

April 6, 2015

CONFIDENTIAL

VIA FEDEX

United States Securities and
Exchange Commission
Washington, D.C. 20459
Attention: Jeffrey P. Riedler
Assistant Director

**Re: aTyr Pharma, Inc.
Amendment No. 1 to Draft Registration Statement on Form S-1
Submitted February 2, 2015
CIK No. 0001339970**

Ladies and Gentlemen:

This letter is submitted on behalf of aTyr Pharma, Inc. (the “**Company**”) in response to comments contained in the letter dated February 18, 2015 (the “**Letter**”) from Jeffrey P. Riedler, Assistant Director of the Staff (the “**Staff**”) of the Securities and Exchange Commission (the “**Commission**”) to John D. Mendlein, Ph.D., Chief Executive Officer and Executive Chairman of the Company, with respect to the Company’s confidential submission of Amendment No. 1 to Draft Registration Statement on Form S-1 (the “**Draft Registration Statement**”) that was submitted on February 2, 2015. The Company is concurrently submitting a revised version of the Registration Statement (the “**Revised Registration Statement**”), including changes in response to the Staff’s comments.

The responses set forth below have been organized in the same manner in which the Commission’s comments were organized and all page references in the Company’s response are to the Revised Registration Statement as marked. Copies of this letter and its attachments will also be provided to Matthew Jones, Bryan Pitko and Mark Brunhofer of the Commission.

Prospectus Summary, page 1

1. *We note on page 95 that you believe data from your Fc fusion experiments may produce data that will provide iModFc molecules for you to explore. We also note on page 96 that*

you are continuing to investigate potential therapeutic Physiocrines that may have the potential to inhibit inflammation in both the lung and the liver. As you do not have a drug candidate for your programs identified by the arrows labeled "iModFc non-RMIC," "Liver," or "Lung." Please eliminate these programs from the pipeline table on pages 2 and 80.

RESPONSE: The Company acknowledges the Staff's comment and has removed the programs with respect to "Liver" and "Lung" from the pipeline table on pages 2 and 83 of the Revised Registration Statement. While the Company has not yet selected a drug candidate for its iMod.Fc program, the Company has included additional disclosure on pages 5 and 100 of the Revised Registration Statement describing the results of preclinical studies with respect to one iMod.Fc molecule. Additionally, the Company has revised the pipeline table to provide additional detail with respect to the expected timing of the anticipated next milestones for certain of the programs and has added a separate diagram immediately below relating to the discovery engine process.

If you require additional information, please telephone the undersigned at (415) 733-6071 or Mitzi Chang at (415) 733-6017.

Very truly yours,

/s/ Maggie Wong

Maggie Wong

cc: John D. Mendlein (*aTyr Pharma, Inc.*)
Frederic Chereau (*aTyr Pharma, Inc.*)
Nancy D. Krueger (*aTyr Pharma, Inc.*)
Kingsley L. Taft (*Goodwin Procter LLP*)
Alan F. Denenberg (*Davis Polk & Wardwell LLP*)