SUMMARY OF SAFETY AND EFFECTIVENESS DATA (SSED)

I. GENERAL INFORMATION

Device Generic Name:	OCT imaging system with AI/ML software for adjunctive detection of breast cancer
Device Trade Name:	Claire™ OCT System
Device Procode:	SHH
Applicant's Name and Address:	Perimeter Medical Imaging AI, Inc. 555 Richmond St W Suite #511, Toronto, Ontario, Canada M5V 3B1

Date(s) of Panel Recommendation: None

Premarket Approval Application (PMA) Number: P250008

Date of FDA Notice of Approval: March 3, 2026

Breakthrough Device: Granted breakthrough device status on April 14, 2021 (Q210535) because the device and proposed indications for use met the Breakthrough Device criteria.

II. INDICATIONS FOR USE

The Claire OCT System is an adjunctive three-dimensional imaging tool which provides volumetric cross-sectional, real-time depth visualization, coupled with an artificial intelligence computer-aided detection algorithm which identifies and marks focal areas suspicious for breast cancer and is used concurrently with physician interpretation of the images. Claire is intended for use in conjunction with other standard methods for evaluation of the margins of excised lumpectomy tissue during surgical procedures in patients with a biopsy-confirmed diagnosis of breast cancer.

III. CONTRAINDICATIONS

- The Claire OCT System should not be used to replace standard tissue histopathology assessment.
- The Claire OCT System should not be used for diagnosis.

IV. WARNINGS AND PRECAUTIONS

The warnings and precautions can be found in the Claire OCT System labeling.

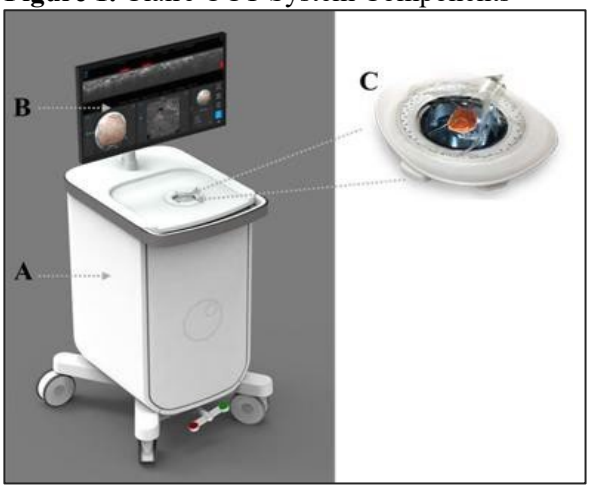
V. DEVICE DESCRIPTION

The Claire OCT System, or referred to as Claire in this document, is an imaging tool for margin assessment of lumpectomy and shave margin specimens. It uses Optical Coherence Tomography (OCT) coupled with photographic surface imaging and image review manipulation software to produce high-resolution, sub-surface images, up to 2 mm deep, of excised breast tissue from patients with a preoperative diagnosis of ductal carcinoma in situ (DCIS) and/or invasive ductal carcinoma (IDC). Claire images intact specimens of ex vivo tissue for a clinician to review in real

time during the operation, while preserving specimen integrity for post-operative evaluation.

The Claire equipment is a stand-alone, cart-mounted system composed of three main components (**Figure 1**).

Figure 1. Claire OCT System Components



The Claire includes (A) a mobile cart for housing system components and providing mobility; (B) a touchscreen monitor for user interface and image control; and (C) single-patient consumables for tissue positioning and imaging.

The specimen is positioned against the flat, OCT-transparent imaging window of the specimen tray. The Claire system features a scan acquisition diameter of up to 8.7 cm (3.4 in) and can accommodate specimens as large as 10 cm (3.9 in) in diameter. The device scans the specimen using near-infrared light to collect an array of cross-sectional, wide-field OCT (WF-OCT) images (B-scans). Changes in the optical properties (namely scattering, absorption, and index of refraction) of the specimen create features in the B-scan images. These images are viewed together to create volumes of WF-OCT images for the user to review with up to 50-µm resolution. Integrated live-specimen photography during WF-OCT image acquisition allows for annotation and manipulation directly through the system's user interface. Additionally, the device enables scanning from all sides of the specimen in any position.

Each case contains two-dimensional, cross-sectional WF-OCT B-scan images; two-dimensional, transverse WF-OCT enface images; and photographic surface images of a specimen. These case data enable a trained user to correlate microstructure features seen in Claire WF-OCT images to a location on the tissue specimen. Claire includes image review manipulation software for manually interacting with the WF-OCT images and annotating regions of interest (ROIs).

The device additionally contains an ImgAssist software feature, which uses an artificial intelligence (AI)-based algorithm to identify morphological features within the WF-OCT images suspicious for breast cancer. This deep-learning algorithm is based on a multi-layered convolutional neural network (CNN) and performs binary classification of ROIs in a WF-OCT B-scan acquired on Perimeter's Claire OCT System, into a "suspicious" and "non-suspicious" class. The suspicious ROIs detected by the deep-learning algorithm are then highlighted to draw the user's attention. The user can turn the ImgAssist display ON, ON (Show Less), or OFF at their discretion. The "Show

Less" option is based on a higher algorithm threshold which reduces the number of ROIs being flagged as suspicious.

VI. ALTERNATIVE PRACTICES AND PROCEDURES

The gold standard for breast cancer resection margin assessment is permanent histopathology, which involves measuring the microscopic margin distance (the standard for reporting distance of cancer cells from the inked surface in millimeters) for all six margins of the primary specimen, as well as any new margins created from additional resected tissue (also called margin shaves). Permanent histopathology is conducted post-operatively. The Claire OCT system is intended to be used intraoperatively to assist the resection procedure and is not intended to replace post-operative histopathology evaluation.

There are several alternative intraoperative assessment tools and methods available for adjunctive detection or removal of cancerous tissue during a lumpectomy[6-9].

These methods include:

- Intraoperative pathology assessment
    - Frozen section analysis
    - Imprint cytology
- Intraoperative imaging
    - Ultrasound imaging
    - Specimen radiograph
    - In vivo fluorescence imaging of the lumpectomy cavity
- Gross examination and palpation of the lumpectomy cavity
- Gross examination and palpation of the ex vivo lumpectomy specimen
- Intraoperative radiofrequency spectroscopy of the ex vivo lumpectomy specimen
- Routine cavity shaves

There is also an alternative surgical intervention - removal of the entire breast (mastectomy). Each alternative has its own advantages and disadvantages. A patient should fully discuss these alternatives with his/her physician to select the method that best meets expectations and lifestyle.

