September 15, 2021

Zebra Medical Vision Ltd.
% Shlomit Cymbalista
Regulatory Affairs Lead
Shefayim Commercial Center, PO Box 25
Shefayim, 6099000
ISRAEL

Re: K210085
Trade/Device Name: HealthCCSng
Regulation Number: 21 CFR 892.1750
Regulation Name: Computed tomography x-ray system
Regulatory Class: Class II
Product Code: JAK
Dated: August 4, 2021
Received: August 9, 2021

Dear Shlomit Cymbalista:

We have reviewed your Section 510(k) premarket notification of intent to market the device referenced above and have determined the device is substantially equivalent (for the indications for use stated in the enclosure) to legally marketed predicate devices marketed in interstate commerce prior to May 28, 1976, the enactment date of the Medical Device Amendments, or to devices that have been reclassified in accordance with the provisions of the Federal Food, Drug, and Cosmetic Act (Act) that do not require approval of a premarket approval application (PMA). You may, therefore, market the device, subject to the general controls provisions of the Act. Although this letter refers to your product as a device, please be aware that some cleared products may instead be combination products. The 510(k) Premarket Notification Database located at https://www.accessdata.fda.gov/scripts/cdrh/cfdocs/cfpmn/pmn.cfm identifies combination product submissions. The general controls provisions of the Act include requirements for annual registration, listing of devices, good manufacturing practice, labeling, and prohibitions against misbranding and adulteration. Please note: CDRH does not evaluate information related to contract liability warranties. We remind you, however, that device labeling must be truthful and not misleading.

If your device is classified (see above) into either class II (Special Controls) or class III (PMA), it may be subject to additional controls. Existing major regulations affecting your device can be found in the Code of Federal Regulations, Title 21, Parts 800 to 898. In addition, FDA may publish further announcements concerning your device in the Federal Register.

Please be advised that FDA's issuance of a substantial equivalence determination does not mean that FDA has made a determination that your device complies with other requirements of the Act or any Federal statutes and regulations administered by other Federal agencies. You must comply with all the 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 Act); 21 CFR 1000-1050.

Also, please note the regulation entitled, "Misbranding by reference to premarket notification" (21 CFR Part 807.97). For questions regarding the reporting of adverse events under the MDR regulation (21 CFR Part 803), please go to https://www.fda.gov/medical-devices/medical-device-safety/medical-device-reporting-mdr-how-report-medical-device-problems.

For comprehensive regulatory information about medical devices and radiation-emitting products, including information about labeling regulations, 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).

Sincerely,

, for

Thalia T. Mills, Ph.D.
Director
Division of Radiological Health
OHT7: Office of In Vitro Diagnostics
and Radiological Health
Office of Product Evaluation and Quality
Center for Devices and Radiological Health

Enclosure

DEPARTMENT OF HEALTH AND HUMAN SERVICES
Food and Drug Administration

Indications for Use

Form Approved: OMB No. 0910-0120
Expiration Date: 06/30/2020
See PRA Statement below.

510(k) Number *(if known)*
K210085

Device Name
HealthCCSng

Indications for Use *(Describe)*
The HealthCCSng device is intended for use as a non-invasive post-processing software to evaluate calcified plaques in the coronary arteries, which present a risk for coronary artery disease. The software generates an estimated coronary artery calcium detection category.
The HealthCCSng device analyzes existing non-cardiac-gated CT studies that include the heart of adult patients above the age of 30. The device generates a three-category output representing the estimated quantity of calcium detected together with preview axial images of the detected calcium meant for informational purposes only. The device output will be available to the radiologist as part of their standard workflow. The HealthCCSng results are not intended to be used on a stand-alone basis for risk attribution, clinical decision-making or otherwise preclude clinical assessment of CT studies.

Type of Use *(Select one or both, as applicable)*

☒ Prescription Use (Part 21 CFR 801 Subpart D) ☐ Over-The-Counter Use (21 CFR 801 Subpart C)

CONTINUE ON A SEPARATE PAGE IF NEEDED.

