April 22, 2022

NanoxAI Ltd.
℅ Shlomit Cymbalista
Head of Regulatory Affairs
Shefayim Commercial Center, PO Box 25
Shefayim, 6099000
ISRAEL

Re: K213944
Trade/Device Name: HealthOST
Regulation Number: 21 CFR 892.1750
Regulation Name: Computed Tomography X-ray System
Regulatory Class: Class II
Product Code: JAK
Dated: March 20, 2022
Received: March 23, 2022

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,

Laurel Burk, Ph.D
Assistant Director
Diagnostic X-ray Systems Team
Division of Radiological Health
OHT7: Office of In Vitro Diagnostics
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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)*
K213944

Device Name
HealthOST

Indications for Use *(Describe)*
HealthOST is an image processing software that provides qualitative and quantitative analysis of the spine from CT images to support clinicians in the evaluation and assessment of musculoskeletal disease of the spine. The HealthOST software provides the following functionality:
-Labelling of T1-L4 vertebrae
-Measurement of height loss in each vertebra (T1-L4)
-Measurement of the mean Hounsfield Units (HU) in volume of interest within vertebra (T11-L4)
HealthOST is indicated for use in patients aged 50 and over undergoing CT scan for any clinical indication, that includes at least four vertebrae in the T1-L4 portion of the spine (for vertebral height loss) and T11-L4 (for bone attenuation) portions of the spine.
The device is indicated for FBP-reconstructed images only.

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 - HealthOST
Nanox AI Ltd.

510(k) Number - K213944

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Date Prepared: April 21, 2022

Device Trade Name: HealthOST

Regulation Number:
21 CFR 892.1750

Regulation Name and Product Code:
JAK - Computed tomography x-ray system

Regulatory Class:
Class II, Radiology

Predicate Device:

The HealthOST device is substantially equivalent to the following Predicate Device:

Proprietary Name	Predicate Device: AI-Rad Companion (Musculoskeletal)
Premarket Notification	K193267
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:

HealthOST is an image processing software that provides qualitative and quantitative analysis of the spine from CT images to support clinicians in the evaluation and assessment of musculoskeletal disease of the spine. The HealthOST software provides the following functionality:

-Labelling of T1-L4 vertebrae
-Measurement of height loss in each vertebra (T1-L4)
-Measurement of the mean Hounsfield Units (HU) in volume of interest within vertebra (T11-L4)

HealthOST is indicated for use in patients aged 50 and over undergoing CT scan for any clinical indication, that includes at least four vertebrae in the T1-L4 portion of the spine (for vertebral height loss) and T11-L4 (for bone attenuation) portions of the spine.

The device is indicated for FBP-reconstructed images only.

Device Description:

HealthOST is an image processing software that provides qualitative and quantitative analysis of the spine from CT images to support clinicians in the evaluation and assessment of musculoskeletal disease of the spine.

HealthOST does this by analyzing CT scans of patients aged 50 and above being performed for any clinical indication and providing the following outputs for each analyzed vertebra

1. The vertebral name, e.g. “L3”
2. The percentage of vertebral height loss, calculated as:

$$Height_{Loss}[\%] = 1 - \frac{l_{min(anterior\ or\ middle)\_vertebral\ height\ measurement}}{l_{posterior\_vertebral\ height\ measurement}}$$

   from three vertebral height measurements placed at the anterior, middle and posterior aspects of the vertebral body, at the point nearest to the center of the vertebral body.

   The height loss measurement is provided for every complete vertebra in the range of T1-L4. Height loss above the height loss display threshold will be indicated to the user. The

height loss display threshold is configurable per installation from a predefined list, with the default set at >20% height loss. In addition, vertebrae without height loss but with significant height deviation from neighboring vertebrae will be displayed to the user.

3. The mean hounsfield unit vertebral bone attenuation, calculated by taking the mean HU from a volume of interest of the trabecular bone. This measurement is provided for every complete vertebrae in the range of T11-L4. HU bone attenuation below a set bone attenuation display threshold will be indicated to the user. The bone attenuation display threshold is configurable per installation from a predefined list.

The following modules compose the HealthOST 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.

HealthOST 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.