VII. MARKETING HISTORY

The Claire OCT System has not been marketed in the United States or any foreign country.

VIII. POTENTIAL ADVERSE EFFECTS OF THE DEVICE ON HEALTH

The Claire OCT System poses no patient-contact risk, as it is used exclusively *ex vivo* on excised tissue and does not physically contact the patient's body. OCT is a low-power optical technology that uses non-ionizing near-infrared light for imaging. No device-related adverse events were reported during the pivotal clinical trial (see Section X below).

Potential adverse effects that could be associated with device use include:

- Extended procedure time
- Errors in device image interpretation

- Unnecessary removal of healthy tissue, potentially affecting cosmetic outcomes

Although not associated with the Claire OCT System, common surgery-related adverse events may occur. These include, but are not limited to, seroma, breast swelling, infection, hematoma, and breast pain.

IX. SUMMARY OF NON-CLINICAL STUDIES

Perimeter has conducted verification and validation activities for the Claire OCT System to confirm that the design outputs of the device meet its design input requirements, and that the product will meet the user needs and intended use of the product. Information on the tests conducted and their results are summarized in **Table 1.**

Table 1. Summary of Non-clinical System and Component-level Testing

Test	Purpose	Method	Result
System Verification	Ensure system meets all pre-defined Product Requirements, including critical imaging and mechanical performance specifications.	Verification tests were conducted against the System Verification Plan. Success required meeting 100% of defined specifications, including the functionally relevant metrics below: • Axial Resolution: ≤ 15 µm in tissue • Lateral Resolution: ≤ 50 µm • Scan Depth: ≥ 2.2 mm • Scan Time: ≤ 5 seconds for low-density 1 cm x 1 cm scan area • Max Vacuum Pressure: ~13 inHg	Passed
Biocompatibility	Assess biocompatibility at the system level	• FDA Guidance: *Use of International Standard ISO 10993-1 "Biological evaluation of medical devices - Part 1: Evaluation and testing within a risk management process"* (September 8, 2023) • ISO 10993-1:2018, *Biological evaluation of medical devices -Part 1: Evaluation and testing within a risk management process* • ISO 10993-5:2009, *Biological evaluation of medical devices - Part 5: Tests for in vitro cytotoxicity*	Passed
Electrical Safety, Electromagnetic Compatibility (EMC), and Laser Testing	Test for Electrical Safety, EMC and Laser Safety	• IEC 60601-1:2005/A2:2021, *Medical electrical equipment - Part 1: General requirements for basic safety and essential performance* • IEC 60601-1-2:2014+A1:2020, *Medical electrical equipment -Part 1-2: General requirements for basic safety and essential performance - Collateral Standard: Electromagnetic disturbances - Requirements and tests, and related standards* • *IEC 60825-1:2014, Safety of laser products - Part 1: Equipment classification and requirements*	Passed

Table 1. Summary of Non-clinical System and Component-level Testing

Test	Purpose	Method	Result
Software Verification & Validation	Ensure software meets software requirements	• IEC 62304:2006+A1:2015, Medical device software – Software life cycle processes • FDA Guidance: Content of Premarket Submissions for Management of Cybersecurity in Medical Devices (September 27, 2023) • Testing was conducted per IEC 62304 and FDA Guidance for Enhanced Documentation Level devices (see row below for additional Cybersecurity details). Verification activities included source code inspections, unit testing, boundary testing, and integration testing to ensure the integrity of individual software units and their combined functionality. System-level functional testing verified that the software meets all defined requirements, including safety-critical performance and user interface logic. Rigorous defect tracking and dispositioning were maintained throughout the life cycle to meet all software specifications.	Passed
Cybersecurity	Ensure device security risk management and data protection	• AAMI TIR57: 2016- *Principles for medical device security—Risk management* • FDA Guidance: *Content of Premarket Submissions for Management of Cybersecurity in Medical Devices* (September 27, 2023) • Industry Guidance: *Health Sector Coordinating Council Health Industry Cybersecurity - Medical Device and Health IT Joint Security Plan Version 2.0* (March 2024) • Industry Guidance: *Framing Software Component Transparency: Establishing a Common Software Bill of Materials (SBOM) Second Edition* (October 2021) • Testing confirmed robust access control via user credentials, automated data anonymization for PHI protection during export, and mitigation of malware risk via functional lockdown and malware scanning capabilities. The system includes active and redundant activity logging for data integrity and incident response investigation. • Third-party Penetration Testing successful per the following methodologies: • UL 2900, IEC TR 60601-4-5, ISO/IEC 17025, IEC 81001-5-1, MITR ATT&CK, PTES, OSSTMM, OWASP, NIST800-115, WASC, NVD, CAPEC, CWE, CVSS	Passed
ImgAssist Standalone Performance	Evaluate standalone performance of the artificial intelligence (AI) model	• AAMI/CR34971:2022, *Guidance on the Application of ISO 14971 to Artificial Intelligence* • ISO/IEC TS 4213:2022, *Information technology — Artificial intelligence — Assessment of machine learning classification performance*	Passed

Table 1. Summary of Non-clinical System and Component-level Testing

Test	Purpose	Method	Result
Usability	Evaluate usability of the system and effectiveness of standardized training program	• FDA Guidance: *Applying Human Factors and Usability Engineering to Medical Devices* (February 3, 2016) • IEC 62366-1 Ed. 1.1 B:2020, *Medical devices - Part 1: Application of usability engineering to medical devices*	Passed
Packaging and Shipping	Test that packaging configuration maintains the integrity of the package and product during handling and transportation	• International Safe Transit Association (ISTA) Procedure 3B, *Less-than-Truckload (LTL) Shipment*	Passed
Reprocessing Cleaning / Disinfection	Evaluate reprocessing materials and methods	• FDA Guidance: *Reprocessing Medical Devices in Health Care Settings: Validation Methods and Labeling* (March 17, 2025) • Evaluation of compatibility of materials and methods in user reprocessing instructions	Passed

System Validation	Ensure system meets all User Requirements and intended use for intraoperative margin assessment.	• Validation tests were conducted under simulated clinical conditions. Success was defined as meeting 100% of User Needs without failures. Tests encompassed at a minimum the categories below:
		  • Integrated system functionality
		  • Specimen handling and immobilization
		  • Scanning workflow
		  • System operation time
		  • User Interface
		  • Imaging performance
		  • General Usability
		  • Installation
		  • Serviceability
			Passed

X. SUMMARY OF PRIMARY CLINICAL STUDIES

Algorithm Training

The artificial intelligence model, ImgAssist 2.0, that highlights suspicious regions of interest on the Claire OCT System images, was trained using histopathology-confirmed breast cancer tissue (DCIS and IDC) from 180 participants during a clinical study (unpublished data: Schmidt 2018, Mount Sinai New York; Thompson A 2021, Baylor College of Medicine; Kristhnamurthy 2021, University of Texas MD Anderson Cancer Center; Jatoi 2021, UTSA; DuPree 2020, Northern Arizona Healthcare).