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510(K) Summary - HealthCCSng
Zebra Medical Vision Ltd.

510(k) Number – K210085

Applicant's Name: Zebra Medical Vision Ltd.
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Date Prepared: September 14, 2021

Trade Name: HealthCCSng

Classification Name:
JAK - Computed tomography x-ray system

Regulation Number:
21 CFR 892.1750

Classification:
Class II, Radiology

Predicate Device:
The HealthCCSng device is substantially equivalent to the following Primary Predicate Device:

Proprietary Name	HealthCCS
Premarket Notification	K172983
Classification Name	Computed tomography x-ray system.
Regulation Number	21 CFR 892.1750
Product Code	JAK
Regulatory Class	II

Secondary Predicate Device:

Proprietary Name	AI-Rad Companion
Premarket Notification	K183268
Classification Name	Computed tomography x-ray system.
Regulation Number	21 CFR 892.1750

Product Code	JAK
Regulatory Class	II

Performance Standards:
No performance standards have been established for such device under Section 514 of the Federal Food, Drug, and Cosmetic Act.

Intended Use/Indication for Use:

The HealthCCSng device is intended for use as a non-invasive post-processing software to evaluate calcified plaques in the coronary arteries, which present a risk for coronary artery disease. The software generates an estimated coronary artery calcium detection category.
The HealthCCSng device analyzes existing non-cardiac-gated CT studies that include the heart of adult patients above the age of 30. The device generates a three-category output representing the estimated quantity of calcium detected together with preview axial images of the detected calcium meant for informational purposes only. The device output will be available to the radiologist as part of their standard workflow. The HealthCCSng results are not intended to be used on a stand-alone basis for risk attribution, clinical decision-making or otherwise preclude clinical assessment of CT studies.

Device Description:

HealthCCSng product is a software device that automatically estimates the coronary artery calcium category from non-cardiac-gated adult CT scans. The product is aimed to leverage the high utilization of CT scans in the medical care environment (both inpatient and outpatient), including lung cancer screening programs, in order to automatically detect calcification in the coronary arteries of patients in an opportunistic manner.

Zebra's HealthCCSng product analyzes cases using an artificial intelligence algorithm for the automated detection and estimation of coronary calcium and outputs a result for review by the radiologist. The device works in parallel to and in conjunction with the standard of care workflow. The final diagnosis is made by the radiologist after reviewing the scan independently of the software. The device is intended for use by the radiologists as a non-diagnostic analysis software in conjunction with additional patient information and professional judgment.

HealthCCSng receives a non-cardiac-gated CT study from the storage application, Zebra's Imaging Analytics Platform (IMA). For each CT study received, the software shall validate there is at least one compliant series in which the entire heart is present, and perform an analysis. For each compliant study, the software shall output:

1. Estimated Coronary Calcium Detection, based on the measurement of calcium deposits in the coronary arteries.

2. A corresponding Estimated Coronary Calcium Detection Category, based on the Estimated Coronary Calcium measurement.

The software output will include the following calcium categories:

Estimated Coronary Calcium Detection	Corresponding Estimated Coronary Calcium Detection Category
0-99	Low
100-399	Medium
≥400	High

For patients in which calcium was detected, the user will be presented with representative images - all the slices containing the measured coronary calcifications (130 HU and above). On these images, the calcified areas will be annotated (with an option for the user to toggle on and off the annotation).

The following modules compose the HealthCCSng software:

Data input and validation: Following retrieval of a study, the validation feature assessed the input data (i.e. age, modality, view, etc.) to ensure compatibility for processing by the algorithm.

HealthCCSng algorithm: Once a study has been validated, the algorithm analyzes the CT for analysis and quantification.

IMA Integration feature: The study analysis and the results of a successful study analysis is provided to IMA.

