



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

DIVISION OF
CORPORATION FINANCE

Mail Stop 4720

April 12, 2016

Via E-mail

Walter Klemp
Chief Executive Officer
Moleculin Biotech, Inc.
2575 West Bellfort, Suite 333
Houston, Texas 77054

**Re: Moleculin Biotech, Inc.
Amendment No. 2 to Registration Statement on Form S-1
Filed March 22, 2016
File No. 333-209323**

Dear Mr. Klemp:

We have reviewed your amended 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 amending your registration statement and providing the requested information. 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 any amendment to your registration statement and the information you provide in response to these comments, we may have additional comments. Unless we note otherwise, our references to prior comments are to comments in our March 4, 2016 letter.

Risk Factors

Risks Relating to our Business

“We have completed and will in the future complete related party transactions that were not and will not be conducted on an arm’s length basis,” page 12

1. Please clarify your response to prior comment 2 to state whether the related party transactions you did not conduct on an arm’s length basis resulted in terms that are similar to a third party agreement. If the terms were more favorable to you than they would have been with a third party, tell us how you accounted for the more favorable terms.

Business, page 42

2. We note your response to prior comment 9 and the associated revised disclosure in the prospectus. On page 42 in the section “Business – Corporate History,” please make the following revisions and any necessary conforming revisions throughout the prospectus:
 - When you refer to Dr. Shepard and the data reported in the Callisto-sponsored research trials, please reiterate here that Dr. Shepard is also currently your Chief Medical Officer;
 - Please remove from your discussion the conclusion reported at the 2009 ASCO presentation that “Nanomolecular Liposomal Annamycin was effective even in refractory ALL,” as this statement does not appear in the journal article reporting the results of the trial and was not subject to peer review, unlike the article. Moreover, the use of the term “effective” in this instance does not appear consistent with the concept of efficacy as applied by the FDA and may confuse investors;
 - If you retain the discussion regarding the observed efficacy signal and the definition of efficacy as used in the Phase I/II ALL study, please define the term “efficacy signal” as used in the journal article and make clear that neither the patient responses observed nor the criteria underlying an “efficacy signal” would satisfy the FDA’s standards for proof of efficacy; and
 - Disclose that the study’s conclusion, as reported in the journal article, was only that Annamycin had “encouraging anti-leukemic activity.”

Moleculin, LLC
Statements of Operations, page F-13

3. Please tell us why your research and development expenses decreased from \$270,991 at September 30, 2015 to \$125,442 at December 31, 2015.

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.

Walter Klemp
Moleculin Biotech, Inc.
April 12, 2016
Page 3

You may contact Keira Nakada at (202) 551-3659 or Lisa Vanjoske at (202) 551-3614 if you have questions regarding comments on the financial statements and related matters. Please contact Scot Foley at (202) 551-3383, Daniel Greenspan at (202) 551-3623 or me at (202) 551-3675 with any other questions.

Sincerely,

/s/ Daniel Greenspan for

Suzanne Hayes
Assistant Director
Office of Healthcare and Insurance

cc: Cavas S. Pavri
Schiff Hardin LLP