Pivotal Study

A pivotal clinical study was conducted to establish a reasonable assurance of safety and effectiveness of the Claire OCT System in reducing unaddressed positive margins in breast lumpectomy procedures when used with standard intraoperative margin assessment (NCT05113927). The study was performed in the US under approved investigational device

exemption (IDE) G210177. A summary of the clinical study is presented below.

A. Study Design

The pivotal study was a prospective, multi-center, randomized, double-arm trial conducted to assess the safety and effectiveness of the Claire OCT system in reducing positive margin rates in female patients with breast cancer undergoing breast conservation surgery. Eligible patients were enrolled between December 1, 2021 and September 23, 2024 across 11 investigational sites. Data collection continued through October 21, 2024 encompassing a total of 613 patients.

The study included a training phase followed by a randomized phase. The randomized phase was further divided into Part A and Part B. In Part A, a developmental version of the AI algorithm was utilized. The algorithm was then updated in accordance with a prespecified development plan, and the finalized model was evaluated in Part B. AI enhancements were blinded to the ongoing clinical trial data, i.e., study Part A results were not used to tune the algorithm that was tested in Part B. Three new clinical sites were also added for Part B, the final study.

During the training phase, site research personnel underwent a standardized, multi-phase training program that introduced fundamental use concepts, demonstrated correct use of the device, and provided supervised intraoperative use. Surgeons trained to interpret OCT images underwent initial classroom training, followed by a practical intraoperative training phase called "Roll-In." During this period, a minimum of 5 and maximum of 10 consented individuals had their lumpectomy tissue and any additional standard of care (SOC) shaves imaged using the Claire OCT System. Surgical cases were conducted under the guidance of a sponsor OCT imaging expert to ensure appropriate device use and interpretation of the images.

During the randomized phase of the study, patients were randomly assigned to either the device or control arm in a 2:1 ratio, with randomization revealed only after the surgeon declared the standard lumpectomy complete (except in cases with destructive methods, such as intraoperative pathology to enable imaging of the intact specimen). In the control arm, patients received standard of care lumpectomy procedures without use of the Claire OCT system. SOC intraoperative assessment modalities included visual inspection, specimen radiograph, radiofrequency spectrometry (MarginProbe), Faxitron imaging device, 2D Hologic Trident, Kubtec's Mozart 3-D, palpation, intraoperative pathology, ultrasound, and shave biopsies of the margin at the surgeon's discretion. In the device arm, patients received SOC followed by use of the Claire device with optional device-informed shaves.

In this study, the control arm served to maximize safety and reduce bias within the study by keeping the surgeon blinded to device use during the SOC procedure. The primary analyses were conducted based on within-subject comparison of patients in the device arm only.

1. Clinical Inclusion and Exclusion Criteria

Enrollment in the Pivotal Study was limited to patients who met the following inclusion criteria:

- Female
- Age 18 years or older
- Patients undergoing elective breast conservation surgery for the treatment of Stage 0-III invasive ductal and/or ductal carcinoma *in situ*
- May include subjects treated with neo-adjuvant therapy (endocrine and/or chemotherapeutic),

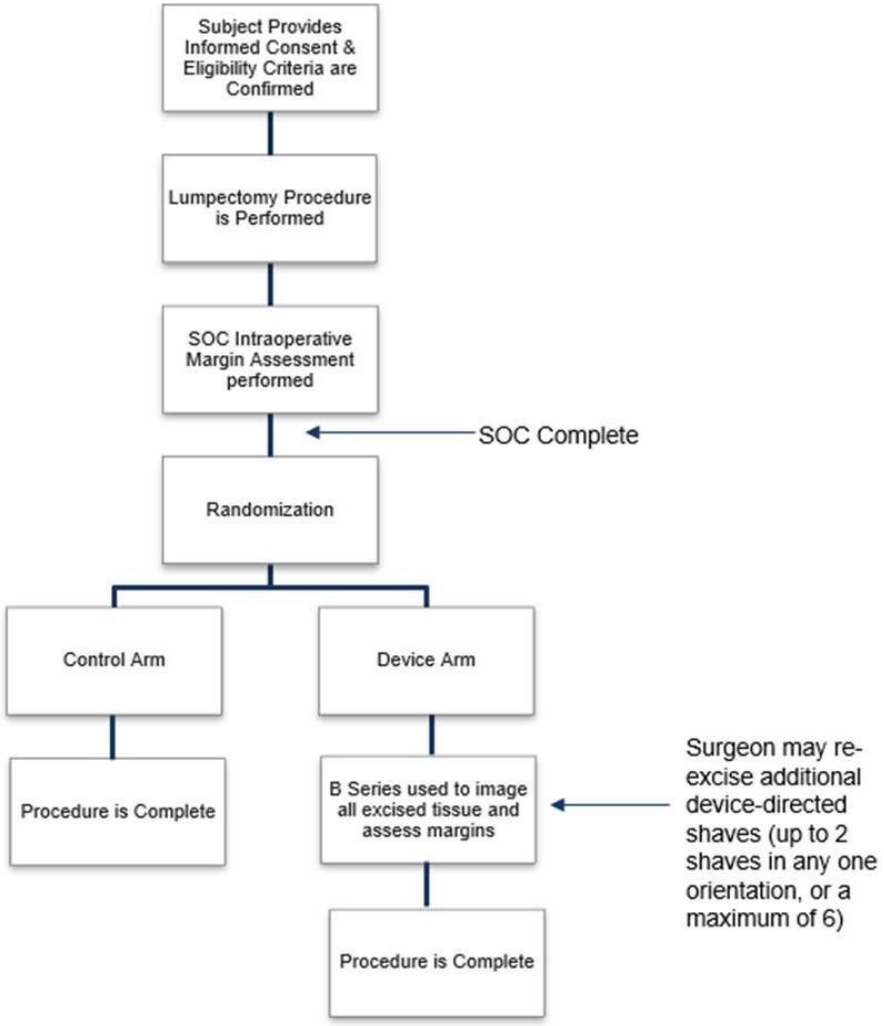
but not required for study inclusion
- Ability to understand and the willingness to sign a written informed consent document

