

December 8, 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 November 22, 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 by letter dated December 6, 2017 (the “**Comment Letter**”) from the Division of Corporation Finance, Office of Manufacturing and Construction, to Dr. Oliver P. Peoples, President & Chief Executive Officer of the Company, relating to the above-referenced amended Registration Statement on Form S-1. In conjunction with this letter, the Company is filing a second amended Registration Statement on Form S-1 (the “**Second Amended Form S-1**”).

For convenient reference, we have set forth below in italics the Staff’s comments set forth in the Comment Letter with the Company’s corresponding response.

Comment:

Underwriting, page 54

Over-allotment Option, page 56

We note your response to comment 1 in our letter dated November 16, 2017. Please reconcile your response that the underwriters may use their over-allotment option to engage in stabilization of the price of Yield10 Bioscience’s common stock with your disclosure on the cover page and page 56 of the prospectus that the underwriters may exercise their over-allotment option “solely” to cover over-allotments. In this regard, we also note that your disclosure under the section “Stabilization, Short Positions and Penalty Bids” on page 57 does not refer to the over-allotment option being utilized for stabilization. Please also revise your prospectus to specify whether the underwriters would still engage in stabilization of the price of Yield10 Bioscience’s common stock in the event that the available securities under the over-allotment

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

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option must be used to cover over-subscriptions and, if so, how would such purchases of common stock for stabilization be priced.

Response: As discussed with Frank Pigott of the Staff on December 7, the response to comment 1 in our letter dated November 22, 2017 did not characterize the intentions of the underwriters with regard to the exercise of the over-allotment option with sufficient precision. Accordingly, we have revised the disclosure in the prospectus on pages 70-71 to respond to the original comment 1 in the Staff's letter dated November 16, 2017.

We hope that the above response will be acceptable to the Staff. Please do not hesitate to call me at (617) 542-6000 with any comments or questions regarding the Second 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