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

DIVISION OF
CORPORATION FINANCE

December 5, 2013

Via E-mail
Douglas M. Fambrough, III, Ph.D.
Chief Executive Officer
Dicerna Pharmaceuticals, Inc.
480 Arsenal Street
Building 1, Suite 120
Watertown, Massachusetts 02472

Re: Dicerna Pharmaceuticals, Inc.
Draft Registration Statement on Form S-1
Submitted November 8, 2013
CIK No. 0001399529

Dear Dr. Fambrough:

We have reviewed your draft registration statement and have the following comments. In some of our comments, we may ask you to provide us with information so we may better understand your disclosure.

Please respond to this letter by providing the requested information and either submitting an amended draft registration statement or publicly filing your registration statement on EDGAR. If you do not believe our comments apply to your facts and circumstances or do not believe an amendment is appropriate, please tell us why in your response.

After reviewing the information you provide in response to these comments and your amended draft registration statement or filed registration statement, we may have additional comments.

General

1. Please file all exhibits as soon as practicable. We may have further comments upon examination of these exhibits.

2. Please provide us proofs of all graphic, visual or photographic information you will provide in the printed prospectus prior to its use, for example in a preliminary prospectus. Please note that we may have comments regarding this material.

3. Please supplementally provide us with any written materials that you or anyone authorized to do so on your behalf provides in reliance on Section 5(d) of the Securities Act to potential investors that are qualified institutional buyers or institutional accredited investors. Similarly, please supplementally provide us with any research reports about

you that are published or distributed in reliance upon Section 2(a)(3) of the Securities Act of 1933 added by Section 105(a) of the Jumpstart Our Business Startups Act by any broker or dealer that is participating or will participate in your offering.

Prospectus Summary, page 1

4. Please revise your disclosure to define or explain the following terms or phrases:

   - "siRNA;"
   - "up-regulated;"
   - "optimal substrates;"
   - "transcription factors;"
   - "conjugation points" and
   - "preclinical knockdown of target mRNA"

5. Please revise your summary to briefly explain how having two conjugation points distinguishes your DsiRNAs from other therapeutic molecules and how such conjugation points enhance the "drug-like" properties of your molecules.

6. Please estimate the amount spent on research and development for the past 3 years ending in December 31, 2012 as required by Item 101(c)(1)(xi) of Regulation S-K.

Risks related to business, page 3

7. Please revise your risk factor summary to highlight risks relating to the unproven and novel nature of the technology underlying your therapeutic product candidates.

Risk Factors

"We face competition from entities that have developed or may develop product candidates…," page 16

8. Please include a separate risk factor which highlights the risks you face as a result of the non-exclusive nature of the patents you have licensed from the City of Hope and Integrated Data. In this regard, we note your disclosure that Arrowhead holds a non-exclusive license to the same patent rights and that Arrowhead is engaged in developing products which directly compete with your product candidates.

Any inability to attract and retain qualified key management, page 17

9. Please expand your discussion to identify any additional key employees and other specialized personnel, the loss of which could have a material adverse effect.

If we are not able to obtain and enforce patent protection, page 21

10. Please identify the extent to which any of your licensed or owned patents or patent applications may be impacted by the U.S. Supreme Court decision in Association for Molecular Pathology v. Myriad Genetics, Inc.

Statistical Data and Market Information, page 39

11. Please revise your disclosure with respect to estimates, projections and other statistical data to remove your statements that investors "are cautioned not to give undue weight to such estimates" and that you have not independently verified the accuracy or completeness of the data. It is not appropriate to directly or indirectly disclaim liability for information in the registration statement.

Use of Proceeds, page 40

12. Please amend your disclosure to include the estimated amount of proceeds you plan to allocate to each of the uses identified on page 40. Additionally, please expand your disclosure to identify the stage of development for each product candidate that you expect to reach using the allocated proceeds.

Dilution, page 44

13. Please revise the table to begin with your historical net tangible book value per share, instead of pro forma net tangible book value per share.

Business, page 67

14. We note that you have listed the advantages that DsiRNAs provides compared to other types of double-stranded RNAs used to induce RNAi. Please revise your disclosure to indicate how other RNAi-inducing molecules are typically delivered and discuss how the potency of other RNAi inducing molecules is impacted by their number of conjugation points.

Product Candidates, page 73

15. We note that your pipeline table indicates that you are researching undisclosed liver programs and an undisclosed oncology program. We also note corresponding references to undisclosed disorders, oncogenes, and targets throughout your registration statement.

Please revise your disclosure to identify and describe each of the "undisclosed" programs to the extent they are material to a discussion of your current development programs. Alternatively, please provide us with an analysis supporting your determination that these programs are not material to your company, and remove any reference to them from your disclosure.