Patients were not permitted to enroll in the pivotal study if they met any of the following exclusion criteria:
- Male
- Metastatic cancer (Stage IV)
- Lobular carcinoma as primary diagnosis
- Previous ipsilateral breast surgery for benign or malignant disease within two years (this includes implants and breast augmentation)
- Subjects with multi-centric disease (histologically diagnosed cancer in two different quadrants of the breast), unless resected in a single specimen
- Subjects with bilateral disease (diagnosed cancer in both breasts)
- Participating in any other investigational margin assessment study which can influence collection of valid data under this study
- Use of cryo-assisted localization
- Currently lactating
- Current pregnancy
- Patients for whom the specimen margins have been destroyed, damaged, or are otherwise not intact prior to imaging (device arm only) imaging

2. Study Procedure and Follow-up Schedule

The study procedure and surgical workflow are visualized in **Figure 2**. All subjects were randomized only after SOC was complete.

Figure 2. Lumpectomy Procedure and Device Intervention Workflow



Note: Device was named B Series when the study was conducted. Now the device name is changed to Claire™ OCT System.

After surgery, resected specimens were sent to the pathology laboratory for grossing and margin assessment according to the standard of care. To ensure an unbiased pathology assessment, pathologists were blinded to the study arm. Preoperatively, patients conducted a sub-assessment of the BREAST-Q patient-reported outcome instrument. Following the procedure, patients were scheduled to return for follow-up examinations at 4 – 12 weeks post-operatively, which included collecting AEs and completing BREAST-Q questionnaire. Key study workflow timepoints are shown in **Table 2**.

Table 2. Schedule of Events

Procedure	Pre-enrollment	Operative Period	Post-operative Period
Assessed eligibility	X		
Informed consent	X		
Preoperative BREAST-Q questionnaire	X		
Standard-of-care lumpectomy procedure[a]		X	
Participant randomization		X	
Part B Device Arm: Intraoperative Device assessment and additional excisions, as applicable		X	
Pathological results (margin status)			X
Post-operative visit: Data collection of additional surgical interventions for positive or close margins and BREAST-Q Post-Operative Questionnaire			X
Re-excision information collected (if applicable)			X

[a] Surgeons were required to confirm completion of SOC prior to assessing Claire OCT images or excising any additional tissue with device aid.

3. Clinical Endpoints

With respect to effectiveness, the following endpoints were evaluated:

The primary endpoint, the occurrence of at least one unaddressed positive margin for a subject, was evaluated to detect a clinically favorable change following the adjunctive use of the Claire OCT System for participants undergoing a standard lumpectomy procedure. The study measured a within-subject comparison, enabling any change in the final margin status between the completion of SOC and the completion of device use to be directly attributed to supplemental device use.

The pivotal study was statistically powered to assess the primary effectiveness endpoint. Success for the primary endpoint was achieved if the probability of a patient having at least one unaddressed positive margin after SOC treatment, but none after SOC + Device exceeded 1% (Performance Goal) tested using a one-sided exact binomial test (alpha = 0.025).

The secondary effectiveness endpoints evaluated the number of unaddressed positive margins per participant and the number of false-positive shaves per participant associated with the adjunctive use of Claire. In addition, margin-level and subject-level effectiveness of clinical decisions aided with Claire were evaluated.

Effectiveness endpoints were designed as a representation of the clinical utility (i.e., clinical decisions aided by Claire), rather than a measure of the standalone performance of the device. Standalone device performance (sensitivity and specificity) at the margin-level were assessed post-hoc.

With respect to safety, the following was evaluated:

Safety was reported on all subjects enrolled, including the roll-in training phase (during which OCT interpretation and device use was practiced under sponsor guidance) and Parts A and B. Adverse events were assessed by recording all adverse events for the duration of the study and then analyzing by seriousness, severity, and device procedure-relatedness. Pre- and post-operative satisfaction with breasts was measured using the Satisfaction with Breasts subscale

score of the BCT module of the patient-reported outcomes measurement instrument BREAST-Q.

Tissue volume excised during the initial lumpectomy, re-excision rate, and operative time duration were also measured.

