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July 26, 2024

VIA EDGAR AND SECURE FILE TRANSFER

U.S. Securities and Exchange Commission
Division of Corporation Finance, Office of Life Sciences
100 F Street, N.E. Washington, D.C. 20549
Attention: Lauren Sprague Hammill
Re: CAMP4 Therapeutics Corporation
Draft Registration Statement on Form S-1
Submitted June 14, 2024
CIK No. 0001736730

Ladies and Gentlemen:

On behalf of CAMP4 Therapeutics Corporation (the "Company"), we hereby confidentially submit to the U.S. Securities and Exchange Commission (the "Commission"), via EDGAR, Amendment No. 1 ("Amendment No. 1") to the above-referenced draft registration statement (the "Draft Registration Statement"). Amendment No. 1 reflects revisions to the Draft Registration Statement made in response to the comment letter from the staff of the Division of Corporation Finance (the "Staff") of the Commission dated July 14, 2024 regarding the Draft Registration Statement, as well as certain other updated information. Marked copies showing changes from the Draft Registration Statement confidentially submitted on June 14, 2024 are being furnished supplementally for the convenience of the Staff.

In addition, we are providing the following responses to the Staff's comments. To assist your review, we have presented the text of the Staff's comments in italics below and the Company's responses are numbered to correspond to the numbered comments from the Staff's letter. The responses and information described below are based upon information provided to us by the Company and all terms used but not defined herein have the meanings assigned to such terms in Amendment No. 1.

Draft Registration Statement on Form S-1 submitted June 14, 2024
Overview, page 1

1. *We refer to your July 20, 2022 press release concerning your Series B financing. We note that your press release indicates that your lead product candidate was designed to treat Dravet syndrome and that you expected to commence clinical trials for this program by mid-2023. We also note that your prospectus disclosure does not mention this program or indicate whether it was one of the legacy programs that you out-licensed in July 2023. Given that this program was recently your lead candidate and given that it appears that your RAP platform was used to develop this candidate, please revise the prospectus (e.g., Summary, Risk Factor, MD&A and Business sections) to address your experience with this program.*

Response to Comment 1:

The Company acknowledges the Staff's comment and respectfully advises the Staff that its previous program for the development of a product candidate designed to treat Dravet syndrome was not developed using the Company's RAP Platform, but rather was in-licensed from OPKO Health in July 2021. The Company evaluated this product candidate in certain preclinical studies, although it was never advanced into clinical development, and the Company ultimately made the decision to cease research and development activities related to the program in the second quarter of 2023. The Company has spent more than three years focusing on developing and enhancing its RAP Platform and product candidates designed using the RAP Platform discussed in the Draft Registration Statement, and respectfully advises the Staff that it does not believe that a discussion of the Dravet syndrome product candidate or the Company's history with the related development program is material to investors' understanding of its business or operations.

2. *With reference to your risk factor disclosures on pages 15, 21 and 25, please revise the opening paragraph to provide balance and context to the first sentence as well as to the subsequent performance claims concerning your RAP platform in the same paragraph and on pages 2-3. In particular, it should be clear that you are in the early stages of development, that you do not have clinical data to support your beliefs and that your approach is unproven and may not lead to successful efforts to identify, discover and develop potential product candidates.*

Response to Comment 2:

In response to the Staff's comment, the Company has revised its disclosure on pages 1-2, 15 and 108 of Amendment No. 1 to provide balance and context, including disclosure that the Company is in the early stages of development and that its approach is unproven and may not lead to successful efforts to identify, discover and develop potential product candidates. These disclosures are supplemented by the Company's statements that no data from its Phase 1 clinical trial of CMP-CPS-001 in healthy volunteers has yet been reported, as the trial is ongoing, and the clear designations as "preclinical" of the Company's other programs for the treatment of heterozygous familial hypercholesterolemia ("FH") and SYNGAP1-related disorders.