Use of axial scans for analysis is only intended as a "back up" in cases that a sagittal scan is not available in the study.

Performance Data:

The HealthOST was designed and manufactured under the Quality System Regulations as outlined in 21 CFR § 820.

Safety and performance of HealthOST 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 HealthOST device performance was evaluated in a stand-alone retrospective study of its performance compared to the established ground truth and respective to the predicate device. The validation data-set included a truthed and enriched sample of 150 anonymized CT scans including a minimum of four vertebrae between T1 to L4 from two healthcare institutions composed of multiple clinical sites in the US and OUS. The sample included sufficient representation from across the disease spectrum for the two key measurement parameters provided by the device,

namely vertebral height, and mean trabecular bone attenuation (measured in Hounsfield Units). Ground truth measurements were determined by the three US board-certified radiologists.

The objective of this study was to establish the safety, effectiveness and substantial equivalence of the HealthOST software as compared to the predicate device (AI-Rad Companion (Musculoskeletal), K193267)). The HealthOST overall performance was determined by comparing the device output measurements, to the ground truth measurements. The validation data-set included 150 cases, that included 1425 vertebrae.

The HealthOST device demonstrated an overall agreement for vertebral naming of 91.49% (95% CI: [89.91%, 92.89%]) exceeding the stated performance goal. The method comparison analysis demonstrated 95% limits of agreement (LOA) for the HealthOST height loss of [-7.98, 7.36], within the stated performance goal and 91.86% of the differences between HealthOST and the GT lie within the ground truthers LOA's, which is substantially equivalent to the predicate device (K193267). There was 91.28% overall agreement between HealthOST and the ground truth in differentiating height loss above and below 20%, exceeding the stated performance goal. Finally, HealthOST demonstrated 95% limits of agreement (LOA) for the bone attenuation of [-20.83, 18.29] which exceeded the stated performance goal however was superior to the [-21.17, 17.19] LOA demonstrated between the ground truthers. In addition, 96.06% of the differences between HealthOST and the GT lie within the ground truthers LOA's. The reported LOA's by the subject devices are similar to those reported by the predicate device (K193267). All CT data across, slice thickness, slice increment, exposure, KVP and manufacturers were well supported by the HealthOST device.

Specifically, the dataset included 33 axial cases (22.45%), of which 14 has slice thickness between 0-1.5mm, and 19 cases had slice thickness 1.5-3.1 mm. The 16 of the axial scans had a slice increment of 0-1.5mm and 17 scans had a slice increment of 1.5-3.1mm. For axial scans, the HealthOST device demonstrated an overall agreement for vertebral naming of 92.19% (95% CI [89.31% ,95.07%]) exceeding the stated performance goal. Regarding the performance of HealthOST on height loss in axial scans, 94.81% of the differences between HealthOST and the GT lie within the ground truthers LOA's, and there was an overall agreement of 91.89% between the HealthOST and ground truth in differentiating height loss above and below 20%. In axial scans, HealthOST demonstrated 95% limits of agreement (LOA) for the bone attenuation of [-15.78, 12.21]. Finally, 96.06% of the differences between HealthOST and the GT lie within the ground truthers LOA's.

A secondary testing dataset from an additional, representative US data source demonstrated device performance across all metrics was generalizable to US populations.

In conclusion, this study demonstrated the HealthOST overall agreement and limits of agreement with respect to the ground truth spinal measurements and establishes its safety and effectiveness, while demonstrating substantial equivalence to the predicate device. It also validated the

performance of the HealthOST device across important cohorts, and applicable subsets of imaging acquisition characteristics.

Technological Characteristics Compared to Predicate Device:

We believe that the HealthOST device is substantially equivalent to the AI-Rad Companion (Musculoskeletal) K193267.