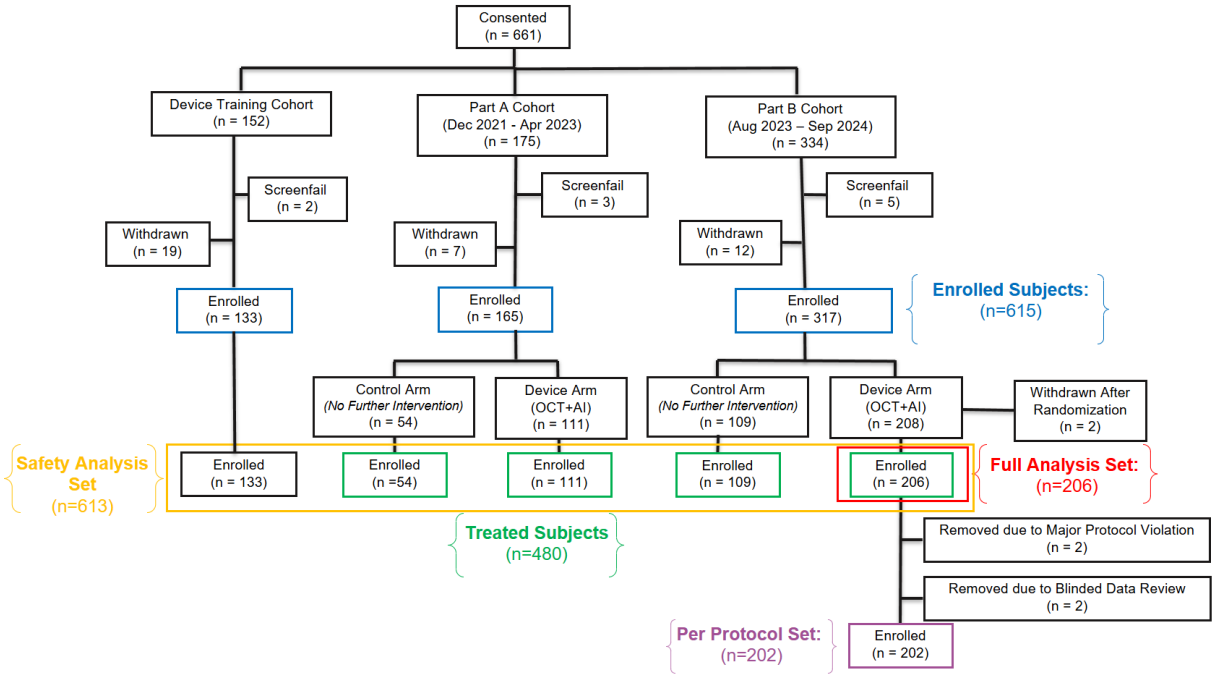
B. Accountability of PMA Cohort

Six hundred sixty-one (661) patients were consented in the pivotal study. Of these, 615 participants were enrolled.

The safety population consisted of all participants from the training portion (133 participants) of the study, Part A (165 participants), and Part B (317 participants). The effectiveness analysis consisted of the 208 Part B participants who were enrolled and randomized to the Device Arm. Two participants were withdrawn after randomization due to investigator discretion. This population (n=206) composes the full analysis set (FAS). An additional four participants were removed from the per protocol set (PPS) due to major protocol deviations for a total of 202 participants for this analysis set (**Figure 3**).

Part A was excluded from the Full Analysis Set because it utilized a prior developmental version of the AI algorithm. Following completion of Part A, the algorithm was updated in accordance with the prespecified development plan, resulting in the finalized model evaluated in Part B. As Part B reflects the performance of the commercially intended and locked algorithm version, it constitutes the appropriate population for assessment of clinical effectiveness.

Figure 3. CONSORT Diagram of Participant Enrollment in the Pivotal Trial



SUMMARY OF SAFETY AND EFFECTIVENESS DATA (SSED)

C. Study Population Demographics and Baseline Parameters

Demographics on enrolled participants in the device effectiveness population were representative of the US population of BCS patients (**Table 3**).

Table 3. Patient Demographics and Baseline Clinical Characteristics (Full Analysis Set, N=206)

Baseline Characteristic	Device Arm (SOC + Device)
Age, years	
Mean ± SD	62.3 ± 11.1
Median (min, max)	63.5 (32, 87)
Sex, Female	206 (100%)
Race	
White	173 (89.6%)
Native Hawaiian or Other Pacific Islander	0 (0.0%)
Black or African American	10 (5.2%)
Asian	9 (4.7%)
American Indian or Alaska Native	1 (0.5%)
Unknown/not reported	13 (6.3%)
Ethnicity	
Hispanic or Latino	8 (4.4%)
Not Hispanic or Latino	175 (95.6%)
Unknown	23 (11.1%)
Biopsy Type	
Fine needle	1 (0.5%)
Core needle	69 (33.5%)
Stereotactic	38 (18.4%)
Ultrasound guided	78 (37.9%)
MRI guided	8 (3.9%)
Other	12 (5.8%)
Pre-operative Diagnosis[a]	
IDC	91 (44.2%)
DCIS	68 (33.0%)
IDC and DCIS	45 (21.8%)
Other	5 (2.4%)
Tumor location[a]	
Lower-outer quadrant	18 (8.7%)
Upper-outer quadrant	78 (37.9%)
Lower-inner quadrant	19 (9.2%)
Upper-inner quadrant	32 (15.5%)
Other	62 (30.1%)

Data are presented as mean ± SD, mean (min, max), or n (%), unless otherwise noted. Abbreviations: DCIS, ductal carcinoma in situ; IDC, invasive ductal carcinoma; DCISM, microinvasive DCIS; SD, standard deviation; SOC, standard of care. More than one category may apply, resulting in percentages that may sum to more than 100%.

[a] Three subjects were represented in more than one category for Preoperative Diagnosis and Tumor Location; consequently, category totals sum to 209 instead of 206.

D. Safety and Effectiveness Results

1. Safety Results

The safety analysis was conducted using a comprehensive Safety Set that included 613 participants from the control arm (n=163), device arm (n=317), and training set (n=133).

Adverse Events

The incidence of adverse events (AEs) was comparable across groups (27.8%, 28.4%, and 30.7% in the training set, device arm, and control arms, respectively). Most reported AEs were minor, transient, and expected (e.g., localized discomfort, mild post-operative pain), consistent with AE rates observed in standard lumpectomy procedures. None of the AEs were reported as related to Claire OCT System use.

Serious Adverse Events

Serious adverse events (SAEs) were rare (< 1.2%) across all study arms, with none attributed to the device. Seven SAEs were reported among the 613 participants in the safety population. In the control arm, one participant experienced a sudden, unexpected death unrelated to the device or the lumpectomy procedure, while another experienced neutropenic fever and a COVID-19 infection. In the roll-in training portion, one participant developed a breast infection associated with the lumpectomy procedure, which was unrelated to the device use. In the device arm, three SAEs were reported: breast abscess related to lumpectomy, an acute kidney injury unrelated to the study, and a pneumothorax associated with a prior CPAP study.

Unanticipated Adverse Device Effects

No unanticipated adverse device effects (UADEs) were reported during the study.

Procedure-Related Adverse Events

Procedure-related AEs associated with lumpectomy were reported in 31 participants (23.3%) in the training group, 75 participants (23.7%) in the device arm, and 40 participants (24.5%) in the control arm. These events highlight the expected incidence of AEs directly related to the lumpectomy surgical procedure.

Satisfaction with Breasts using BREAST-Q (Cosmesis Outcomes)

Patient-reported BREAST-Q scores improved after surgery across all consented participants. The standard deviations showed similar levels of variability and central tendency across all three groups. This suggests the device aid did not negatively impact patient satisfaction scores. No formal statistical tests were conducted to assess the significance of these differences.

