Q212497
Openwater
Prabhu Raghavan

Re: Written Feedback for Openwater Headset

This document is being communicated via e-mail as an attachment. The date on which the Food and Drug Administration (FDA) sent this e-mail is the official date of this correspondence.

This document contains the FDA's written feedback to your Pre-Submission request. This feedback represents our best advice based on the information provided in the Pre-Submission and other information currently known. While our review of your Pre-Submission does not imply that your future submission will necessarily be approved or cleared, FDA intends that this feedback will not change, provided that the information submitted in a future Investigational Device Exemption (IDE) or marketing application is consistent with that provided in this current Pre-Submission and that the data in the future submission do not raise any important new issues materially affecting safety or effectiveness.

If you requested a meeting and this feedback satisfies your needs, you may cancel our upcoming meeting by contacting the lead reviewer. If you still wish to meet, please provide us with your agenda of items and any slides you wish to present no later than two business days prior to the scheduled meeting date per the Pre-Submission guidance.[1] If that agenda or presentation contains significant new information, FDA may not be prepared to discuss it. As a reminder, you are expected to submit draft meeting minutes as an amendment to this Pre-Submission within 15 days of the meeting.

Our feedback to your Pre-Submission questions is provided below.

Sponsor Question #1
Does FDA agree that the proposed regulatory pathway is appropriate for Openwater Headset? Specifically,

a. **Does the FDA agree that based on the regulatory strategy provided and the device's risk profile, the subject device may be classified as a Class II device?**
b. **Does the FDA agree that based on the regulatory strategy provided, that a 510(k) pathway may be appropriate for the subject device that utilizes the DPW, "Flowmeter, Blood, Cardiovascular" product code under regulation 870.2100, "Cardiovascular blood flowmeter"?**
c. **For a future 510(k) for the subject device, Openwater proposes to use the K150268, CerOx Model 3215FOP as a predicate, with the K200203, Infrascanner Model 2500 as a reference predicate. Does the FDA have any concerns with the predicate device proposed or recommendations for alternative predicates or references?**

[1] https://www.fda.gov/media/114034/download

Official FDA Response

1. To determine the appropriate regulatory pathway for the subject device, a clear understanding of the intended use is needed. Based on the information provided in this submission, we have several questions regarding the proposed Indications for Use (IFU) statement. The proposed IFU provided in this submission is as follows:

   "*The non-invasive Openwater Headset is intended for monitoring of blood flow in tissue, including the brain. The Openwater Headset is intended for monitoring of adults. The prospective clinical value of data from Openwater Headset has not been demonstrated in disease states. Openwater Headset should not be used as the sole basis for diagnosis or therapy.*"

   The statement "*monitoring of blood flow in tissue, including the brain*" does not appear to be aligned with the proposed device design. Section 2 (p. 4) of the submission discusses the device description, design, and form factor as a headset prototype. Based on this information, the Openwater Headset appears designed for monitoring blood flow only in the brain, specifically in the anterior circulation. Additionally, the "*monitoring of blood flow*" indication does not seem to reflect the functionality or associated interpretation of the blood volume index (BVI) that is generated by the device. It is also not clear from the language in the proposed IFU statement what the intended environment of use of the subject device is. Therefore, we recommend that you provide a revised IFU statement that addresses these discrepancies in any future submission.

2. Although FDA does not make formal classification determinations via the Pre-Submission program, there appear to be differences in the functionality and associated clinical interpretation and use of the subject device compared to the identified predicate CerOx Model 3215FOP (K150268) that may constitute a new intended use or raise new questions of safety and effectiveness that preclude making a substantial equivalence comparison that are discussed below:

   a. The proposed predicate device is indicated for "*use as an adjunct monitor of microcirculation blood flow in tissue*." The design and form factor of the predicate device allows monitoring of blood flow at various sites on the body. The monitoring of microcirculation blood flow in tissue under the sensor of the predicate device is different from an intended use and performance perspective compared to the deeper interrogation depths of blood flow in the brain, specifically limited to the anterior circulation, with the presence of the skull that are proposed for the subject device. We recommend that you review the FDA guidance, "General/Specific Intended Use," for a comprehensive discussion of the levels of specificity of medical device claims, including a discussion of the criteria used by the FDA to determine whether a more specific claim represents a new intended use. We recommend that you provide a discussion of the proposed IFU for the subject device compared to the cleared IFU for the predicate device that explains whether the differences result in a new intended use in any future submission.

   b. There are also technological differences between the proposed predicate device and the subject device. The predicate device uses a combination of near-infrared and ultrasound technologies to monitor microcirculation blood flow in tissue, while the subject device utilizes near infrared spectroscopy (NIRS) and diffuse correlation spectroscopy (DCS) technology to provide cerebral blood flow and blood volume data via the blood flow index (BFI) and BVI. Although the current

submission includes a brief discussion of the technological differences, stating that you intend to address any differences through performance testing, it is not clear why the identified differences in either the underlying fundamental technology or the type of information provided to users for interpretation do not raise different questions of safety or effectiveness. We recommend that you provide a detailed comparison of the fundamental technologies utilized by the subject and predicate devices, accompanied by a discussion of why the differences do not raise new questions of safety or effectiveness in any future submission. Additionally, we recommend that you provide a detailed comparison of the measurements and analyses performed by the subject and predicate devices, accompanied by a discussion of why the differences do not raise new questions of safety or effectiveness.