3. *You state on pages 1, 4, and throughout the Business section that your lead candidate CMP-CPS-001 has the potential to be the "first disease-modifying therapy" to market for the treatment of the most prevalent UCDs. Please provide context and balance to the statement by clarifying that your belief is based on preclinical studies.*

Response to Comment 3:

In response to the Staff's comment, the Company has added disclosure on pages 1, 4, 108 and throughout the Overview and Business sections of Amendment No. 1 to clarify that its belief that CMP-CPS-001 has the potential to be the first disease-modifying therapy for the treatment of the most prevalent urea cycle disorders ("UCDs") is based on its preclinical studies.

4. *Please revise to explain briefly the term "upregulate."*

Response to Comment 4:

In response to the Staff's comment, the Company has briefly explained the term "upregulate" on pages 1 and 108 of Amendment No. 1.

Our RAP platform, page 2

5. *As safety and efficacy determinations are solely within the authority of the FDA and comparable foreign regulators and are continually assessed through all phases of clinical trials, please remove or revise any statements that state or imply that your product candidates are safe or effective. By way of example only, we note the statements on pages 2 and 107 regarding your proprietary technology enabling you to design RNA Actuators that "optimize for specificity and safety."*

Response to Comment 5:

In response to the Staff's comment, the Company has revised the language on pages 3, 109 and throughout Amendment No. 1 to remove references to optimization for safety.

6. *With reference to your risk factor disclosure on page 27, please revise to disclose that regulatory authorities to date have not approved any ASOs that are directed towards regulatory RNAs and the resulting uncertainty as to the safety profile of your product candidates.*

Response to Comment 6:

In response to the Staff's comment, the Company has revised the disclosure on pages 3, 27 and 109-110 to disclose that regulatory authorities to date have not approved any ASOs that are directed towards regulatory RNAs and that, as a result, there is uncertainty as to the safety profile of the Company's product candidates.

Our Pipeline, page 3

7. *You state that you are advancing a pipeline of programs initially focused on metabolic and CNS disorders with validated disease biology, significant unmet needs and large potential market opportunities. In light of your disclosures on page 29 and elsewhere regarding the "small number of patients" who have the rare diseases on which you are initially focused, please clarify what you mean by "large potential market opportunities."*

Response to Comment 7:

In response to the Staff's comment, the Company has revised the language on pages 3-4, 110 and 118 of Amendment No. 1 to clarify that the indications it is targeting have validated disease biology and attractive potential market opportunities due to the significant unmet need of affected patients.

CMP-CPS-001: Potential treatment for urea cycle disorders, page 4

8. *You state that you have designed CMP-CPS-001 to overcome the limitations of other programs in development for the treatment of late onset UCDs by "targeting more than 85% of patients with UCD." Please revise to describe the relevant patient subpopulation(s) you are targeting. In this regard, we note your disclosure on page 123 that assuming the successful completion of your ongoing Phase 1 clinical trial in health adult volunteers, you anticipate conducting a Phase 2/3 clinical trial to enroll patients, two years of age or older, who have been diagnosed with OTC deficiency. As applicable, please revise, where appropriate, to discuss risks or challenges associated with pediatric trials.*

Response to Comment 8:

In response to the Staff's comment, the Company has revised its disclosure on page 4 and 111 of Amendment No. 1 to clarify that it believes CMP-CPS-001 has the potential to address more than 85% of patients with late-onset UCDs, and is initially targeting development of CMP-CPS-001 in the most prevalent late-onset UCD patients (those with OTC, ASL and ASS1 deficiencies, which together constitute more than 80% of patients with UCDs). In addition, the Company has revised its disclosure on pages 23-24 and 26 of Amendment No. 1 to discuss the risks and challenges associated with pediatric trials.

9. *With reference to the risk disclosure on page 25, please provide balance to your page 4 discussion of the NHP studies by disclosing that ureagenesis is not an established clinical endpoint, and that this is one reason why these results should not be interpreted as evidence of efficacy.*

Response to Comment 9:

In response to the Staff's comment, the Company has revised its disclosure on pages 5, 25-26, and 111-112 of Amendment No. 1 to disclose that ureagenesis is not an established clinical endpoint, and that this is one reason why these results should not be interpreted as evidence of efficacy.

