UNITED STATES
SECURITIES AND EXCHANGE COMMISSION
WASHINGTON, D.C. 20549

DIVISION OF
CORPORATION FINANCE

April 22, 2021

Markus Renschler, M.D.
President and Chief Executive Officer
Cyteir Therapeutics, Inc.
128 Spring St, Building A, Suite 510
Lexington, MA 02421

**Re: Cyteir Therapeutics, Inc.**
**Draft Registration Statement on Form S-1**
**Submitted March 26, 2021**
**CIK No. 0001662244**

Dear Dr. Renschler:

We have reviewed your draft registration statement and have the following comments. In some of our comments, we may ask you to provide us with information so we may better understand your disclosure.

Please respond to this letter by providing the requested information and either submitting an amended draft registration statement or publicly filing your registration statement on EDGAR. If you do not believe our comments apply to your facts and circumstances or do not believe an amendment is appropriate, please tell us why in your response.

After reviewing the information you provide in response to these comments and your amended draft registration statement or filed registration statement, we may have additional comments.

Draft Registration Statement on Form S-1 Submitted March 26, 2021

Prospectus Summary, page 1

1. We note your statements throughout your filing that you believe CYT-0851 potentially may be a "first-in-class" oral small molecule inhibitor of RAD51-mediated HR. Since these statements could be interpreted as implying an expectation of regulatory approval, and given the stage of development, and your acknowledgement that obtaining FDA approval is inherently uncertain, these statements would appear to be premature. Please revise these statements as appropriate.

2. Please revise your intention to "rapidly" advance CYT-0851 through clinical development and regulatory approval. Given the length of time it takes to conduct clinical trials and the frequency with which clinical trials fail to meet trial endpoints, any indications that you will be able to perform them rapidly appears premature.

3. We note the statement that your product candidate demonstrated a "tolerable safety profile." Since findings of safety or efficacy are solely within the authority of the FDA or similar foreign regulators, please revise to remove any statements that suggest the safety and efficacy of your candidates. Where you deem appropriate, you may present objective data without including your conclusions related to safety or efficacy.

4. Please include brief disclosure regarding the current status of your intellectual property rights in your prospectus summary. Please include in that summary whether you have composition of matter protection on CYT-0851 and disclose, if true, that you do not currently have any patent protections on CYT-1853.

Our pipeline, page 3

5. Please revise your product pipeline table here and in the Business section as follows:
   - replace the term "Pivotal" with "Phase 3." If "Pivotal" is intended to mean something other than Phase 3, please provide disclosure to clarify; and
   - with respect to CYT-1853, include separate columns for the Phase 1 and Phase 2 trials or tell us the basis for your belief that you will be able to conduct Phase 1/2 trials for this product candidate. In this regard, we note your disclosure that you plan to file an IND for this product candidate in 2022.

Our programs, page 3

6. We note the disclosure that your analysis was based on ten patients that were considered response-evaluable, and that you observed preliminary evidence of clinical benefit with four patients achieving stable disease, and two patients with diffuse large B-cell lymphoma and soft tissue sarcoma achieving a partial response. Please disclose in your prospectus summary the observed results for all ten patients and disclose if this analysis was found to be statistically significant (including, if so, a p-value).

7. Without making conclusions regarding safety or efficacy, please define the term "therapeutic index" when first used so that an investor not familiar with this term may understand its meaning.

Use of Proceeds, page 61

8. Please revise to provide an estimate of how far in the clinical development process for CYT-0851 and CYT-1853 the allocated proceeds of the offering will enable you to reach. If any material amounts of other funds are necessary to complete your clinical trials for these candidates, please revise your disclosure to state the amounts and the sources of such other funds. Refer to Instruction 3 of Item 504 of Regulation S-K.

Management's discussion and analysis of financial condition and results of operations
Critical accounting policies and estimates
Stock-Based compensation, page 78

9. We note that you utilized a valuation expert to determine your enterprise value. Please tell us the nature and extent of the valuation expert's involvement and whether you believe the valuation expert was acting as an expert as defined under Section 11(a) of the Securities Act of 1933 and Section 436(b) of Regulation C, such that you must disclose the name of the valuation expert in the Form S-1 along with a consent from the valuation expert once the Form S-1 is publicly filed. If you conclude the valuation expert is not considered an expert under the Securities Act, please revise your filing to clarify. Disclose the valuation methodologies used and nature of material assumptions used within those methodologies.

Business
Intellectual property, page 111

10. Please revise your intellectual property disclosure to clearly describe on an individual basis the type of patent protection granted for each technology, the expiration of each patent held, and the jurisdiction, including any foreign jurisdiction, of each pending or issued patent. In this regard, it may be useful to provide this disclosure in tabular form to support the narrative already included.

Principal stockholders, page 151

11. We note your disclosure in footnotes 2, 5 and 7. Please ensure that you have identified the natural persons who have or share beneficial ownership of the securities held by each of the entities listed in your table.

General

12. Please supplementally provide us with copies of all written communications, as defined in Rule 405 under the Securities Act, that you, or anyone authorized to do so on your behalf, present to potential investors in reliance on Section 5(d) of the Securities Act, whether or not they retain copies of the communications.

13. Please revise your pipeline table and other graphics throughout your filing to ensure that the text in all graphics, including footnotes, is legible. By way of example, we refer to the graphics on page 95.

You may contact Tracey Houser at 202-551-3736 or Mary Mast at 202-551-3613 if you have questions regarding comments on the financial statements and related matters. Please contact Kasey Robinson at 202-551-5880 or Tim Buchmiller at 202-551-3635 with any other questions.

Sincerely,

Division of Corporation Finance
Office of Life Sciences

cc: Marc Rubenstein, Esq.