November 28, 2023

Aidoc Medical, Ltd.
℅ John Smith
Partner
Hogan Lovells U.S. LLP
555 Thirteenth Street NW
WASHINGTON, DC 20004

Re: K231631
    Trade/Device Name: BriefCase-Quantification
    Regulation Number: 21 CFR 892.1750
    Regulation Name: Computed Tomography X-Ray System
    Regulatory Class: Class II
    Product Code: JAK
    Dated: October 30, 2023
    Received: October 30, 2023

Dear John Smith:

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 (the 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 available 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.

Additional information about changes that may require a new premarket notification are provided in the FDA guidance documents entitled "Deciding When to Submit a 510(k) for a Change to an Existing Device" (https://www.fda.gov/media/99812/download) and "Deciding When to Submit a 510(k) for a Software Change to an Existing Device" (https://www.fda.gov/media/99785/download).

Your device is also subject to, among other requirements, the Quality System (QS) regulation (21 CFR Part 820), which includes, but is not limited to, 21 CFR 820.30, Design controls; 21 CFR 820.90, Nonconforming product; and 21 CFR 820.100, Corrective and preventive action. Please note that regardless of whether a change requires premarket review, the QS regulation requires device manufacturers to review and approve changes to device design and production (21 CFR 820.30 and 21 CFR 820.70) and document changes and approvals in the device master record (21 CFR 820.181).

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 Part 803) for devices or postmarketing safety reporting (21 CFR Part 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 Part 4, Subpart A) for combination products; and, if applicable, the electronic product radiation control provisions (Sections 531-542 of the Act); 21 CFR Parts 1000-1050.

Also, please note the regulation entitled, "Misbranding by reference to premarket notification" (21 CFR 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,

Lu Jiang

Lu Jiang, Ph.D.
Assistant Director
Diagnostic X-Ray Systems Team
DHT8B: Division of Radiologic Imaging
   Devices and Electronic Products
OHT8: Office of 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: 07/31/2026

See PRA Statement below

510(k) Number *(if known)*

K231631

Device Name

BriefCase-Quantification

Indications for Use *(Describe)*

BriefCase-Quantification is a software intended for use in the analysis of non-cardiac-gated non-contrast CT (NCCT) images that include the heart in adult patients aged 30 and older.

The device is intended to assist physicians by providing the user with a four-category Coronary Artery Calcification (CAC) of plaques, which present a risk for coronary artery disease, together with preview axial images of the detected calcium meant for informational purposes only.

The BriefCase-Quantification results are not intended to be used on a stand-alone basis for clinical decision-making or otherwise preclude clinical assessment of cases. Clinicians are responsible for viewing full images per the standard of care.

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.

510(k) Summary
Aidoc Medical, Ltd.'s BriefCase-Quantification
K231631

Submitter:

Aidoc Medical, Ltd.
3 Aminadav St.
Tel-Aviv, Israel
Phone: +972-73-7946870

Contact Person: Amalia Schreier, LL.M.

Date Prepared: November 27, 2023

Name of Device: BriefCase-Quantification

Classification Name: Computed Tomography X-ray System

Regulatory Class: Class II

Product Code: JAK (21 CFR 892.1750)

Primary Predicate Device: HealthCCSng (K210085)

Reference Device: iCAC (K230223)

Device Description

BriefCase-Quantification is a standalone software as a medical device intended for use in the analysis of non-cardiac-gated non-contrast CT (NCCT) images that include the heart to assist hospital networks and appropriately trained medical specialists. The software consists of a single module based on an algorithm programmed component and is intended to run on a linux-based server in a cloud environment.

The BriefCase-Quantification receives filtered routine, non-contrast, non-gated computed tomography (CT) scans, and processes them chronologically by running the algorithm on relevant series to evaluate calcified plaques in the coronary arteries. Following the AI processing, the output of the algorithm analysis is transferred to an image review software (the PACS or a desktop application).

