November 8, 2024

iCAD, Inc.
Spence Hartwell
Sr. Regulatory Affairs Manager
98 Spit Brook Road, Suite 100
NASHUA NH 03062

Re: K240417
Trade/Device Name: ProFound Detection (V4.0)
Regulation Number: 21 CFR 892.2090
Regulation Name: Radiological Computer Assisted Detection And Diagnosis Software
Regulatory Class: Class II
Product Code: QDQ
Dated: October 2, 2024
Received: October 7, 2024

Dear Spence Hartwell:

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.

FDA's substantial equivalence determination also included the review and clearance of your Predetermined Change Control Plan (PCCP). Under section 515C(b)(1) of the Act, a new premarket notification is not required for a change to a device cleared under section 510(k) of the Act, if such change is consistent with an

established PCCP granted pursuant to section 515C(b)(2) of the Act. Under 21 CFR 807.81(a)(3), a new premarket notification is required if there is a major change or modification in the intended use of a device, or if there is a change or modification in a device that could significantly affect the safety or effectiveness of the device, e.g., a significant change or modification in design, material, chemical composition, energy source, or manufacturing process. Accordingly, if deviations from the established PCCP result in a major change or modification in the intended use of the device, or result in a change or modification in the device that could significantly affect the safety or effectiveness of the device, then a new premarket notification would be required consistent with section 515C(b)(1) of the Act and 21 CFR 807.81(a)(3). Failure to submit such a premarket submission would constitute adulteration and misbranding under sections 501(f)(1)(B) and 502(o) of the Act, respectively.

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.

All medical devices, including Class I and unclassified devices and combination product device constituent parts are required to be in compliance with the final Unique Device Identification System rule ("UDI Rule"). The UDI Rule requires, among other things, that a device bear a unique device identifier (UDI) on its label and package (21 CFR 801.20(a)) unless an exception or alternative applies (21 CFR 801.20(b)) and that the dates on the device label be formatted in accordance with 21 CFR 801.18. The UDI Rule (21 CFR 830.300(a) and 830.320(b)) also requires that certain information be submitted to the Global Unique Device Identification Database (GUDID) (21 CFR Part 830 Subpart E). For additional information on these requirements, please see the UDI System webpage at https://www.fda.gov/medical-devices/device-advice-comprehensive-regulatory-assistance/unique-device-identification-system-udi-system.

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,

YANNA S. KANG -S

Yanna Kang, Ph.D.
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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.

Submission Number *(if known)*

K240417

Device Name

ProFound Detection (V4.0)

Indications for Use *(Describe)*

ProFound Detection V4.0 is a computer-assisted detection and diagnosis (CAD) software device intended to be used concurrently by interpreting physicians while reading digital breast tomosynthesis (DBT) exams from compatible DBT systems. The system detects soft tissue densities (masses, architectural distortions and asymmetries) and calcifications in the 3D DBT slices. The detections and Certainty of Finding and Case Scores assist interpreting physicians in identifying soft tissue densities and calcifications that may be confirmed or dismissed by the interpreting Physician.

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 K240417

Date Prepared: November 5, 2024

Submitter:
iCAD, Inc.
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Contact Person:
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Device Information:

Trade Name:	ProFound Detection V4.0
Common Name:	Medical Imaging Software
Classification:	Radiological Computer Assisted Detection and Diagnosis Software
Product Code:	QDQ
Regulation Number:	21 CFR 892.2090
Review Panel:	Radiology

Predicate Device:

510k Number:	K203822
Manufacturer:	iCAD, Inc.
Device Name:	ProFound AI V3.0

Device Description

ProFound Detection V4.0 is a computer-assisted detection and diagnosis (CAD) software device that detects malignant soft-tissue densities and calcifications in digital breast tomosynthesis (DBT) images. The ProFound Detection V4.0 software allows an interpreting physician to quickly identify suspicious soft tissue densities and calcifications by marking the detected areas in the tomosynthesis images. When the ProFound Detection V4.0 marks are displayed by a user, the marks will appear as overlays on the tomosynthesis images. Each detected finding will also be assigned a "score" that corresponds to the ProFound Detection V4.0 algorithm's confidence that the detected finding is a cancer (Certainty of Finding). Certainty of Finding scores are a percentage in range of 0% to 100% to indicate CAD's confidence that the finding is malignant. ProFound Detection V4.0 also assigns a score to each case (Case Score) as a percentage in range of 0% to 100% to indicate CAD's confidence that the case has malignant findings. The higher the Certainty of Finding or Case Score, the higher the confidence that the detected finding is a cancer or that the case has malignant findings.