CMP-FH: Program for the treatment for heterozygous familial hypercholesterolemia, page 5

10. *We note your disclosure that you expect to initiate final GLP toxicology studies to enable the filing of a clinical trial application for your CMP-FH program. Please revise to disclose the jurisdiction(s) where you plan to file such application(s) or clarify that such determinations remain pending. Make similar revisions in the sections throughout the prospectus discussing your CMP-SYNGAP program.*

Response to Comment 10:

The Company acknowledges the Staff's comment and respectfully advises the Staff that the Company has not yet made any final determinations with respect to the geographic jurisdictions in which it anticipates filing a clinical trial application for either its CMP-FH program or its CMP-SYNGAP program. The Company does not currently anticipate that it will have determined the geographic jurisdictions for the filing of its clinical trial applications in these programs in advance of completing its initial public offering but, if such determinations are made before the offering is complete, the Company undertakes to add the disclosure in its Registration Statement on Form S-1.

11. *You disclose that Heterozygous FH is a common genetic disorder affecting over 3 million patients in the United States and Europe, in the aggregate. To the extent that this genetic disorder is materially less prevalent in other large geographic markets that you might target, please briefly discuss.*

Response to Comment 11:

The Company acknowledges the Staff's comment and respectfully advises the Staff that it does not currently intend to target the development of its CMP-FH program in any large geographic markets in which the prevalence of heterozygous FH is materially less prevalent than in the United States and Europe.

Risk Factors
We currently depend on third-party suppliers for the manufacture of our product candidates., page 45

12. *We note your disclosure that you rely on third-party suppliers for the manufacture of your product candidates, and that "certain" Chinese biotechnology companies and CMOs supply you with product candidate components.*

- *Please tell us whether any Chinese companies you do business with have been named as "companies of concern" in the amended version of the U.S. House of Representatives' draft of the BIOSECURE Act approved on May 15, 2024, or are a subsidiary or affiliate of a named company of concern.*

- *Revise your disclosure to include an updated discussion of the pending BIOSECURE legislation that would result in trade restrictions, sanctions, or other regulatory requirements by the U.S. government, which could restrict or even prohibit your ability to work with your contractual counterparties.*

- *To the extent you are unable to replace any supply or contract manufacturing agreement(s) with any Chinese counterparty, please consider whether you are substantially dependent on such agreement(s) and whether such agreement(s) are required to be filed pursuant to Item 601(b)(10)(ii)(B) of Regulation S-K.*

Response to Comment 12:

In response to the Staff's comment, the Company has revised its disclosure on page 46 of Amendment No. 1 to identify the Chinese company with which it conducts business that has been named as a "company of concern" (or is a subsidiary or affiliate of a company of concern) in the pending BIOSECURE Act legislation and to include an updated discussion of the pending BIOSECURE Act legislation and the potential impact to the Company of the enactment of such legislation. Further, the Company respectfully advises the Staff that it does not maintain ongoing supply or manufacturing agreements with any Chinese counterparty; while the Company purchases materials from these suppliers on an as-needed basis through purchase orders, the Company has determined that such agreements are not required to be filed pursuant to Item 601(b)(10)(ii)(B) of Regulation S-K.

If we or our licensors are unable to obtain..., page 51

13. *Please revise to explain the significance of composition of matter patents. Also, add a Summary risk factor to highlight the risks of not having this type of patent coverage for your product candidates.*

Response to Comment 13:

In response to the Staff's comment, the Company has revised its disclosure on page 52 of Amendment No. 1 to explain the significance of composition of matter patents and has added a Summary risk factor to highlight the risks of not having this type of patent coverage for its product candidates on page 9 of Amendment No. 1.