The device generates a four-category output corresponding with the estimated quantity of calcium detected: very low, low, medium, and high. The categories composing the output of the device correspond with a validated visual assessment categorization of none, mild, moderate, and severe [1] in agreement with categorized Agatston scores indicated in the literature (very low: 0; low: 1-100; medium: 101-400; high: ≥400). In addition, the categories accord with the 2016 SCCT/STR guidelines for coronary artery calcium scoring of non-contrast non-cardiac chest CT scans and are used as standard of care in clinical practice during CAC assessment in NCCT scans.

The BriefCase-Quantification software generates a preliminary summary report that is provided in the desktop application that includes applicable user warnings, the CAC detection category and number

of slices that include CAC. The report presents preliminary results only and instructs the user to review the full image and any other clinical information before making a clinical decision. For all analyzed scans, the user will be presented in the PACS with all the slices containing the measured coronary calcifications. On these images, the calcified areas will be represented to provide the user visibility on the areas which supported the category output. These slices will be presented along with the original slices. Preview images of the represented calcium are non-diagnostic and are available in the PACS for informational purposes only.

References:
[1] Shemesh, J., Henschke, C.I., Shaham, D., Yip, R., Farooqi, A.O., Cham, M.D., McCauley, D.I., Chen, M., Smith, J.P., Libby, D.M. and Pasmantier, M.W., 2010. Ordinal scoring of coronary artery calcifications on low-dose CT scans of the chest is predictive of death from cardiovascular disease. Radiology, 257(2), pp.541-548.

Intended Use / Indications for Use

BriefCase-Quantification is a software intended for use in the analysis of non-cardiac-gated non-contrast CT (NCCT) images that include the heart in adult patients aged 30 and older.

The device is intended to assist physicians by providing the user with a four-category Coronary Artery Calcification (CAC) of plaques, which present a risk for coronary artery disease, together with preview axial images of the detected calcium meant for informational purposes only.

The BriefCase-Quantification results are not intended to be used on a stand-alone basis for clinical decision-making or otherwise preclude clinical assessment of cases. Clinicians are responsible for viewing full images per the standard of care.

Comparison of Technological Characteristics

The subject BriefCase-Quantification for Coronary Artery Calcification (CAC) is substantially similar to primary predicate HealthCCSng (K210085) and to reference device iCAC (K230223), as explained below.

The subject, predicate and the reference devices are radiological computer-aided non-invasive post-processing software. All devices are artificial intelligence, deep-learning algorithms incorporating software packages for use with compliant scanners, PACS, and radiology workstations. The predicate HealthCCSng and the reference iCAC evaluate images from CT scanners as does the proposed device for BriefCase-Quantification for Coronary Artery Calcification (CAC). The reference and subject devices have four coronary calcium levels and detection categories.

The proposed device for BriefCase-Quantification for Coronary Artery Calcification (CAC) has similar technology and design as the predicate and reference devices, and similar indications for use - as all devices are intended to aid in the evaluation of radiological images. The subject, predicate and reference devices raise the same types of safety and effectiveness questions. A table comparing the key features of the subject device predicate and reference devices is provided below.

Table 1. Key feature comparison

	Primary Predicate Device HealthCCSng (K210085)	**Reference Device iCAC (K230223)**	**BriefCase-Quantification for Coronary Artery Calcification (CAC)**
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.	iCAC is a software device intended for use in estimating presence and quantity of coronary artery calcium for patients aged 30 years and above during routine care. The device automatically analyzes non-gated, non-contrast chest computed tomography (CT) images collected during routine care and outputs a visual representation of estimated coronary artery calcium segmentation (intended for informational purposes only) and both exact and four-category quantitative estimates of the patient's coronary artery calcium burden in Agatston units. The output of the subject device is made available to the physician on-demand as part of his or her standard workflow. The device-generated calcium score or score group can be viewed in the patient report at the discretion of the physician, and the physician also has the option of viewing the device-generated calcium segmentation in a	BriefCase-Quantification is a software intended for use in the analysis of non-cardiac-gated non-contrast CT (NCCT) images that include the heart in adult patients aged 30 and older. The device is intended to assist physicians by providing the user with a four-category Coronary Artery Calcification (CAC) of plaques, which present a risk for coronary artery disease, together with preview axial images of the detected calcium meant for informational purposes only. The BriefCase-Quantification results are not intended to be used on a stand-alone basis for clinical decision-making or otherwise preclude clinical assessment of cases. Clinicians are responsible for viewing full images per the standard of care.