c. The submission includes a list of three potential reference devices: the Infrascanner Model 2500 (K200203), the FORE-SIGHT (K190270), and the INVOS PM7100 Patient Monitor (K182868). However, it is not clear how these devices would be used to support a potential substantial equivalence comparison. As discussed in the FDA guidance, "The 510(k) Program: Evaluating Substantial Equivalence in Premarket Notifications [510(k)]:"

> "*If a manufacturer successfully navigates through Decision Point 4 on the Flowchart using a single predicate device, other legally marketed devices, which FDA calls "reference devices," may be used to support scientific methodology or standard reference values at Decision Point 5a.*
>
> *It is important to note that a reference device is not considered a predicate device and it cannot be used to address Decision Points 1 – 4 on the Flowchart. Additionally, the applicability of a reference device will need to be reviewed by FDA for its appropriateness. If a selected reference device is used in an anatomical location or for a physiological purpose that is considerably different than that of the new device, its utility as a reference device may be limited."*

We recommend that you review the contents of this guidance document and provide a discussion of the scientific methodology or standard reference values that you intend to rely upon with the reference devices to evaluate the effects of the differences in technological characteristics on safety or effectiveness in any future submission. Note that we are concerned that the approach proposed in the current submission may not successfully navigate the subject device through Decision Point 4 on the "510(k) Decision-Making Flowchart" (Appendix A) in the referenced FDA 510(k) program guidance document.

If you are not able to resolve the issues detailed above, a De Novo would likely be the most appropriate regulatory pathway, provided that a risk analysis demonstrates the proposed intended use of the subject device represents a low-to-moderate risk. To obtain a formal determination of the appropriate classification for the Openwater Headset, we recommend that you submit a 513(g) Request for Information as discussed in the FDA guidance, "FDA and Industry Procedures for Section 513(g) Requests for Information under the Federal Food, Drug, and Cosmetic Act." We recommend that any future 513(g) submission includes additional information that addresses the issues raised above.

Sponsor Question #2

Does the FDA have any comments on the proposed testing to assess device performance, as described in Section 7, for a future device submission?

a. **Does the FDA agree that the proposed testing of the proprietary blood flow and volume indices utilizing a phantom model, like the predicate K150268, would be an appropriate method to characterize device performance as well as establish substantial equivalence? Are there any specific considerations for testing with the phantom model that Openwater should additionally include in its test plans?**
b. **Based on the regulatory strategy provided, does FDA agree, based on the discussion provided, that clinical or animal performance testing data is not needed to support a future 510(k)?**
c. **Does FDA agree that the Openwater Headset software is a "moderate" level of concern and that the level of documentation that will be included in an upcoming marketing submission is consistent with FDA's recommendations provided in FDA's guidance entitled "Guidance for the Content of Premarket Submissions for Software Contained in Medical Devices" as part of the upcoming device submission?**

Official FDA Response

3. It is not clear whether performance testing obtained from a phantom model will be sufficient to validate the proposed indices of blood flow and blood volume in the brain. Based on the information provided in this submission, proper validation of the BFI and BVI device outputs would require evidence that the device can accurately evaluate blood flow and volume in different locations in the brain, evidence that these measures are robust to anatomical variability in humans, that clinically meaningful changes in blood flow or blood volume are detectable by the device, and that the device measures are reliable across the intended patient population. Any future phantom model that is used to address these questions will additionally need to scientifically justify how the phantom model simulates the skull, brain tissue, vasculature, and blood flow. Furthermore, due to the limitations of existing animal models in representing human cranial anatomy and blood flow characteristics, if data collected from a phantom model is insufficient, then clinical data may be warranted. We recommend that you provide additional details regarding how you plan to collect evidence that supports each aspect of device validation described above in any future submission.

4. Based on the answers to "Table 2 Moderate Level of Concern" from the FDA guidance, "Guidance for the Content of Premarket Submissions for Software Contained in Medical Devices," we agree that the subject device software meets the criteria for a moderate level of concern (LOC). However, this information is subject to change based on any revisions or clarifications provided in response to the recommendations in FDA responses #1 and 2. The LOC only pertains to the amount of software documentation that is expected to be included in support of a premarket submission. Other documentation may be requested during the review of any premarket submission if questions of safety or effectiveness arise that require review of additional software documentation. Furthermore, you are expected to develop, document, and maintain your software according to your established quality system regardless of LOC.

Sponsor Question #3

Does the FDA have any other concerns or topics they would like Openwater to consider for Openwater Headset's premarket notification?

Official FDA Response

5. We do not have additional comments at this time. Refer to the responses to specific questions #1 and #2 above for preliminary feedback regarding the proposed regulatory pathway and the proposed testing.

This notification is being sent in lieu of a formal written letter. If you have any questions, please contact Saikat Bhuiyan at 301-796-2436 or Saikat.Bhuiyan@fda.hhs.gov.