/or principal in connection with the public offering of the Securities and in connection with each transaction contemplated by this Agreement and the process leading to such transactions, and no fiduciary or advisory relationship between the Company or any of its respective affiliates, stockholders (or other equity holders), creditors or employees or any other party, on the one hand, and the Placement Agent, on the other hand, has been or will be created in respect of any of the transactions contemplated by this Agreement, irrespective of whether or not the Placement Agent has advised or is advising the Company on other matters, and the Placement Agent has no obligation to the Company with respect to the transactions contemplated by this Agreement except the obligations expressly set forth in this Agreement;

(b) the public offering price of the Securities was not established by the Placement Agent; it is capable of evaluating and understanding, and understands and accepts, the terms, risks and conditions of the transactions contemplated by this Agreement;

(c) the Placement Agent has not provided any legal, accounting, regulatory or tax advice with respect to the transactions contemplated by this Agreement and it has consulted its own legal, accounting, regulatory and tax advisors to the extent it has deemed appropriate;

(d) it is aware that the Placement Agent and its affiliates are engaged in a broad range of transactions which may involve interests that differ from those of the Company and the Placement Agent

has no obligation to disclose such interests and transactions to the Company by virtue of any fiduciary, advisory or agency relationship or otherwise; and

(e) it waives, to the fullest extent permitted by law, any claims it may have against the Placement Agent for breach of fiduciary duty or alleged breach of fiduciary duty and agrees that the Placement Agent shall not have any liability (whether direct or indirect, in contract, tort or otherwise) to it in respect of such a fiduciary duty claim or to any person asserting a fiduciary duty claim on its behalf or in right of it or the Company, employees or creditors of Company.

[Signature Page Follows]

If the foregoing is in accordance with your understanding of our agreement, please sign and return to the Company a counterpart hereof, whereupon this instrument, along with all counterparts, will become a binding agreement by and between the Placement Agent and the Company in accordance with its terms.

Very truly yours,

IDERA PHARMACEUTICALS, INC.

By: /s/ Vincent J. Milano

Name: Vincent J. Milano

Title: Chief Executive Officer

CONFIRMED AND ACCEPTED, as of the date first above written:

JMP SECURITIES LLC

By /s/ Andrew Mertz

Name: Andrew Mertz

Title: Managing Director - Head of Equity Capital Markets

EXHIBIT A

FORM OF PLACEMENT NOTICE

From: []
Cc: []
To: []
Date: []

Subject: Equity Distribution—Placement Notice

Gentlemen:

Pursuant to the terms and subject to the conditions contained in the Equity Distribution Agreement between Idera Pharmaceuticals, Inc. (the “Company”) and JMP Securities LLC (the “Placement Agent”) dated November 26, 2018 (the “Agreement”), I hereby request on behalf of the Company that the Placement Agent sell up to [] shares of the Company’s common stock, par value \$0.001 per share, at a minimum market price of \$[] per share.

[ADDITIONAL SALES PARAMETERS MAY BE ADDED, SUCH AS THE MAXIMUM AGGREGATE OFFERING PRICE, THE TIME PERIOD IN WHICH SALES ARE REQUESTED TO BE MADE, SPECIFIC DATES THE SHARES MAY NOT BE SOLD ON, THE MANNER IN WHICH SALES ARE TO BE MADE BY THE PLACEMENT AGENT, AND/OR THE CAPACITY IN WHICH THE PLACEMENT AGENT MAY ACT IN SELLING SHARES (AS PRINCIPAL, AGENT, OR BOTH)]

EXHIBIT B

AUTHORIZED INDIVIDUALS FOR PLACEMENT NOTICES AND ACCEPTANCES

JMP Securities LLC

Name

David Kellman, Managing Director
Andrew Mertz, Managing Director,
Kenneth Clausman, Managing Director
Gil Mogavero, Chief Compliance Officer

Email

dkellman@jmpsecurities.com
amertz@jmpsecurities.com
kclausman@jmpsecurities.com
gmogavero@jmpsecurities.com

Idera Pharmaceuticals, Inc.

Name

Vincent J. Milano
John J. Kirby
Bryant D. Lim

Email

vmilano@iderapharma.com
jkirby@iderapharma.com
blim@iderapharma.com

EXHIBIT C

COMPENSATION

The Placement Agent shall be paid compensation equal to 3.0% of the gross proceeds from the sales of Securities pursuant to the terms of this Agreement.

EXHIBIT D

OFFICER CERTIFICATE

The undersigned, John J. Kirby and Bryant D. Lim, are the Vice President of Finance and General Counsel and Secretary, respectively, of Idera Pharmaceuticals, Inc., a Delaware corporation (the "Company"). The undersigned hereby execute this pursuant to the terms of that certain Equity Distribution Agreement, dated November 26, 2018 (the "Equity Distribution Agreement"), between the Company and JMP Securities LLC. Capitalized terms used herein without definition shall have the meanings given to such terms in the Equity Distribution Agreement.

