March 1, 2021

Fifth Eye Inc.
% Donna-Bea Tillman
Senior Consultant
Biologics Consulting Group
1555 King Street, Suite 300
Alexandria, Virginia 22314

Re: DEN200022
Trade/Device Name: Analytic for Hemodynamic Instability (AHI)
Regulation Number: 21 CFR 870.2220
Regulation Name: Adjunctive hemodynamic indicator with decision point
Regulatory Class: Class II
Product Code: QNV
Dated: April 2, 2020
Received: April 3, 2020

Dear Donna-Bea Tillman:

The Center for Devices and Radiological Health (CDRH) of the Food and Drug Administration (FDA) has completed its review of your De Novo request for classification of the Analytic for Hemodynamic Instability (AHI), a prescription device under 21 CFR Part 801.109 with the following indications for use:

> The AHI software is intended for use by healthcare professionals managing in-hospital patients 18 years or older who are receiving continuous physiological monitoring with electrocardiography (ECG).
>
> AHI provides a frequently updated binary output over time based on pattern analysis of a lead-II ECG waveform intended to describe a patient's hemodynamic status and indicate if a patient is showing signs of hemodynamic stability or instability. Signs of hemodynamic instability are defined as hypotension (systolic blood pressure <90 mmHg or mean arterial pressure (MAP) <70 mmHg) combined with tachycardia (heart rate ≥ 100 bpm).
>
> The goal of this adjunctive monitoring method is to enable identification of patients who are showing signs of hemodynamic instability and to allow clinicians an opportunity to increase vigilance. This device is intended for adjunctive use with other physical vital sign parameters and patient information and is not intended to independently direct therapy.

FDA concludes that this device should be classified into Class II. This order, therefore, classifies the Analytic for Hemodynamic Instability (AHI), and substantially equivalent devices of this generic type, into Class II under the generic name adjunctive hemodynamic indicator with decision point.

FDA identifies this generic type of device as:

> **Adjunctive hemodynamic indicator with decision point**. An adjunctive hemodynamic indicator with decision point is a device that identifies and monitors hemodynamic condition(s) of interest and provides notifications at a clinically meaningful decision point. This device is intended to be used adjunctively along with other monitoring and patient information.

Section 513(f)(2) of the Food, Drug and Cosmetic Act (the FD&C Act) was amended by section 607 of the Food and Drug Administration Safety and Innovation Act (FDASIA) on July 9, 2012. This law provides two options for De Novo classification. First, any person who receives a "not substantially equivalent" (NSE) determination in response to a 510(k) for a device that has not been previously classified under the Act may request FDA to make a risk-based classification of the device under section 513(a)(1) of the Act. On December 13, 2016, the 21st Century Cures Act removed a requirement that a De Novo request be submitted within 30 days of receiving an NSE determination. Alternatively, any person who determines that there is no legally marketed device upon which to base a determination of substantial equivalence may request FDA to make a risk-based classification of the device under section 513(a)(1) of the Act without first submitting a 510(k). FDA shall, within 120 days of receiving such a request, classify the device. This classification shall be the initial classification of the device. Within 30 days after the issuance of an order classifying the device, FDA must publish a notice in the Federal Register announcing the classification.

On April 3, 2020, FDA received your De Novo requesting classification of the Analytic for Hemodynamic Instability (AHI). The request was submitted under section 513(f)(2) of the FD&C Act. In order to classify the Analytic for Hemodynamic Instability (AHI) into class I or II, it is necessary that the proposed class have sufficient regulatory controls to provide reasonable assurance of the safety and effectiveness of the device for its intended use. After review of the information submitted in the De Novo request FDA has determined that, for the previously stated indications for use, the Analytic for Hemodynamic Instability (AHI) can be classified in class II with the establishment of special controls for class II. FDA believes that class II (special) controls provide reasonable assurance of the safety and effectiveness of the device type. The identified risks and mitigation measures associated with the device type are summarized in the following table:

Table 1 – Identified Risks to Health and Mitigation Measures

Identified Risks to Health	**Mitigation Measures**
Delayed or incorrect treatment due to erroneous output as a result of software malfunction or algorithm error	Software verification, validation, and hazard analysis Non-clinical performance testing Clinical data Labeling
Delayed or incorrect treatment due to user misinterpretation	Usability assessment Labeling

In combination with the general controls of the FD&C Act, the adjunctive hemodynamic indicator with decision point is subject to the following special controls:

(1) Software description, verification, and validation based on comprehensive hazard analysis and risk assessment must be provided, including:
    (i) Full characterization of technical parameters of the software, including algorithm(s);

(ii) Description of the expected impact of all applicable sensor acquisition hardware characteristics on performance and any associated hardware specifications;
(iii) Specification of acceptable incoming sensor data quality control measures;
(iv) Mitigation of impact of user error or failure of any subsystem components (signal detection and analysis, data display, and storage) on output accuracy; and
(v) The sensitivity, specificity, positive predictive value, and negative predictive value in both percentage and number form for clinically meaningful pre-specified time windows consistent with the device output.