Strategic Partnerships and Collaborations
Strategic Partnership with KHK, page 81

16. Please revise your disclosure to provide the following information with respect to the material terms of your collaboration agreement with KHK:

    - The percentage royalty payment that KHK is obligated to pay on net sales of products resulting from the collaboration; and
    - The duration of the agreement.

City of Hope License Agreement, page 82

17. Please revise your disclosure to provide the following information with respect to the material terms of your license agreement with COH:

    - the non-refundable license fee,
    - the number of shares issued,
    - the specific amount of aggregate potential milestone payments COH may be entitled to receive, and
    - the duration of the agreement.

Patents and Proprietary Rights, page 83

18. Please revise your disclosure to include the following information:

    - the type of patent protection (e.g., method, composition of matter) related to your RNAi technology and discovery technologies; and
    - the expiration date of the material patents related to your lipid delivery technology and the type of patent protection maintained.

In-licenses, page 84

19. Please revise your disclosure to provide the following information with respect to the terms of your license agreement with PBL:
    - the signature fee and nomination fee paid; and
    - the aggregate potential milestone payments.

20. Please revise your disclosure to provide the following information with respect to the terms of your license agreement with Carnegie:
    - the upfront fee;
    - the potential aggregate milestone payments, and
    - the royalty percentage to be paid on net sales.

U.S. government regulation, page 86

21. Please revise your disclosure to expand your discussion of the Breakthrough Therapy designation by the FDA. Specifically, please describe the requirements which must be met in order to obtain this designation and identify the benefits conveyed by such designation.

Management, page 95

22. Please revise your disclosure with respect to the business experience of your officers and directors over the past five years to include the following information, as applicable:
    - the period of time that Dr. Fambrough worked at Oxford Bioscience Partners
    - the period of time that Dr. Hoffman has worked at Skyline Ventures;
    - the period of time that Dr. Kolchinsky has worked at RA Capital;
    - the period of time that Dr. Langer has worked as a clinical professor; and
    - the period of time that Mr. Madden has worked at Narrow River Management, LP and at River Vision Development Corporation.

Executive and Director Compensation
Director Compensation, page 103

23. Please file your offer letters with Mr. Madden and Dr. Langer and your transition agreement with Dr. Jensen as exhibits to the registration statement pursuant to Item 601(b)(10)(iii)(A) of Regulation S-K.

Consulting Agreement, page 114

24. Please file your consulting agreement with Mr. Cordo as an exhibit to the registration statement pursuant to Item 601(b)(10)(iii)(A) of Regulation S-K.

Principal Stockholders, page 115

25. Please disclose the natural person or persons who exercise the voting and/or dispositive powers with respect to the shares beneficially owned by Abingworth Bioventures V, LP.

Shares Eligible for Future Sale, page 123

26. Once available please file copies of each of the lock-up agreements.

Financial Statements, page F-3

27. Please update the financial statements and financial information throughout the filing pursuant to Rule 8-08 of Regulation S-X.

15. Subsequent Event, page F-26

28. Confirm that no additional equity issuances such as options, warrants, preferred stock, common stock, etc. were made subsequent to the latest filing or provide additional disclosure in that regard.

Exhibit Index, Page II-7

29. Please file your license agreements with Plant Bioscience Limited and the Carnegie Institution of Washington as exhibits pursuant to Item 601(b)(10) of Regulation S-K or provide an analysis as to why such agreements are not required to be filed as exhibits to the registration statement.

30. We note your disclosure at page F-25 that you have entered into a contract research agreement with an independent corporation to provide laboratory services, materials, and research support. Please identify the independent corporation you are referring to and file your agreement with this entity as an exhibit to the registration statement. In the alternative, please provide an analysis as to why the agreement is not required to be filed as an exhibit to the registration statement.

General

If you intend to respond to these comments with an amended draft registration statement, please submit it and any associated correspondence in accordance with the guidance we provide in the Division's October 11, 2012 announcement on the SEC website at http://www.sec.gov/divisions/corpfin/cfannouncements/drsfilingprocedures101512.htm.

Please keep in mind that we may publicly post filing review correspondence in accordance with our December 1, 2011 policy (http://www.sec.gov/divisions/corpfin/cfannouncements/edgarcorrespondence.htm). If you intend to use Rule 83 (17 CFR 200.83) to request confidential treatment of information in the correspondence you submit on EDGAR, please properly mark that information in each of your confidential submissions to us so we do not repeat or refer to that information in our comment letters to you.

You may contact Keira Ino at (202) 551-3659 or Mary Mast at (202) 551-3613 if you have questions regarding comments on the financial statements and related matters. Please

contact Matthew Jones at (202) 551-3786, Bryan Pitko at (202) 551-3203 or me at (202) 551-3715 with any other questions.

Sincerely,

/s/ Bryan J. Pitko for

Jeffrey P. Riedler
Assistant Director

cc: Sam Zucker, Esq.
O'Melveny & Myers LLP
2765 Sand Hill Road
Menlo Park, California 94025