Management's Discussion and Analysis of Financial Condition and Results of Operations
Components of our Results of Operation
Revenue, page 94

14. *You state that through the year ended December 31, 2023 you have recognized $17.4 million in research collaboration and license revenue through your collaboration and license agreements. Since you recognized $350,000 and none in the years ended December 31, 2023 and 2022, respectively, please clarify in this discussion of the collaboration and licensing agreements to which the $17.4 million revenue was derived and whether the agreement(s) is ongoing.*

Response to Comment 14:

In response to the Staff's comment, the Company has revised its disclosure on page 95 of Amendment No. 1 to disclose the revenue recognized pursuant to its license and collaboration agreements for each of the fiscal years ended December 31, 2023 and 2022. The Company previously recognized approximately $17.0 million of revenue related to a research collaboration agreement with Biogen Inc., which was executed in December 2019 and was subsequently terminated in February 2021. The Company respectfully advises the Staff that it has removed the disclosure relating to revenue recognized under this agreement from the Management's Discussion and Analysis of Financial Condition and Results of Operations in Amendment No. 1 because (i) the research collaboration and license revenue from this agreement was recognized in its entirety prior to the earliest comparable period presented in Amendment No. 1 (the year ended December 31, 2022), and (ii) the agreement was terminated in February 2021, at which time the Company had no further contractual obligations under the agreement and there were no remaining payments due to the Company pursuant to the agreement, and thus no additional revenue to be recognized.

The role of regRNA in controlling transcription, page 113

15. *We note your disclosure that modest increases in protein expression can lead to clinically meaningful therapeutic benefits in many of the more than 1,200 haploinsufficient or recessive partial loss-of-function indications. Please revise to explain your support for this statement and provide disclosure that explains what is depicted in each of the three columns in the graph. Also revise to explain the term "many" in quantitative terms.*

Response to Comment 15:

In response to the Staff's comment, the Company has revised the disclosure on page 116 of Amendment No. 1 to explain that both its preclinical studies and research reports published by third parties have found that a modest increase in protein expression can lead to clinically meaningful therapeutic benefits in both haploinsufficient and recessive partial loss-of-function indications. For example, with respect to haploinsufficient diseases, the Company's preclinical studies have shown that less than a two-fold increase in LDL receptor protein can lead to a 25-50% decrease in LDL-cholesterol levels in a humanized mouse liver model. While this study was conducted using wild-type human liver cells, the Company believes this would translate to a meaningful therapeutic benefit in heterozygous (haploinsufficient) FH. Scientific research published by third parties has identified similar findings. For example, in a mouse model of Dravet syndrome, a haploinsufficient genetic epilepsy caused by mutation of one copy of the SCN1A gene, two research groups have published studies demonstrating that increasing expression of *Scn1a* by 20-25% had a significant impact on disease phenotype, reducing seizure frequency by 70% and decreasing mortality (Hsiao, et al 2016 doi.org/10.1016/j.ebiom.2016.05.011 and Han, et al 2020 doi:10.1126/scitranslmed.aaz6100). In addition, in a research report published in 2018 (doi:10.1016/j.cll.2018.02.006), Gennarino, et al, described how different mutations in the PUM1 gene lead to different degrees of disease severity in a haploinsufficient ataxia disorder. Specifically, they showed that one completely inactive PUM1 allele (50% total protein level) leads to a severe pediatric onset disease. In contrast, a partially active allele (75% total protein level) causes a much less severe, adult-onset disease.

Similarly, with respect to partial loss-of-function indications, the Company's preclinical studies have shown that increasing expression of Cps1 by less than two-fold can normalize the response to an ammonia challenge in mice with a partial loss of function mutation in Otc, the most commonly mutated gene in urea cycle disorders. As with haploinsufficient disorders, research published by third parties has identified similar findings. For example, a research article published in 2011 by Wakiya, et al (doi:10.1016/j.ymgme.2011.12.019) also found that small differences in OTC protein activity caused by different mutations significantly impacted the severity of disease. Specifically, in the liver transplant patients they studied, Wakiya, et al showed that OTC activity in neonatal onset patients averaged 1.2% compared to wild-type, whereas later onset patients had an average of 8.8% activity. Thus, a modest 7% increase in protein activity compared to wild-type dramatically affected disease severity. Similar findings by third-party researchers correlating disease severity with the level of protein expression include examples in GLUT1-deficiency syndrome (Rotstein, et al 2010 doi:10.1002/ana.22088), KCNB1-related neurodevelopmental disorder (Xiong, et al 2022 doi:10.3389/fped.2021.755344), KCNQ2-related neonatal seizures (Miceli, et al 2022 https://www.ncbi.nlm.nih.gov/books/NBK32534/) and GABRG2-related neurodevelopmental disorders (Kang, et al 2016 doi:10.1001/jamaneurol.2016.0449).