	Proposed Device: HealthOST Device	**Primary Predicate Device: AI-Rad Companion (Musculoskeletal) (K193267)**
Intended Use/ Indications for Use	HealthOST is an image processing software that provides qualitative and quantitative analysis of the spine from CT images to support clinicians in the evaluation and assessment of musculoskeletal disease of the spine. The HealthOST software provides the following functionality: • Labelling of T1-L4 vertebrae • Measurement of height loss in each vertebra (T1-L4) • Measurement of mean Hounsfield Units in volume of interest within vertebra (T11-L4) HealthOST is indicated for use in patients aged 50 and over undergoing CT scan for any clinical indication that includes at least two vertebrae in the T1-L4 portion of the spine (for vertebral height loss) and/or T11-L4 (for bone attenuation) portions of the spine. The device is indicated for FBP-reconstructed images only.	AI-Rad Companion (Musculoskeletal) is an 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 musculoskeletal disease. It provides the following functionality: • Segmentation of vertebras • Labelling of vertebras • Measurements of heights in each vertebra and indication if they are critically different • Measurement of mean Hounsfield value in volume of interest within vertebra. Only DICOM images of adult patients are considered to be valid input

The intended use is equivalent to the predicate device in that both devices perform both qualitative and quantitative analysis of the spine for the evaluation and assessment of musculoskeletal disease using an artificial intelligence algorithm. Both devices perform labeling of vertebrae, measurement of the vertebral height, and measurement of Hounsfield Units within the vertebrae. Both devices highlight vertebrae with calculated height deviations deemed different in accordance with the

Genant criteria. This information is output to the user. Neither device is intended to be used as a standalone diagnostic tool, but provides additional information the physician can use for further clinical management. Both devices are indicated for adult CT scans in DICOM format.

Based on the above, HealthOST has the same intended use and the substantially equivalent indications for use as the predicate device (AI-Rad Companion (Musculoskeletal), K193267).

Comparison of Technological Characteristics

Technological Characteristics	**Proposed Device: HealthOST Device**	**Primary Predicate Device: AI-Rad Companion (Musculoskeletal) (K193267)**	**Summary**
Regulation			
Product Code	JAK	JAK	Same
Regulation Number	21 CFR §892.1750	21 CFR §892.1750	
General			
Modality	CT	CT	Same
Image format	DICOM	DICOM	Same
Analysis and Measurement			
Detection of Vertebra	Yes	Yes	Same
Labeling of Vertebra	Yes	Yes	Same
Segmentation of Vertebra	Deep-learning-based segmentation of vertebras	Deep-learning-based segmentation of vertebras	Same
Measurement of Vertebral Heights	Yes, comparison with neighboring measurements Application of Genant criteria, indication if critically different	Yes, comparison with neighboring measurements. Application of Genant criteria, indication if critically different	Same

Measurement of Hounsfield (HU) value	HU measurements based on segmentation results Indication to user if outside reference range	HU measurements based on segmentation results	Similar, the subject device highlights HU outside of reference range. This does not raise new questions of safety and effectiveness.
Reporting			
Device output	1. Vertebrae label/name 2. 3 lines representing the anterior, middle, and posterior points measures, together with relative measurements 3. % Height loss and relative Genant category (20) 4. Bone density measured in HU	1. Vertebrae label/name 2. 3 lines representing the anterior, middle, and posterior points measures, together with relative measurements 3. Bone density measured in HU	Similar, new information does not raise new questions of safety and effectiveness.

The predicate devices and the subject HealthOST device are all standalone software devices that are intended for the same purpose, i.e.: to perform quantitative and qualitative analysis of the spine in CTs. Both devices are DICOM-compliant software devices incorporated into the radiology infrastructure of a clinical center. The devices all utilize an artificial intelligence algorithm and run on adult CT scans.

Both the subject device and predicate device perform segmentation and naming of the vertebrae, measurement of vertebral height and bone density as measured in HU within the vertebrae. In addition, both devices indicate if there is a critical difference in height as applied through the Genant criteria. In both devices, the procedure is performed in parallel to and in conjunction with the standard processing of image storage and availability for clinician assessment.

Nano-X AI Ltd. believes that the technological characteristics of the subject device described above raise the same types of safety and/or effectiveness questions as the predicate. The verification and validation tests, in addition to the stand-alone performance assessment of the HealthOST Device demonstrate that the HealthOST Device performance is substantially equivalent to the predicate device.

Conclusion:

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

The results of the performance comparison study demonstrated that the HealthOST device performs as intended, similarly to the predicate device. The HealthOST device is therefore substantially equivalent to the predicate device.