

December 15, 2017

VIA EDGAR

Securities and Exchange Commission
Division of Corporation Finance
100 F Street, N.E. Washington, D.C. 20549
Attention: Office of Manufacturing and Construction

**Re: Yield10 Bioscience, Inc.
Amended Registration Statement on Form S-1
Filed December 12, 2017
File No. 333-221283**

Ladies and Gentlemen:

We are submitting this letter on behalf of Yield10 Bioscience, Inc. (the “**Company**”) in response to comments from the staff (the “**Staff**”) of the Securities and Exchange Commission (the “**Commission**”) received during a telephone call on December 14, 2017 (the “**Comment Letter**”) between Pamela Long, Esq., of the Division of Corporation Finance, Office of Manufacturing and Construction, to Megan Gates of this office, relating to the above-referenced amended Registration Statement on Form S-1. In conjunction with this letter, the Company is filing a third amended Registration Statement on Form S-1 (the “**Third Amended Form S-1**”).

For convenient reference, we have summarized the Staff’s comments as described during our discussion on December 14 together with the Company’s corresponding response.

Comment:

Underwriting, page 54

Over-allotment Option, page 56

1. *Comment:* State specifically in the Underwriting section how much the Underwriters would pay the Company for each warrant that they choose to purchase as part of an exercise of the over-allotment option.

Response: We have revised the disclosure on page 59 of the Third Amended Form S-1 in response to this comment.

Mintz, Levin, Cohn, Ferris, Glovsky and Popeo, P.C.

BOSTON | LONDON | LOS ANGELES | NEW YORK | SAN DIEGO | SAN FRANCISCO | STAMFORD | WASHINGTON

2. *Comment:* Revise the parenthetical phrase contained in the paragraph entitled “Over-allotment Option” to clarify what the parenthetical phrase refers to.

Response: We have revised the disclosure on page 59 of the Third Amended Form S-1 in response to this comment.

3. *Comment:* Revise the paragraph entitled “Stabilization, Short Positions and Penalty Bids” to make it explicit that the open market purchases described in that paragraph would be of the common stock, and not the warrants, which would be obtained directly from the Company.

Response: We have revised the disclosure on page 60 of the Third Amended Form S-1 in response to this comment.

4. *Comment:* Make corresponding changes to any other sections of the document where these same concepts are implicated.

Response: We have revised the disclosure on the cover page of the prospectus, and on pages 9 and 58 of the Third Amended Form S-1 in response to this comment.

We hope that the above responses will be acceptable to the Staff. Please do not hesitate to call me at (617) 542-6000 with any comments or questions regarding the Third Amended Form S-1 and this letter. We thank you for your time and attention.

Sincerely,

/s/ Megan N. Gates

Megan N. Gates

cc:

Securities and Exchange Commission

Pamela Long

Yield10 Bioscience, Inc.

Dr. Oliver P. Peoples, CEO