The Company has also updated the figure on page 117 of Amendment No. 1 in response to the Staff's comment. The updated figure illustrates the concept that modest increases in protein expression can lead to clinically meaningful therapeutic benefits in both haploinsufficient and recessive partial loss-of-function disorders, of which there are more than 1,200. The Company's RAP Platform has the potential to identify the regRNA associated with all of these diseases, which the Company believes enables it to design RNA Actuators to address the underlying biology of these diseases.

Our solution for UCDs: CMP-CPS-001, page 118

16. *Please revise to provide descriptive text to explain in greater detail what the table on page 118 shows and how you interpret those results. Also explain the references to analogs and explain why CMP-CPS-001 could not be used in what appear to be in vitro studies of healthy human donor cells.*

Response to Comment 16:

In response to the Staff's comment, the Company has revised the disclosure on page 121 of Amendment No. 1 to provide further details and interpretation of the results presented, including clarification of the reference to analogs and an explanation as to why CMP-CPS-001 could not be used in this context.

17. *Please revise to explain when you commenced work on this program, including when you identified the target gene and generated the ASO candidate.*

Response to Comment 17:

In response to the Staff's comment, the Company has revised the disclosure on page 121 of Amendment No. 1 to explain when work was commenced on its CMP-CPS-001 program and when the Company identified the target regulatory RNA and generated the ASO candidate.

Our preclinical studies, page 119

18. *Please expand your discussion of your preclinical animal studies as follows:*

- *Briefly describe the scope and size of the animal studies and the number of tests conducted. Also, with respect to your discussion of the evaluation of CPS1 upregulation in a mouse Otc deficiency model on page 119, disclose the three different dose levels.*

- *Wherever you disclose you observed study results that were statistically significant, such as the statistically significant decrease in ammonia levels observed in the preclinical evaluation of CMP-CPS-001 in mice with humanized livers, please revise to provide p-values. At first use of the term p-value, please provide a brief explanation regarding how p-values are used to measure statistical significance and the p-value that you have to achieve to conclude a statistically significant result.*

Response to Comment 18:

In response to the Staff's comment, the Company has revised the disclosure on page 122 of Amendment No. 1 to (i) provide detail as to the number of studies performed in the Otc mouse model, along with the typical group size, (ii) disclose the three different dose levels assessed in the mouse Otc deficiency model, and (iii) provide p-values, as well as an explanation regarding how p-values are used to measure statistical significance. The Company respectfully advises the Staff that p-values have been added to the text throughout the preclinical sections to reflect what is shown in the relevant figures.

Our ongoing Phase 1 clinical trial, page 123

19. *Please revise to explain the reason(s) for conducting your clinical trial in Australia as opposed to the United States, particularly in light of the risks discussed on page 64. With reference to the risk factors on pages 19 and 25, please also tell us whether the utilization of the URT test impacted the decision to conduct the trials in Australia.*

Response to Comment 19:

In response to the Staff's comment, the Company has revised its disclosure on page 126 of Amendment No. 1 to explain the reasons for conducting its clinical trial in Australia. The Company respectfully advises the Staff that the utilization of the URT test did not impact the decision to conduct the Phase 1 clinical trial in Australia.

20. *Please revise to discuss here, and as applicable, on page 25, to explain why URT is not an established clinical endpoint even though it has experienced expanded use in clinical studies.*

Response to Comment 20:

In response to the Staff's comment, the Company has revised its disclosure on page 26 of Amendment No. 1 to make explicit that the ureagenesis rate test ("URT") is not an established clinical endpoint. It is the Company's understanding that active conversations with regulators regarding potential adoption of URT as a clinical endpoint are ongoing, but as far as the Company is aware, to date no regulators have adopted URT as an approvable endpoint. The Company respectfully advises the Staff that it considered inclusion of this information in response to the Staff's comment, but felt it would be improper for the Company to speculate as to timeline or reasoning as to why these conversations have not yet resulted in approval.