	Primary Predicate Device HealthCCSng (K210085)	Reference Device iCAC (K230223)	BriefCase-Quantification for Coronary Artery Calcification (CAC)
		diagnostic image viewer. The subject device output in no way replaces the original patient report or the original chest CT scan; both are still available to be viewed and used at the discretion of the physician. The device is intended to provide information to the physician to provide assistance during review of the patient's case. Results of the subject device are not intended to be used on a stand-alone basis and are solely intended to aid and provide information to the physician. In all cases, further action taken on a patient should only come at the recommendation of the physician after further reviewing the patient's results.	
User population	Radiologists	Interpreting physicians	Hospital networks and appropriately trained medical specialists
Anatomical region of interest	Chest	Chest	Chest
Data acquisition protocol	Non-cardiac-gated CT studies that include the heart	Non-gated, non-contrast chest CT images	Non-cardiac-gated non-contrast CT images that include the heart

	Primary Predicate Device HealthCCSng (K210085)	**Reference Device iCAC (K230223)**	**BriefCase-Quantification for Coronary Artery Calcification (CAC)**
Calcified plaques evaluation	Yes	Yes	Yes
Interference with standard workflow	No	No	No
Algorithm	Artificial intelligence algorithm with database of images.	Artificial intelligence algorithm with database of images.	Artificial intelligence algorithm with database of images.
Slice Thickness	Up to 3.0 mm	Up to 5.0 mm	Up to 5.0 mm
Patient population	Patients aged 30 and older	Patients aged 30 and older	Patients aged 30 and older
Default threshold of calcium	130 HU (Hounsfield Units)	130 HU (Hounsfield Units)	130 HU (Hounsfield Units)
Report of the calcium score - output	Yes, Coronary Calcium Detection Category. 3 categories: ● 0-99 ● 10-399 ● >400	Yes, Coronary Calcium Detection Category and exact Agatston score. 4 categories (for detection category): ● 0 ● 1-99 ● 100-399 ● >_400	Yes, Coronary Calcium Detection Category: very low, low, medium, and high. ● The categories composing the output of the device correspond with a validated visual assessment categorization of none, mild, moderate, and severe in agreement with categorized Agatston scores indicated in the literature (very low: 0; low: 1-100; medium: 101-400; high: ≥400).
Structure	- HealthCCSng is an algorithm module that receives a non-cardiac-gated CT study from the	- The iCAC Device takes as an input non-contrast, non-gated chest CT scans via DICOM	- BriefCase-Quantification, is hosted on a cloud server, analyzes applicable CT images

	Primary Predicate Device HealthCCSng (K210085)	Reference Device iCAC (K230223)	BriefCase-Quantification for Coronary Artery Calcification (CAC)
	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.	transfer from the clinicians imaging database such as PACS or DICOM router. - The device uses a deep learning-based computer vision algorithm for its assessment.	that are acquired on CT scanner that are forwarded to BriefCase-Quantification - The results of the analysis are exported in DICOM format, and are sent to a PACS destination for review by medical specialists, to assist in the evaluation of CAC.

