



DIVISION OF
CORPORATION FINANCE

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

September 14, 2012

Via E-mail

Mr. Keith R. Leonard, Jr.
President and Chief Executive Officer
KYTHERA Biopharmaceuticals, Inc.
27200 West Agoura Road, Suite 200
Calabasas, CA 91301

**Re: KYTHERA Biopharmaceuticals, Inc.
Amendment No. 3 to Registration Statement on Form S-1
Filed August 31, 2012
File No. 333-181476**

Dear Mr. Leonard:

We have reviewed your amended registration statement and response letter filed August 31, 2012 and have the following comment. In our comment, we may ask you to provide us with information so we may better understand your disclosure.

Please respond to this letter by amending your registration statement and providing the requested information. If you do not believe our comment applies to your facts and circumstances or do not believe an amendment is appropriate, please tell us why in your response.

After reviewing any amendment to your registration statement and the information you provide in response to this comment, we may have additional comments.

Amendment No. 3 to Registration Statement on Form S-1/A

7. Commitments, Collaborations and Contingencies

Collaboration Arrangements

Bayer, page F-24

1. Please explain to us how you determined that the period of substantial involvement in collaboration activities ended on June 30, 2012 when you appear to be continuing to develop under the agreement pursuant to your statement that you received approximately \$17,400,000 to fund collaboration efforts related to the continued development of ATX-101 under the terms of the collaboration agreement.

We urge all persons who are responsible for the accuracy and adequacy of the disclosure in the filing to be certain that the filing includes the information the Securities Act of 1933 and all applicable Securities Act rules require. Since the company and its management are in

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possession of all facts relating to a company's disclosure, they are responsible for the accuracy and adequacy of the disclosures they have made.

Notwithstanding our comment, in the event you request acceleration of the effective date of the pending registration statement please provide a written statement from the company acknowledging that:

- should the Commission or the staff, acting pursuant to delegated authority, declare the filing effective, it does not foreclose the Commission from taking any action with respect to the filing;
- the action of the Commission or the staff, acting pursuant to delegated authority, in declaring the filing effective, does not relieve the company from its full responsibility for the adequacy and accuracy of the disclosure in the filing; and
- the company may not assert staff comments and the declaration of effectiveness as a defense in any proceeding initiated by the Commission or any person under the federal securities laws of the United States.

Please refer to Rules 460 and 461 regarding requests for acceleration. We will consider a written request for acceleration of the effective date of the registration statement as confirmation of the fact that those requesting acceleration are aware of their respective responsibilities under the Securities Act of 1933 and the Securities Exchange Act of 1934 as they relate to the proposed public offering of the securities specified in the above registration statement. Please allow adequate time for us to review any amendment prior to the requested effective date of the registration statement.

You may contact Vanessa Robertson at (202) 551-3649 or Joel Parker at (202) 551-3651 if you have questions regarding comments on the financial statements and related matters. Please contact Rose Zukin at (202) 551-3239, Daniel Greenspan at (202) 551-3623, or me at (202) 551-3710 with any other questions.

Sincerely,

/s/ Daniel Greenspan for

Jeffrey P. Riedler
Assistant Director

cc: Brian Cuneo, Esq.
Latham & Watkins LLP
140 Scott Drive
Menlo Park, CA 94025