2. Effectiveness Results

Primary Effectiveness Endpoint

In the full analysis set (FAS) (N=206), at least one unaddressed positive margin was identified in 35 participants following SOC procedures and in 28 participants after the completion of SOC and device procedures (**Figure 4, Table 4**). This result demonstrates that the use of the device facilitated the detection and complete removal of all pathology-confirmed, excisable residual diseased margins that would have been missed by SOC alone in seven participants, representing an absolute reduction

of 3.4%, a relative reduction of 20.0%, and an overall positive change in clinical outcome.

Figure 4. Reduction in Residual Diseased Margins within each Assessment Portion During BCS (FAS, N=206)

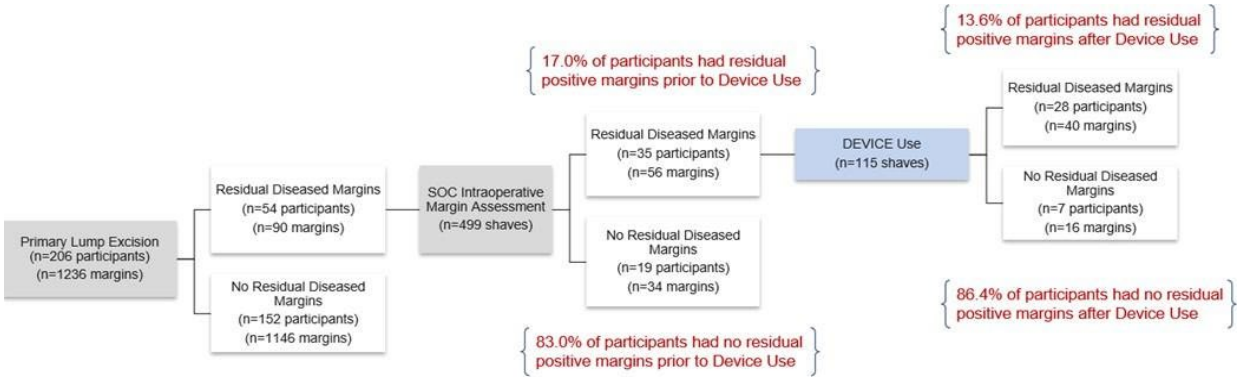


Table 4. Participants With At Least One Unaddressed Positive Margin (Full Analysis Set, N=206)

	Device Arm (N = 206)			
	After SOC	**After SOC + Device**	**Absolute Reduction**	**Relative Reduction**
≥ 1 Unaddressed Positive Margin[a]	35 (17%)	28 (13.6%)	7 (3.4%)[b]	7/35 (20%)
0 Unaddressed Positive Margins	171 (83%)	178 (86.5%)		

[a] According to NCCN and SSO/ASTRO guidelines.
[b] P = 0.005 (Exact Binomial Test; alpha 0.025)

The calculated p-value for this test was 0.0050 (Exact Binomial Test, alpha 0.025) and was statistically significant with 95% confidence interval (1.38%, 6.88%). This test evaluated the null hypothesis that the probability of a FAS participant having at least one unaddressed positive margin after SOC treatment but none after SOC combined with Claire (SOC+Device) was less than or equal to the performance goal of 1% (0.01), against the alternative hypothesis that it was greater than 0.01. Therefore, the difference in unaddressed positive margins was statistically significant using this test and the performance goal was met for the primary endpoint.

Additional clinical benefit was noted that was not captured in the statistical analysis of this endpoint, due to the narrow definition of an unaddressed positive margin by histopathology (defined using NCCN and SSO/ASTRO guidelines) and protocol specifications (**Table 5**). Two additional surgical cases had the potential to meet this endpoint criterion; however, residual disease was undetected during the SOC assessment portion of the lumpectomy that was correctly detected by the surgeon with device aid. In one instance, no further tissue could be excised from the diseased orientation, thus classifying the case as "addressed" by protocol definition. The other case was a major protocol violation in which the surgeon misunderstood the parameters surrounding the maximum number of shaves that were permitted to be excised with device-aid, resulting in a subsequent shave to not be excised, despite the surgeon classifying the margin as "positive" with device-aid.

It is additionally noteworthy that at least six patients who were classified in the false positive group had shaves containing disease that did not meet criteria for positive classification. However, in all

of these instances, the previous margin was negative for disease. As such, these device-directed shaves resulted in the removal of disease that would have otherwise remained undetected in the body cavity. By the protocol classification system, these shaves cannot be classified as True Positive because the previous margin was reported to be negative by pathology. This can potentially be attributed to limitations and under sampling at the time of final pathology, as lumpectomy specimens are representatively sampled, characterizing less than 1% of the entire volume of resected tissue.[1,2]

Furthermore, four additional surgical cases narrowly missed the primary endpoint. In these four cases, surgeons correctly identified disease with the device aid in close margins, defined as less than 1 mm from the inked surface. This includes one case with residual disease at 0.1 mm. These four participants had no other positive residual margins and would have otherwise met the primary endpoint. These additional cases demonstrate clinical value not captured in the primary endpoint, but indicate a potential benefit to the patient in that residual disease was appropriately detected with adjuvant use of Claire.

Table 5. Overall Clinical Benefit[a] of Claire Use (Full Analysis Set, N=206)

	Number of Participants
Participants with all residual disease[b] addressed with adjunctive use of Claire	7
Participants with all residual disease detected with adjunctive use of Claire, but not excised: • Additional tissue unable to be excised from 1 participant • Tissue not excised due to protocol violation from 1 participant	2
Participants with residual cancer removed in the outer shave (excised with use of Claire) and a negative interior margin upon SOC completion	6
Participants with close final margin(s) (i.e., any DCIS/IDC present ≤ 1 mm)	4
Total number of participants who received clinical benefit from adjunctive use of Claire	**19**

[a] Clinical benefit is defined as the detection of residual disease using Claire that was otherwise undetected by intraoperative SOC modalities and/or final histopathology assessment.
[b] Residual disease is defined as a positive margin after completion of SOC intraoperative margin assessment (prior to Claire use)

Secondary Effectiveness Endpoints

Secondary Endpoint 1: Number of Unaddressed Positive Margins

In the full analysis set (N=206), the numbers of unaddressed positive margins per participant were:

- After SOC only: mean 0.27 ± 0.74 and median 0.0 (0, 5)
- After SOC + DEVICE: mean 0.23 ± 0.71 and median 0.0 (0, 5)

The difference in mean number of unaddressed positive margins per participant, between groups, was 0.044. **Table 6** presents the number of participants who had between one and six unaddressed positive margins after standard of care (SOC) alone, compared to after SOC + Device.