Error codes feature: In the case of a study failure during data validation or the analysis by the algorithm, an error is provided to the system.

Performance Data:

Safety and performance of HealthCCSng has been evaluated and verified in accordance with software specifications and applicable performance standards through Software Development and Validation & Verification Process to ensure performance according to specifications, User Requirements and Federal Regulations and Guidance documents, “Guidance for the Content of Premarket Submissions for Software Contained in Medical Devices”.

The HealthCCSng software device performance was validated in a stand-alone retrospective study for its overall agreement compared to the established ground truth and respective to the predicate device. The validation data-set consisted of anonymized CT scans of the chest from two healthcare institutions composed of multiple clinical sites. The sample included representation of each coronary calcium detection category. Ground truth category was determined by the majority agreement of two of three radiologists.

The objective of the study was to establish the safety, effectiveness and substantial equivalence of the HealthCCSng software as compared to the predicate device (HealthCCS, K172983). The HealthCCSng overall agreement was determined by comparing the device output coronary calcium detection category, to the ground truth coronary calcium detection category. For overall agreement to be considered successful it had to be equal or superior to the 85% performance goals defined by the predicate device.

The performance results were analyzed for 447 anonymized CT chest cases. Patient age ranged from 30-93 y.o (mean age of 62.6 years; SD=14.4) and 57.7% (258) were male. The validation data-set represented the following imaging parameters: Modality (CT), Slice Thickness (0.625, 1, 1.25, 1.5, 2, 2.5 and 3 mm), Slice Increment (0.625, 1, 1.25, 1.5, 2, 2.5 and 3 mm), Exposure in mAs (Radiation Dose) i(15-966), KVP (100, 120, 130 and 140), and four (4) manufacturers of CT devices (GE, Philips, Siemens and Toshiba).

The HealthCCSng device demonstrated an overall agreement of 92.5% (95% CI: [89.7%, 95.5%]) exceeding the stated performance goal and the predicate performance. All CT data across, slice thickness, slice increment, exposure, KVP, manufacturers and reconstruction type were well supported by the HealthCCSng device. In conclusion, this study demonstrated the HealthCCSng overall agreement with the ground truth coronary calcium detection category and establishes its substantial equivalence to the predicate device. It also validated the performance of the HealthCCSng across important cohorts, and applicable subsets of imaging acquisition characteristics.

Technological Characteristics Compared to Predicate Device:

Zebra Medical Vision believes that the HealthCCSng device is substantially equivalent to the HealthCCSng Device K172983 (primary predicate) and the AI-Rad Companion (Cardiovascular) K183268 (secondary predicate).
The two predicate devices listed (K172983 and K183268) have the same intended use as the predicate device, namely, coronary calcium detection and quantification, and support substantial equivalence with respect to technological characteristics.