Indications for Use/Intended Use

ProFound Detection V4.0 is a computer-assisted detection and diagnosis (CAD) software device intended to be used concurrently by interpreting physicians while reading digital breast tomosynthesis (DBT) exams from compatible DBT image acquisition systems. The system detects soft tissue densities (masses, architectural distortions and asymmetries) and calcifications in the 3D DBT slices. The detections and Certainty of Finding and Case Scores assist interpreting physicians in identifying soft tissue densities and calcifications that may be confirmed or dismissed by the interpreting Physician.

Comparison with Predicate Device

	Predicate Device **ProFound AI V3.0** **K203822**	**Subject Device** **ProFound Detection V4.0** **K240417**
Manufacturer	iCAD, Inc.	iCAD, Inc.
Classification Name	Radiological Computer Assisted Detection and Diagnosis Software	Radiological Computer Assisted Detection and Diagnosis Software
Regulation Number	21 CFR 892.2090	21 CFR 892.2090
Product Code	QDQ	QDQ
Intended Use / Indication for Use	ProFound AI® V3.0 is a computer-assisted detection and diagnosis (CAD) software device intended to be used concurrently by interpreting physicians while reading digital breast tomosynthesis (DBT) exams from compatible DBT systems. The system detects soft tissue densities (masses, architectural distortions and asymmetries) and calcifications in the 3D DBT slices. The detections and Certainty of Finding and Case Scores assist interpreting physicians in identifying soft tissue densities and calcifications that may be confirmed or dismissed by the interpreting Physician.	ProFound Detection V4.0 is a computer-assisted detection and diagnosis (CAD) software device intended to be used concurrently by interpreting physicians while reading digital breast tomosynthesis (DBT) exams from compatible DBT systems. The system detects soft tissue densities (masses, architectural distortions and asymmetries) and calcifications in the 3D DBT slices. The detections and Certainty of Finding and Case Scores assist interpreting physicians in identifying soft tissue densities and calcifications that may be confirmed or dismissed by the interpreting Physician.
End User	Radiologists	Radiologists

	Predicate Device **ProFound AI V3.0** **K203822**	**Subject Device** **ProFound Detection V4.0** **K240417**
Patient Population	Symptomatic and asymptomatic women undergoing mammography.	Symptomatic and asymptomatic women undergoing mammography.
Mode of Action	Image processing device intended to aid in the detection, localization, and characterization of soft tissue densities (masses, architectural distortions and asymmetries) and calcifications in the 3D DBT slices.	Image processing device intended to aid in the detection, localization, and characterization of soft tissue densities (masses, architectural distortions and asymmetries) and calcifications in the 3D DBT slices.
Image Source Modalities	Digital breast tomosynthesis slices	Digital breast tomosynthesis slices
Output Device	Softcopy Workstation	Softcopy Workstation
Supported Digital Breast Tomosynthesis Systems	• Hologic Selenia Dimensions/3Dimensions • Hologic 3Dimentions (Clarity HD) • GE Senographe Essential with SenoClaire • GE Senographe Pristina • Siemens Mammomat Inspiration both Standard and Empire Reconstruction • Siemens Mammomat Revelation both Standard and Empire Reconstruction	• Hologic Selenia Dimensions/3Dimensions
Certainty of Finding and Case Scores	• Represented on a 0% to 100% scale • Certainty of Finding relative score assigned to each detected region • Case Score assigned to each case (regardless of the number of detected regions)	• Represented on a 0% to 100% scale • Certainty of Finding relative score assigned to each detected region • Case Score assigned to each case (regardless of the number of detected regions)

	Predicate Device ProFound AI V3.0 K203822	Subject Device ProFound Detection V4.0 K240417
View Processing Component Architecture	Implements view processing in three steps.	Implements view processing in two steps.
Processing of Prior Exams	Not included	Included
CAD Output Display	Marks displayed on the current exam.	Marks displayed on the current exam.
Maximum Marks Per View	Unlimited	Three
Inclusion of PCCP	N/A	Included The PCCP in the subject device includes proposed modifications related to extending supported DBT image acquisition systems.

From the comparison above, the subject device and predicate device have the same Indications for Use and the same mode of action for image processing device intended to aid in the detection, localization, and characterization of soft tissue densities (masses, architectural distortions and asymmetries) and calcifications in the 3D DBT slices. The minor differences in the devices do not raise different questions of safety or effectiveness.