The undersigned each hereby further certifies, in their respective capacities as officers of the Company, in its own capacity that:

1. The representations and warranties of the Company in the Equity Distribution Agreement are true and correct, as if made on and as of the date hereof, and the Company have complied with all of its obligations thereunder and satisfied all of the conditions on their part to be performed or satisfied at or prior to the date hereof;
2. No stop order suspending the effectiveness of the Registration Statement or any post-effective amendment thereto has been issued and no proceedings for that purpose have been instituted or are pending or threatened under the Securities Act of 1933, as amended;
3. Subsequent to the respective dates as of which information is given in the Registration Statement or the Prospectus, there has not been (A) any Material Adverse Change, (B) any transaction that is material to the Company and its Subsidiaries taken as a whole, (C) any obligation, direct or contingent, that is material to the Company and its Subsidiaries, taken as a whole, incurred by the Company or the Subsidiaries, (D) any change in the capital stock or outstanding indebtedness of the Company or any Subsidiary that is material to the Company and its Subsidiaries, taken as a whole, or (E) any loss or damage (whether or not insured) to the Properties which has been sustained or will have been sustained which could reasonably be expected to have a Material Adverse Effect; and
4. Each of Morgan, Lewis & Bockius LLP and Cooley LLP is entitled to rely on this Officers' Certificate in connection with the opinion that each firm is rendering pursuant to the Equity Distribution Agreement.

[Signature Page Follows]

IN WITNESS WHEREOF, the undersigned have signed their names on this [] day of [], 20[].

IDERA PHARMACEUTICALS, INC.

By: _____
Name: John J. Kirby
Title: Vice President of Finance

By: _____
Name: Bryant D. Lim
Title: General Counsel and Secretary

EXHIBIT E

ISSUER FREE WRITING PROSPECTUSES

None.

[MORGAN, LEWIS & BOCKIUS LLP Letterhead]

November 26, 2018

Idera Pharmaceuticals, Inc.
505 Eagleview Boulevard, Suite 212
Exton, Pennsylvania 19341

Re: Idera Pharmaceuticals, Inc.
Registration Statement on Form S-3 (File No. 333-219851)

Ladies and Gentlemen:

We have acted as counsel to Idera Pharmaceuticals, Inc., a Delaware corporation (the "Company"), in connection with the filing of the referenced Registration Statement on Form S-3 (No. 333-219851) (the "Registration Statement") under the Securities Act of 1933, as amended (the "Act"), filed with the Securities and Exchange Commission (the "Commission") on August 10, 2017, as amended by pre-effective amendments filed September 1, 2017 and September 8, 2017, and declared effective by the Commission on September 8, 2017, the prospectus included in the Registration Statement (the "Base Prospectus"), and the prospectus supplement of the Company dated November 26, 2018, including the accompanying Base Prospectus, filed by the Company with the SEC on November 26, 2018 pursuant to Rule 424(b) promulgated under the Act (the "Prospectus"), relating to the offering and sale by the Company of up to \$50,000,000 aggregate offering price of shares (the "Shares") of the Company's common stock, \$0.001 par value per share (the "Common Stock") in an "at the market offering" as defined in Rule 415 of the Act in accordance with the Equity Distribution Agreement, dated November 26, 2018, between the Company and JMP Securities LLC (the "Sales Agreement").

As to all matters of fact (including factual conclusions and characterizations and descriptions of purpose, intention or other state of mind), we have relied, with your permission, entirely upon written actions by the board of directors of the Company and certificates of certain officers of the Company and have assumed, without independent inquiry, the accuracy of those certificates and written actions by the board of directors of the Company.

As counsel to the Company, in rendering the opinions hereinafter expressed, we have examined and relied upon originals or copies of such corporate records, agreements, documents and instruments as we have deemed necessary or advisable for purposes of this opinion, including (i) the certificate of incorporation and bylaws of the Company, (ii) the Registration Statement and the exhibits thereto filed with the Commission, (iii) the Prospectus, (iv) the Sales Agreement, and (v) the written actions of the board of directors referenced above.

This opinion is limited solely to the Delaware General Corporation Law without regard to choice of law, to the extent that the same may apply to or govern the transactions contemplated by the Registration Statement. We express no opinion as to the effect of events occurring, circumstances arising, or changes of law becoming effective or occurring, after the date hereof on the matters addressed in this opinion.

Based on such examination and subject to the foregoing, we are of the opinion that the Shares, when issued by the Company and delivered by the Company against payment therefore as contemplated by the Sales Agreement and a Placement Notice (as defined in the Sales Agreement), will be duly and validly issued, fully paid and non-assessable.

We hereby consent to the filing of this opinion with the Commission as an exhibit to a Current Report on Form 8-K to be filed with the Commission (and its incorporation by reference into the Registration Statement) in accordance with the requirements of Item 601(b)(5) of Regulation S-K promulgated under the Act and to the reference to this firm therein and under the heading "Legal Matters" in the Prospectus included in the

Registration Statement. In giving this consent, we do not admit that we are in the category of persons whose consent is required under Section 7 of the Act, or the rules and regulations of the Commission thereunder. In rendering this opinion, we are opining only as to the specific legal issues expressly set forth herein, and no opinion shall be inferred as to any other matter or matters. This opinion is intended solely for use in connection with the issuance and sale of the Shares subject to the Registration Statement and is not to be relied upon for any other purpose.

Very truly yours,

/s/ MORGAN, LEWIS & BOCKIUS LLP