Table 6. Frequency Distribution of Unaddressed Positive Margins

	0	1	2	3	4	5	6
After SOC (35 subjects)	171	24	5	4	0	2	0
After SOC + Device (28 subjects)	178	18	5	3	0	2	0

Secondary Endpoint 2: Number of False-Positive Shaves

In the full analysis set (N=206), 173 participants (84%) had one or more false-positive shaves collected within the SOC intraoperative margin assessment portion and 67 (32.5%) participants had one or more false-positive shaves collected as a result of device use. Note, the number of device-directed shaves was restricted in the study to 2 per orientation and at most 6 per subject.

The number of false-positive shaves per participant were:

- After SOC only: mean 2.2 ± 1.7 and median 2.0 (0, 11)
- After SOC + DEVICE: mean 2.7 ± 1.8 and median 3.0 (0, 11)

The difference in mean number of false-positive shaves per participant, between groups, was 0. 5 (indicating that adjunctive use of the device contributed on average 0.5 false positive shaves per participant.

Secondary Endpoint 3: Margin-Level Effectiveness of the Clinical Decisions Aided with Claire per NCCN and SSO/ASTRO Guidelines

While the primary endpoint examined the supporting role of the device in clearing a patient of all residual positive margins, this endpoint examines each margin independently. The margin-level effectiveness of clinical decisions aided by Claire, based on NCCN and SSO/ASTRO guidelines for histopathology ground truth, for the 1,335 device-assessable margins from the full analysis set, showed a sensitivity of 24.62% and a specificity of 91.34%, with a negative predictive value (NPV) of 95.95% and a lower positive predictive value (PPV) at 13.22% (**Table 7**).

Sixteen diseased margins out of 65 residual diseased margin opportunities (25%) were correctly identified with device-aid, while 105 margins (7.9%) were flagged as being suspicious using the device, but did not contain disease per pathology. 49 diseased margins (3.7%) were undetected by the clinician with device-aid and 1160 margins (86.9%) showed concordance between pathology and device-aided clinician assessment as having no disease.

Six (6) additional margins were deemed suspicious based on OCT imaging. However, subsequent histopathology margin assessments, following protocol criteria aligned with National Comprehensive Cancer Network (NCCN) and Society of Surgical Oncology (SSO)/ American Society for Radiation Oncology (ASTRO) guidelines, did not classify these margins as positive. In these cases, disease was present within 2 mm, which correctly correlated with OCT imaging findings, demonstrating concordance between imaging, clinician interpretation, and histopathological findings.

Table 7. Secondary Endpoint: Margin-Level Effectiveness of Device-Aided Clinical Decisions Based on NCCN and SSO/ASTRO Guidelines (Full Analysis Set, N=206)

Endpoint	Value
True Positives	16 (1.2%)
False-Positives	105 (7.9%)
False Negatives	49 (3.7%)
True Negatives	1160 (86.9%)
Missing Positive[a]	0
Missing Negative[a]	5 (0.4%)
Accuracy[b]	88.1% (95% CI: 85.9, 90.2).
Sensitivity[c]	24.62% (95% CI: 14.47, 36.84)
Specificity[c]	91.34% (95% CI: 89.39, 93.20)
Youden's J Statistic	15.95% (95% CI: 5.79, 27.95)
PPV (Positive Predictive Value)	13.22% (95% CI: 7.02, 20.18)
NPV (Negative Predictive Value)	95.95% (95% CI: 94.15, 97.51)

[a] "Missing" indicates that no OCT images were collected for surgeon interpretation

[b] Post-hoc analysis of the accuracy was performed with accuracy as an additional measure of margin-level effectiveness of clinical decisions aided with Claire, with the following definition in the full analysis population (FAS), where T=true, F=false, M=missing, P=positive, and N=negative.

Clinical decision accuracy = (TP+TN)/(TP+TN+FN+FP+MP+MN)

[c] This does not represent true (per margin) sensitivity or specificity of device standalone performance, but rather a measure of clinical decisions aided with the device after SOC was completed.

Secondary Endpoint 4: Subject-Level Effectiveness of the Clinical Decisions Aided with Claire on Final SOC Margins per NCCN and SSO/ASTRO Guidelines

The clinical decision aided by Claire for a participant was positive, negative, or missing based on the completeness of the data for the six final SOC margins. This endpoint is an assessment of whether the device correctly identified all of the diseased margins that had residual disease after completion of SOC. It is important to note that if any diseased margin was missed upon review with the device, that this is considered a false negative (FN), even in instances where some disease was correctly identified using the device.

The subject-level effectiveness of clinical decisions aided with Claire for the final SOC margins in the full analysis set (n=206), assessed according to NCCN and SSO/ASTRO guidelines, demonstrated a sensitivity of 27.03% and a specificity of 64.50%, with a negative predictive value (NPV) of 80.15% and a lower positive predictive value (PPV) at 14.71% (**Table 8**). This indicates the correct clinical decision was made using Claire to excise additional tissue in 10 out of 37 participants. Residual disease was detected in an additional four patients, but are not considered true positives (TPs), as only some of the diseased margins were correctly detected using the device. In addition, two of the FN cases had no further action possible (NFAP), so the device could not provide clinical benefit. Of the 35 patients with actionable residual diseased margins after completion of SOC margin assessments, 14 of these were identified as such by the clinician with aid of the device (40%).

Table 8. Secondary Endpoint: Subject-Level Effectiveness of Device-Aided Clinical Decisions with Ground Truth Based on NCCN and SSO/ASTRO Guidelines (Full Analysis Set, N=206)

Endpoint	Value
True Positives	10 (4.9%)
False Positives	58 (28.2%)
False Negatives	27 (13.1%)
True Negatives	109 (52.9%)
Missing Positive	0
Missing Negative	2 (1.0%)
Sensitivity[a]	27.03% (95% CI: 13.79, 44.12)
Specificity[a]	64.50% (95% CI: 56.78, 71.69)
Youden's J Statistic	-8.48% (95% CI: -24.50, 7.55)
PPV (Positive Predictive Value)	14.71% (95% CI: 7.28, 25.39)
NPV (Negative Predictive Value)	80.15% (95% CI: 72.45, 86.49)

[a] This does not represent true (per subject) sensitivity or specificity of device standalone performance, but instead is a measure of clinical decisions aided with the device after SOC was completed.