The subject device includes a Predetermined Change Control Plan (PCCP) that extends supported DBT image acquisition systems. In accordance with the PCCP, the CAD algorithm will be trained, tuned, and locked prior to commercial release of the algorithm with the extended DBT image acquisition system(s) listed in the PCCP. Updates to the device Instructions for Use (User Manual) will be made available, and include performance information per each DBT image acquisition system. DBT image acquisition systems in scope of the PCCP include Hologic 3Dimensions (Clarity HD), GE Senographe Essential with SenoClaire, GE Senographe Pristina, Siemens Mammomat Revelation both Standard and Empire Reconstruction, Siemens Mammomat Inspiration both Standard and Empire Reconstruction. The PCCP in the subject device with the proposed modifications related to extending supported DBT image acquisition systems do not raise different questions of safety and effectiveness from the predicate device.

All DBT image acquisition systems will be subject to standalone performance protocols to measure the performance of said DBT image acquisition system. A secondary protocol will be utilized to confirm the system performance to be statistically non-inferior to a baseline system performance as defined in the PCCP.

Assessment of Non-Clinical Performance Data

ProFound Detection V4.0 has been verified and validated. A Standalone Performance Assessment and Paired Analysis have demonstrated that ProFound Detection V4.0 has improved performance over the predicate device (V3.0). This has been accomplished by changing the neural network architecture for each subsystem and retraining the model, and by the processing of prior images when they are available. The primary endpoint of the assessment demonstrated that ProFound Detection V4.0 was not inferior to the predicate device (V3.0) on the same independent dataset, considering performance metrics for Sensitivity, False Positives Per Image (FPPI) and Area Under the ROC Curve (AUC). The secondary endpoint demonstrated that while using prior exams in conjunction with current exams, ProFound Detection V4.0 achieved non-inferiority over the predicate device (V3.0) for all primary endpoints, as well as achieving superiority in specificity. CAD performance on the different versions is provided in the table below on the same independent data set:

	Sensitivity	Specificity	AUC
ProFound Detection V4.0 using priors	0.9004 (0.8633-0.9374)	0.6205 (0.5846-0.6565)	0.8753 (0.8475-0.9032)
ProFound Detection V4.0	0.9004 (0.8633-0.9374)	0.5863 (0.5498-0.6228)	0.8714 (0.8423-0.9007)
Predicate (ProFound AI V3.0)	0.8725 (0.8312-0.9138)	0.5278 (0.4909-0.5648)	0.8230 (0.7878-0.8570)

A standalone study was conducted, which evaluated the performance of ProFound Detection version 4.0 without an interpreting physician. There were 952 cases meeting the inclusion and exclusion criteria for this study that were retrospectively collected by iCAD from U.S. image acquisition sites. Hologic DBT system exam data was collected from multiple sites, in accordance with pre-specified protocols. These cases included 251 biopsy proven cancer cases with 256 malignant lesions and 701 non-cancer cases. The standalone performance of ProFound Detection V4.0 was evaluated by comparing its results to established reference standards. These reference standards were derived from clinical data including radiology report, follow-up biopsy and pathology data. Each cancer case was a biopsy proven positive, truthed by an expert breast imaging radiologist who outlined the location and extent of cancer lesions in the case. The dataset is representative of the mammography screening population for such subgroups as breast density, BI-RADS, cancer lesion size, appearance, and whether or not the cancer is invasive. The data was collected from sites that are independent of those included in the training and

development. iCAD ensures the independence of this dataset by sequestering the data and keeping it separate from the test and development datasets. Demographic information about the test population is provided in the table below:

Cancer status	Malignant: 26% Normal/benign: 74%
Breast Density	Fatty: 65% Dense: 35%
Age (years old)	Minimum: 35 Maximum: 90 Mean: 63 25th percentile: 55 75th percentile: 71
Race/Ethnicity	White, non-Hispanic: 59% Black, non-Hispanic: 10% Asian or Pacific Islander, non-Hispanic:10% American Indian or Alaska Native, non-Hispanic: 0.3% Other or Multiracial, non-Hispanic: 8% Hispanic: 12%
Imaging Modality	DBT: 100%
Modality Manufacturer	Hologic: 100%
Exam Dates (range)	2018 - 2022

Unit and integration/system level (feature) testing was performed, and expected results were achieved.

Conclusion

The performance testing demonstrated that the subject device, ProFound Detection V4.0, can perform as well or better than the predicate device, ProFound AI V3.0. Therefore, the subject device is substantially equivalent to the predicate device.