	Proposed Device: HealthCCSng	Primary Predicate Device: HealthCCS Device v3.0 (K172983)	Secondary Predicate Device: AI-Rad Companion (K183268)
Intended Use/ Indications for Use	The HealthCCSng device is intended for use as a non-invasive post-processing software to evaluate calcified plaques in the coronary arteries, which present a risk for coronary artery disease. The software generates an estimated coronary artery calcium detection category. The HealthCCSng device analyzes existing non-cardiac-gated CT studies that include the heart of adult patients above the age of 30. The device generates a three-category output representing the estimated quantity of calcium detected together with preview axial images of the detected calcium meant for informational purposes only. The device output will be available to the radiologist as part of their standard workflow. The HealthCCSng results are not intended to be used on a stand-alone basis for risk attribution, clinical decision-making or otherwise preclude clinical assessment of CT studies.	The HealthCCS Device is intended for use as a non-invasive post-processing software that can be used to evaluate calcified plaques in the coronary arteries, which may be a risk factor for coronary artery disease. The software can be used to generate reports of the total risk category of coronary calcium. This information can then be used by a physician for further analysis and treatment. The HealthCCS Device analyzes pre-existing heart or chest ECG-Gated/Triggered CT scans. The Device is indicated for use only on patients whose age at the time, when the CT scan was taken, was above 20 years old. This device generates a 4-category Agatston-equivalent risk score, and the patient management, especially for the patient with the score from 0-10, will depend on the physician's own judgment. It may require further testing to evaluate the appropriate clinical management.	AI-Rad Companion (Cardiovascular) is image processing software that provides quantitative and qualitative analysis from previously acquired Computed Tomography DICOM images to support radiologists and physicians from emergency medicine, specialty care, urgent care, and general practice in the evaluation and assessment of cardiovascular diseases. It provides the following functionality: • Segmentation and volume measurement of the heart • Quantification of the total calcium volume in the coronary arteries • Segmentation of the aorta • Measurement of maximum diameters of the aorta at typical landmarks •Threshold-based highlighting of enlarged diameters The software has been validated for non-cardiac chest CT data with filtered backprojection reconstruction from Siemens Healthineers, GE Healthcare, Philips, and Toshiba/Canon. Additionally, the calcium detection feature has been validated on non-cardiac chest CT data with iterative reconstruction from Siemens Healthineers. Only DICOM images of adult patients are considered to be valid input.

Comparison of Technological Characteristics

Technological Characteristics	Proposed Device: HealthCCSng Device v1.0	Primary Predicate Device: HealthCCS Device v3.0 (K172983)	Secondary Predicate Device: AI-Rad Companion (K183268)	Summary
Regulation				
Product Code	JAK	JAK	JAK	Same
Regulation Number	21 CFR §892.1750	21 CFR §892.1750	21 CFR §892.1750	Same
General				
Modality	CT	CT	CT	Same
Image format	DICOM	DICOM	DICOM	Same
Contrast	Non-contrast	Non-contrast	Non-contrast	Same
Supported CT scan	Non-cardiac-gated CT scan	Cardiac-gated CT scan	Non-cardiac-gated CT scan	Different supported CT scans by the subject device and primary predicate device.
Slice thickness	Up to 3mm	Up to 3mm	Up to 3mm	Same
Quantification				
Calcification detection	Automatic	Automatic	Automatic	Same
Default threshold of calcium	130 HU (Hounsfield Units)	130 HU (Hounsfield Units)	130 HU (Hounsfield Units)	Same
Coronary artery calcification quantification method	CAC detection category	Agatston equivalent CAC risk category, based on the Agatston method	Calcium volume	Similar, provide detected calcium for assessment.
Display and Visualization				
Main Image Quality	DICOM	DICOM	Not applicable	Same

Compressed preview image	Yes	No	Not applicable	Does not introduce questions of safety and effectiveness
Annotation of detected calcium	Yes	Yes	Not applicable	Same
Visualization tools	Zooming, panning, windowing	Zooming, panning	Not applicable	Similar, does not introduce questions of safety and effectiveness
Data reporting				
Generate patient report	Optional to copy result to clipboard, insert in report, DICOM Secondary Capture	Optional to copy result to clipboard, insert in report	Optional to insert results in report	Similar, does not introduce questions of safety and effectiveness
Report of the calcium score	Yes, Coronary Calcium Detection Category 3 categories: 0-99 100-399 ≥400	Yes, Coronary artery calcium risk category 4 categories 0-10 11-100 101-400 >400	Not applicable	Both the subject and primary predicate device provide calcium detection and category

Conclusion:

Based on the information submitted in this premarket notification, and based on the indications for use, technological characteristics and performance testing, HealthCCSng device raises no new questions of safety and effectiveness and is substantially equivalent to the primary predicate device in terms of safety, efficacy and performance.

The results of the performance comparison study demonstrated that the HealthCCSng device performs as intended, in the specified use conditions, similarly to the predicate devices. The HealthCCSng device is therefore substantially equivalent to the primary predicate device.