

Mail Stop 6010

December 22, 2006

David S. Barlow, Chairman  
Molecular Insight Pharmaceuticals, Inc.  
160 Second Street  
Cambridge, Massachusetts 02142

**Re: Molecular Insight Pharmaceuticals, Inc.  
Amendment No. 2 to Form S-1 Registration Statement  
File No. 333-129570**

Dear Mr. Barlow:

We have reviewed your filing and have the following comments. Where indicated, we think you should revise your document in response to these comments. If you disagree, we will consider your explanation as to why our comment is inapplicable or a revision is unnecessary. Please be as detailed as necessary in your explanation. In some of our comments, we may ask you to provide us with supplemental information so we may better understand your disclosure. After reviewing this information, we may or may not raise additional comments.

Please understand that the purpose of our review process is to assist you in your compliance with the applicable disclosure requirements and to enhance the overall disclosure in your filing. We look forward to working with you in these respects. We welcome any questions you may have about our comments or on any other aspect of our review. Feel free to call us at the telephone numbers listed at the end of this letter.

Comments applicable to the entire document

1. Please refer to comment 4 in our initial comment letter dated December 14, 2005 regarding the use of technical jargon in your filing. Although the jargon was deleted or explanations of the jargon provided in your first amendment, the disclosure in this amendment has been revised so that it again includes technical jargon we objected to. Accordingly, we are hereby reissuing that comment. Please revise the disclosure as previously requested.

Use of Proceeds – page 27

2. We note the revisions you made in response to comment 2 in our last letter. However, the revised disclosure in the first two bullets still does not discuss how far you anticipate the proceeds will get you in your progress towards commercialization. If you anticipate needing additional funds for these purposes, please also disclose the source and amounts of additional funding you anticipate using.

Management's Discussion and Analysis – page 33

Strategic Agreements – page 45

3. We note that the disclosure in this section still does not include the aggregate amount of the milestone payments you may be required to make under your agreements. As we indicated previously, this information is material to investors and we are not willing to grant confidential treatment for it. Please revise the disclosure here, as well as in the business section, accordingly.

Stock-Based Compensation – page 35

4. We note the disclosure states "Since September 2006, we have enjoyed notable successes...". In order to explain changes in the fair value of your common stock, revise the disclosure here to indicate the dates of those significant events that caused the change in fair value of the common stock since September 30, 2006 and briefly describe the event that caused the change in fair value.

Research and Development Expenses – page 37

5. Please expand your research and development disclosure for the products in development by referring to the Division of Corporation Finance "Current Issues and Rulemaking Projects Quarterly Update" under section VIII – Industry Specific Issues – Accounting and Disclosure by Companies Engaged in Research and Development Activities. You can find it at the following website address:  
<http://www.sec.gov/divisions/corpfin/cfcrq032001.htm#secviii>.

Please disclose the following information for each of your major research and development projects:

- a. The costs incurred during each period presented and to date on the project;

- b. The nature, timing and estimated costs of the efforts necessary to complete the project;
- c. The anticipated completion dates;
- d. The risks and uncertainties associated with completing development on schedule, and the consequences to operations, financial position and liquidity if the project is not completed timely.

Regarding a., if you do not maintain research and development costs by project, disclose that fact and explain why management does not maintain and evaluate research and development costs by project. Provide other quantitative or qualitative disclosure that indicates the amount of the company's resources being used on the project.

Regarding b. and c., disclose the amount or range of estimated costs and timing to complete the phase in process and each future phase. To the extent that information is not estimable, disclose those facts and circumstances indicating the uncertainties that preclude you from making a reasonable estimate.

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As appropriate, please amend your registration statement in response to these comments. You may wish to provide us with marked copies of the amendment to expedite our review. Please furnish a cover letter with your amendment that keys your responses to our comments and provides any requested supplemental information. Detailed cover letters greatly facilitate our review. We may have additional comments after reviewing your amendment and responses to our comments.

David S. Barlow  
Molecular Insight Pharmaceuticals, Inc.  
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You may contact Lisa Vanjoske at 202-551-3614 if you have questions regarding comments on the financial statements and related matters. Please contact Mary Fraser at 202-551-3609 or me at 202-551-3710 with any other questions.

Regards,

Jeffrey P. Riedler  
Assistant Director

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