21. *With reference to your disclosure on page 122, please revise your disclosure to discuss the use of sodium acetate as a surrogate biomarker. Explain the basis for concluding that sodium acetate is a valid surrogate for ammonia in humans and discuss whether there are risks that sodium acetate could act differently or measure differently than ammonia.*

Response to Comment 21:

In response to the Staff's comment, the Company has revised its disclosure on pages 5, 111-112 and 125 of Amendment No. 1 to further explain the function of ^{13}C-sodium acetate in the URT used as part of the Company's preclinical studies. The revised language clarifies that ^{13}C-sodium acetate is not an independent surrogate biomarker for ammonia, but that, like ammonia, the labeled carbon atom of ^{13}C-sodium acetate is processed by the urea cycle. An increase in the metabolic output of the urea cycle, as indicated by an increase in the amount of ^{13}C-sodium acetate metabolized, is expected to correlate with an increase in the amount of ammonia metabolized by the urea cycle.

License and collaboration agreements
Whitehead Institute patent license agreement, page 128

22. *Please revise your disclosure regarding the license agreement with the Whitehead Institute to include a discussion of all material payment terms, including quantification of the past patent expenses paid in addition to the upfront fee, and aggregate potential milestone payments segregated by development and commercial milestone payments.*

Response to Comment 22:

In response to the Staff's comment, the Company has revised its disclosure on pages 94 and 133 of Amendment No. 1 to more clearly distinguish the various payment obligations under the Whitehead Agreement, and respectfully advises the Staff that, while the Company is obligated to pay annual license maintenance fees and certain filing, prosecution and maintenance fees with respect to certain patent rights for the term of the agreement, it does not consider the payment amounts to be material.

23. *You state that your royalty obligations will terminate on a product-by-product and country-by-country basis upon either the last-to-expire valid claim of a Whitehead Institute patent covering the product, which such patent you state is expected to expire in 2043, or "a specified duration after the first commercial sale." Please disclose this specified duration.*

Response to Comment 23:

In response to the Staff's comment, the Company has revised its disclosure on pages 94 and 133 of Amendment No. 1.

Program-related intellectual property, page 131

24. *Please disclose the dates when provisional patent applications were filed and/or when the applications expire.*

Response to Comment 24:

In response to the Staff's comment, the Company has revised its disclosure on page 135 of Amendment No. 1.

Exhibits

25. *With reference to your disclosures on pages 170-171, please file the employment agreements and indemnification agreements with each of your directors and executive officers.*

Response to Comment 25:

The Company acknowledges the Staff's comment and respectfully advises the Staff that it will file copies of its employment and indemnification agreements with each of its directors and executive officers, as applicable, as an exhibit to a subsequent amendment to the Draft Registration Statement.

General

26. *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, have presented or expect to present to potential investors in reliance on Section 5(d) of the Securities Act, whether or not they retain copies of the communications.*

Response to Comment 26:

The Company acknowledges the Staff's comment and advises the Staff that it will provide the Staff, on a confidential basis under separate cover, copies of all written communications presented to potential investors in reliance on Section 5(d) of the Securities Act, whether or not they retain copies of such communications.

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Please do not hesitate to call me at (617) 992-6165 or Lisa Folkerth at (617) 951-7791 with any questions or further comments you may have regarding this filing or if you wish to discuss the above responses.

Sincerely,

/s/ Thomas J. Danielski

Thomas J. Danielski

cc. Josh Mandel-Brehm (CAMP4 Therapeutics Corporation)
cc. Kelly Gold (CAMP4 Therapeutics Corporation)
cc. Lisa Folkerth (Ropes & Gray LLP)
cc. Seo Salimi (Paul Hastings LLP)
cc. Will Magioncalda (Paul Hastings LLP)