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February 18, 2021

VIA EDGAR

U.S. Securities and Exchange Commission
Division of Corporation Finance
100 F Street, NE
Washington, D.C. 20549

Re: Unicycive Therapeutics, Inc.
Draft Registration Statement on Form S-1
Submitted on November 2, 2020
CIK No. 0001766140

Ladies and Gentlemen:

This letter sets forth the responses of Unicycive Therapeutics, Inc., a Delaware corporation (the "**Company**"), to the comments received from the Staff (the "**Staff**") of the U.S. Securities and Exchange Commission (the "**Commission**") concerning its Draft Registration Statement on Form S-1 (CIK No. 0001766140) submitted to the Commission on November 2, 2020 (the "**Registration Statement**").

References in the text of the responses herein to captions and page numbers refer to Amendment No. 2 to the Company's Draft Registration Statement on Form S-1 (the "**Amended Draft Registration Statement**"), which is being filed herewith.

Amendment No. 1 to Draft Registration Statement on Form S-1 submitted November 2, 2020

PROSPECTUS SUMMARY
Overview, page 1

QUESTION 1: We note your response to prior comment 1 and that UNI 494 was initially developed by Sphaera Pharmaceuticals. Please revise the business section to clearly disclose the discovery/preclinical work conducted by Sphaera Pharmaceuticals.

RESPONSE: The Company has revised its disclosure to detail the discovery/preclinical work conducted by Sphaera Pharmaceuticals. Please see page 1 of the Amended Draft Registration Statement.

Business
Background on Renazorb, page 52

QUESTION 2: We note your response to prior comment 2 and your revised disclosure here and throughout the registration statement that your candidate has "the potential to be effective." Please revise the prospectus to remove any statements that suggest the efficacy of your candidate, as these determinations are the exclusive authority of the FDA or other regulators.

RESPONSE: The Company has removed the use of the phrase "potential to be effective" and similar phrases throughout the Amended Draft Registration Statement.

Clinical Trial Experience, page 53

QUESTION 3: We note your response to prior comment 8 and reissue. For the clinical trial discussed in this section, please disclose the phase; the date(s) of the trial and the location; duration of treatment and dosage information (both amount and frequency); the specific endpoints established by the trial protocol; and actual results observed, including whether statistical significance was demonstrated and the p-values supporting statistical significance.

RESPONSE: The Company has revised its disclosure to detail the information requested. Please see page 53 of the Amended Draft Registration Statement.

General

QUESTION 4: We note your response to prior comment 14. The pipeline table on page 49 and on your website indicates that Renazorb has completed Phase 3 clinical trials. However, we note your disclosure on page 1 that "Spectrum conducted a Phase 1 clinical trial with Renazorb in 2012 prior to the grant of [your] license in 2018." To the extent that you have completed Phase 2 and 3 clinical trials, please include disclosure that complies with comment 3 above. Otherwise, revise the pipeline table on page 49 and on your website to illustrate the product candidate's current status.

RESPONSE: The Company has revised its disclosure in the Amended Draft Registration Statement to clarify the current status of Renazorb regarding clinical trial phases.

If you have any questions relating to any of the foregoing, please contact Jeffrey Fessler of Sheppard, Mullin, Richter & Hampton LLP at (212) 653-8700.

Very truly yours,

/s/ Jeffrey Fessler
Jeffrey Fessler
Sheppard, Mullin, Richter & Hampton LLP