(2) Scientific justification for the validity of the hemodynamic indicator algorithm(s) must be provided. Verification of algorithm calculations and validation testing of the algorithm must use an independent data set.
(3) Usability assessment must be provided to demonstrate that risk of misinterpretation of the status indicator is appropriately mitigated.
(4) Clinical data must support the intended use and include the following:
(i) The assessment must include a summary of the clinical data used, including source, patient demographics, and any techniques used for annotating and separating the data;
(ii) Output measure(s) must be compared to an acceptable reference method to demonstrate that the output represents the measure(s) that the device provides in an accurate and reproducible manner;
(iii) The data set must be representative of the intended use population for the device. Any selection criteria or limitations of the samples must be fully described and justified;
(iv) Where continuous measurement variables are displayed, agreement of the output with the reference measure(s) must be assessed across the full measurement range;
(v) Data must be provided within the clinical validation study or using equivalent datasets to demonstrate the consistency of the output and be representative of the range of data sources and data quality likely to be encountered in the intended use population and relevant use conditions in the intended use environment; and
(5) Labeling must include the following:
(i) The type of sensor data used, including specification of compatible sensors for data acquisition, and a clear description of what the device measures and outputs to the user;
(ii) Warnings identifying factors that may impact output results;
(iii) Guidance for interpretation of the outputs, including warning(s) specifying adjunctive use of the measurements;
(iv) Key assumptions made in the calculation and determination of measurements; and
(v) A summary of the clinical validation data, including details of the patient population studied (e.g., age, gender, race/ethnicity), clinical study protocols, and device performance with confidence intervals for all intended use populations.

In addition, this is a prescription device and must comply with 21 CFR 801.109.

Although this letter refers to your product as a device, please be aware that some granted products may instead be combination products. If you have questions on whether your product is a combination product, contact CDRHProductJurisdiction@fda.hhs.gov.

Section 510(m) of the FD&C Act provides that FDA may exempt a class II device from the premarket notification requirements under section 510(k) of the FD&C Act, if FDA determines that premarket

notification is not necessary to provide reasonable assurance of the safety and effectiveness of the device type. FDA has determined premarket notification is necessary to provide reasonable assurance of the safety and effectiveness of the device type and, therefore, the device is not exempt from the premarket notification requirements of the FD&C Act. Thus, persons who intend to market this device type must submit a premarket notification containing information on the adjunctive hemodynamic indicator with decision point they intend to market prior to marketing the device.

Please be advised that FDA's decision to grant this De Novo request does not mean that FDA has made a determination that your device complies with other requirements of the FD&C Act or any Federal statutes and regulations administered by other Federal agencies. You must comply with all the FD&C Act's requirements, including, but not limited to: registration and listing (21 CFR Part 807); labeling (21 CFR Part 801); medical device reporting (reporting of medical device-related adverse events) (21 CFR 803) for devices or postmarketing safety reporting (21 CFR 4, Subpart B) for combination products (see https://www.fda.gov/combination-products/guidance-regulatory-information/postmarketing-safety-reporting-combination-products); good manufacturing practice requirements as set forth in the quality systems (QS) regulation (21 CFR Part 820) for devices or current good manufacturing practices (21 CFR 4, Subpart A) for combination products; and if applicable, the electronic product radiation control provisions (Sections 531-542 of the FD&C Act); 21 CFR 1000-1050.

A notice announcing this classification order will be published in the Federal Register. A copy of this order and supporting documentation are on file in the Dockets Management Branch (HFA-305), Food and Drug Administration, 5630 Fishers Lane, Room 1061, Rockville, MD 20852 and are available for inspection between 9 a.m. and 4 p.m., Monday through Friday.

As a result of this order, you may immediately market your device as described in the De Novo request, subject to the general control provisions of the FD&C Act and the special controls identified in this order.

For comprehensive regulatory information about medical devices and radiation-emitting products, please see Device Advice (https://www.fda.gov/medical-devices/device-advice-comprehensive-regulatory-assistance) and CDRH Learn (https://www.fda.gov/training-and-continuing-education/cdrh-learn). Additionally, you may contact the Division of Industry and Consumer Education (DICE) to ask a question about a specific regulatory topic. See the DICE website (https://www.fda.gov/medical-devices/device-advice-comprehensive-regulatory-assistance/contact-us-division-industry-and-consumer-education-dice) for more information or contact DICE by email (DICE@fda.hhs.gov) or phone (1-800-638-2041 or 301-796-7100).

If you have any questions concerning the contents of the letter, please contact Shawn Forrest at 301-796-5554.

Sincerely,

for

Bram Zuckerman, M.D.
Director
Office of Cardiovascular Devices
Office of Product Evaluation and Quality
Center for Devices and Radiological Health