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

DIVISION OF
CORPORATION FINANCE

August 20, 2014

Via E-mail
Susan M. Molineaux, Ph.D.
President and Chief Executive Officer
Calithera Biosciences, Inc.
343 Oyster Point Blvd. Suite 200
San Francisco, California 94080

Re: Calithera Biosciences, Inc.
Draft Registration Statement on Form S-1
Submitted July 25, 2014
CIK No. 0001496671

Dear Ms. Molineaux:

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. 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.

2. 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.

3. Please be advised that we may have additional comments when items that are currently blank are completed.

4. We note that you have omitted a price range and related information from your prospectus. Since the price range triggers a number of disclosure matters, we will need sufficient time to process the amendment when it is included. Please understand that its effect on disclosure throughout the document may cause us to raise issues on areas upon which we have not previously commented.

5. We note that you have yet to file a number of exhibits. Please file these exhibits as soon as possible in order to give the staff adequate time to review them. Note that we may have comments after we review these materials.

6. Prior to the effectiveness of the registration statement, please arrange to have the Financial Industry Regulatory Authority call us or provide us with a letter indicating that they have cleared the filing.

7. Please expand your disclosure to indicate whether you or a third party has filed investigational new drug (IND) applications for the following product candidates:

    - CB-839 for the treatment of Solid Tumors (including Triple-negative Breast Cancer);
    - CB-839 for the treatment of Multiple Myeloma Non-Hodgkin's Lymphoma;
    - CB-839 for the treatment of Acute Lymphocytic Leukemia;
    - CB-839 for the treatment of Acute Myeloid Leukemia;
    - CB-839 for the combination treatment of Triple-negative Breast Cancer; and
    - CB-839 for the combination treatment of Multiple Myeloma.

    If INDs for these product candidates and corresponding indications have been filed, please additionally disclose the identity of the filers and the sates the applications were filed. Alternatively, where no IND has been filed, please explain why.

8. Page 6 indicates that a reverse stock split will occur prior to the closing of this offering. If the stock split will occur at or immediately before the effectiveness of your registration statement, we remind you that in accordance with SAB Topic 4C, you must revise your financial statements and your disclosures throughout the filing to give effect to the expected reverse stock split. If the reverse stock split will occur after effectiveness of your registration statement but prior to the consummation of this offering, please provide appropriate pro forma information throughout the filing.

Summary, page 1

Our Research and Development Program, page 2

Our Lead Program in Tumor Metabolism: CB-839, page 3

9. We note your disclosure on page 63 identifying the adverse events deemed possibly or probably related to CB-839. Please identify the adverse events that you have seen in your summary as well.

10. Please revise your disclosure to specify the input from regulatory authorities necessary prior to initiation of Phase 2 and Phase 3 clinical trials.

Risk Factors, page 9

We will need substantial funding. If we are unable to raise capital when …, page 10

11. Please expand the disclosure in this risk factor to include quantitative information such as: the amount of funds you have raised to date from all sources; the amount of funds currently available; and the period of time you expect to be able to operate without raising additional funds.

If serious adverse events or unexpected characteristics of our product…, page 14

12. Please expand this risk factor to identify the adverse events deemed possibly or probably related to CB-839.

Product liability lawsuits against us could cause us to incur substantial…, page 18

13. Please quantify the extent of the insurance coverage you discuss.

Use of Proceeds, page 38

14. Please provide disclosure as to the amount of the proceeds that you expect to devote to each of the clinical trials for CB-839. Please disclose whether you expect that the application of such proceeds to enable you to complete the trial. If not, please disclose what the application of these proceeds will allow you to accomplish as to each such partially funded trial.

Business, page 54

General

15. We note your disclosure that you currently rely on third parties to conduct your clinical trials and to conduct some aspects of your research and preclinical testing. Please discuss your

arrangements involving third parties. Please file any material third party agreements as exhibits.

Our Programs, page 60

Our Lead Program in Tumor Metabolism: CB-839, page 60

Phase 1 Trial Status, page 63

16. Please revise your disclosure to explain the scale for determining the severity of adverse events and, specifically, what Grade 1, Grade 2 and Grade 3, indicate about the severity of the event experienced.

17. Please revise your disclosure to indicate which clinical trial the Grade 1 adverse events deemed possibly or probably related to CB-839.

Intellectual Property, page 68

18. We note that you have 23 pending U.S. and foreign patent applications. Please expand your disclosure to indicate the foreign jurisdictions in which you have applications pending.

Financial Statements for the Year Ended December 31, 2013

Note 6. Stock Option Plan, page F-14

19. Please disclose the deemed fair value of the common stock underlying your stock options granted during the periods presented as well as your basis for determining such fair value. Address this comment as it relates to the options granted during the six months ended June 30, 2014. Please note that once you have disclosed the estimated IPO price range we may have comments regarding the estimated fair value of your most recent equity grants.

You may contact Jeffrey Gordon, Staff Accountant, at (202) 551-3866 or Jeanne Baker, Assistant Chief Accountant, at (202) 551-3691 if you have questions regarding comments on the financial statements and related matters. Please contact Asia Timmons-Pierce, Staff Attorney, at (202) 551-3754 or me at (202) 551-3397 with any other questions.

Sincerely,

/s/ Jay Ingram

Jay Ingram
Legal Branch Chief

cc: John T. McKenna (*via e-mail*)
Cooley LLP