Performance Data

Pivotal Study Summary

Aidoc conducted a retrospective, blinded, multicenter, study with the BriefCase-Quantification software to evaluate the software's performance in providing estimated coronary artery calcification detection category from non-cardiac-gated NCCT images that include the heart in 433 cases from 6 US-based clinical sites, both academic and community centers, compared to the ground truth. In cases where the reviewers disagree on the level of CAC, the senior US board-certified radiologist provided a final opinion which has established the ground truth. The cases collected for the pivotal dataset were all distinct in time or center from the cases used to train the algorithm.

Primary Endpoint
The algorithm performance showed that the overall agreement between the ground truth and algorithm across estimated CAC scores was 87.1%. Because the overall agreement estimate was up to the prespecified performance goal, the study's primary endpoint was achieved.

Secondary Endpoint

The algorithm performance between the ground truth and algorithm, in individual categories, was as follows: very low = 95.1%; low = 81.3%; medium = 81.5%; and high =89.3% . Because the overall agreement estimate was up to the prespecified performance goal across all individual categories, the study's secondary endpoint was achieved.

Thus, the reported similar overall agreement for subject, predicate and reference devices demonstrates that when using the subject BriefCase-Quantification for Coronary Artery Calcification (CAC) the appropriately trained medical specialists may have the same benefits as when using the HealthCCSng and iCAC.

As can be seen in **Table 2** the mean age of patients whose scans were reviewed for BriefCase-Quantification for Coronary Artery Calcification (CAC) was 67.4 years, with a standard deviation of 12.8 years. Gender distribution was 50% male, and 50% female (**Table 3**). Scanner distribution can also be found in **Table 4** below.

Table 2. Descriptive Statistics for Age

	Mean	Std	Min	Median	Max	N
Age (Years)	67.4	12.8	30	69	90	432*

* 1 case did not have any age information in the DICOM metadata

Table 3. Frequency Distribution of Gender

Ground Truth Results	Gender					
	Female		Male		All	
	N	%	N	%	N	%
Very Low	64	62%	39	38%	103	100%
Low	50	47%	57	53%	107	100%
Medium	47	51%	45	49%	92	100%
High	54	41%	77	59%	131	100%
All	215	50%	218	50%	433	100%

Table 4. Frequency Distribution of Manufacturer

Manufacturer	Very Low	Low	Medium	High	All
GE	30 (25%)	27 (23%)	29 (24%)	33 (28%)	119 (100%)
Philips	20 (18%)	36 (33%)	28 (25%)	26 (24%)	110 (100%)

Manufacturer	Very Low	Low	Medium	High	All
Siemens	12 (23%)	13 (25%)	6 (12%)	21 (40%)	52 (100%)
Toshiba	41 (27%)	31 (20%)	29 (19%)	51 (34%)	152 (100%)
Total	103 (24%)	107 (25%)	92 (21%)	131 (30%)	433 (100%)

Clinical Subgroups and Confounders: Fully negative; Inflammatory; Neoplastic; Heart and Vascular; Trauma, Chronic diseases and None of the above.

In summary, performance validation data, combined with a comparison of overall agreement metric with the reference device demonstrated equivalent performance.

Conclusions

The subject BriefCase-Quantification for Coronary Artery Calcification (CAC), the predicate HealthCCSng and the reference iCAC are software devices intended to evaluate calcified plaques in the coronary arteries, which present a risk for coronary artery disease. The subject, predicate and the reference devices are not intended to be used as diagnostic devices. All three devices are software packages with similar technological characteristics and principles of operation, incorporating deep learning AI algorithms that process images. In all devices, the labeling instructs the user that the results are not intended to be used on a stand-alone basis for clinical decision making or otherwise preclude clinical assessment of CT studies.

The subject, predicate and reference devices operate in parallel to the standard of care workflow in the sense that they have the potential to allow accurate evaluation and facilitate the standard manual workflow. The BriefCase-Quantification for Coronary Artery Calcification (CAC) device is thus substantially equivalent and as safe and effective to the HealthCCSng and iCAC devices.