3. Additional Reporting

Additional analyses were performed for all participants who completed lumpectomy in the full analysis population.

Tissue Volume Excised

The mean total tissue volume excised during the index BCS was 74.0 ± 74.2 cm³, with a median of 54.4 cm³ (range: 5.0-690.60 cm^3) (**Table 9**).

Table 9. (CSR Table 16-1 REVISED) Tissue Volume Excised Per Participant During the Index Surgery, Full Analysis Set (n=206)

Device Arm (SOC + Device)	Mean ± SD (per participant)	Median (Min, Max) (per participant)
Total Tissue Volume per SOC + Device	74.0 ± 74.2	54.4 (4.9, 690.6)
Primary Lump Tissue Volume	56.5 ± 66.4	37.4 (4.4, 634.2)
SOC Shave Tissue Volume	14.7 ± 16.9	9.0 (0.0, 104.7)
Device-aided Shaves Tissue Volume	2.8 ± 6.7	0.0 (0.0, 56.4)
Total per SOC+Device: participants who underwent additional oncoplastic closures or reductions during surgery[a]	169.6 ± 166.9[a]	103.1 (18.6, 690.6)[a]

All data are presented as cm³
Means are calculated as an average among the 206 subjects.
[a]Note: This line item was assessed only for participants who underwent additional oncoplastic closures or reductions during surgery (n=15 patients)

Tissue excision with the Device accounted for a mean volume of only 2.8 cm³, representing 4% of the total excised volume, whereas SOC shaves contributed a mean volume of 14.7 cm³, or 20% of the total (**Table 10**). Furthermore, the mean number of shaves collected with the device was 0.6, compared to 2.4 shaves with SOC alone, which indicates minimal additional shaves. Note, the number of device-directed shaves was restricted in the study to 2 per orientation and at most 6 per subject. Additionally, the mean volume of device-aided shaves represented above is the average across all 206 subjects, including those who did not have any device-directed shaves. The number

of subjects with device-aided shaves was 76 out of 206 subjects (36.9%) who had a total of 115 device-aided shaves.

Table 10. Total Tissue Volume Excised During the Index Procedure

	Primary Lump	SOC Shaves	Device Shaves	Total Tissue Volume
Total volume per participant, %	76.3%	20.0%	4.0%	100%
Mean number of shaves collected	N/A	2.4	0.6	N/A

Post-Hoc Tissue Excision Comparison

Examination of the tissue volume of the shaves collected per participant during the initial surgery shows that the shaves excised per SOC intraoperative margin assessment accounted for 82.0% (95% CI: 78.1%, 85.8%) of the total volume of shaved tissue. Additionally, the mean number of shaves excised per SOC intraoperative margin assessment per participant accounted for 80.1% of the total number of shaves excised per participant (95% CI: 76.2%, 83.9%).

Operative Time Duration

The surgical duration, defined as the time from first incision to completion of skin closure, was recorded for all participants. The mean operation time was 87.7 ± 39.68 minutes, with a median of 79.5 minutes (range: 13-330 minutes), reflecting the expected variability in procedure length.

Re-excision Procedures

During the follow-up period (after the index surgery and prior to collection of the post-operative BREAST-Q), 23 participants (11.2%) underwent additional surgical procedures. Of these, 19 participants (9.2%) required a re-excision lumpectomy, and one participant (0.5%) underwent a mastectomy. Other procedures included sentinel lymph node biopsy in three participants (1.5%) and breast reconstruction in one participant (0.5%).

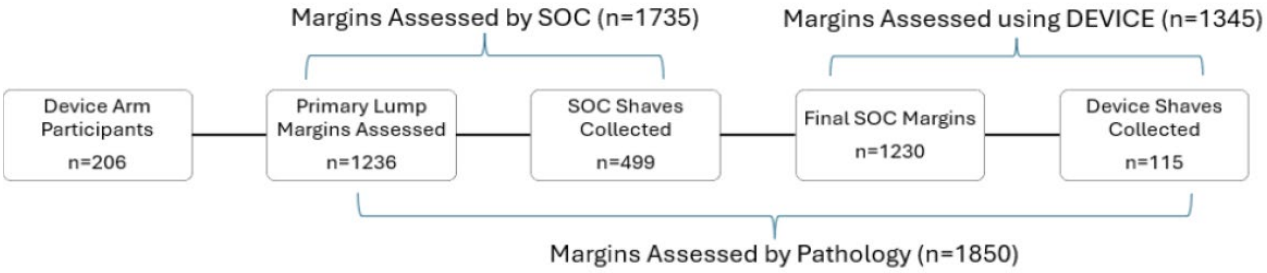
For participants diagnosed with DCIS with margin widths of ≤2 mm or IDC on ink (0 mm) who did not undergo re-excision, alternative management strategies were implemented, including adjuvant therapy.

4. Additional Post-Hoc Analyses

Margin-level clinical performance with and without adjunctive device use

Clinical effectiveness of SOC intraoperative assessments were evaluated with and without adjunctive device use for the subset of margins (N=1,735) that were evaluated by both the device and SOC modalities (**Figure 5**). As Claire serves as an adjunct technology to current SOC margin assessments methods, a combined analysis shows the impact of this additional tool on intraoperative assessment performance.

Figure 5. Schematic of Margins Assessable by SOC, Device, and Pathology, Full Analysis Set



This schematic outlines the assessment of surgical margins in the Claire Device Arm, Full Analysis Set (N=206). A total of 1,236 primary BCS margins were assessed, with 499 SOC shaves collected. After Final SOC margin assessment (n=1,230), an additional 115 shaves were evaluated using the device, bringing the total margins assessed by pathology to 1,850. Margins were categorized based on evaluation by SOC (n=1,735) and the Claire (n=1,345).
Note: 10 margins were not assessed using the Device due to no further action possible (NFAP), bringing the total number of margins assessed using the Device to 1,335.

The SOC + Device Aid analysis reflects the combined performance of SOC assessment followed by device-assisted evaluation. Margin assessments of the primary specimen and interior shaves were determined using SOC methods, whereas evaluation of the outermost margins incorporated the Device Aid. This analytical approach mirrors the protocolized serial use of SOC followed by the Device Aid during the pivotal clinical study.

Intraoperative SOC assessment alone had a margin sensitivity and specificity of 48.7% and 72.1% respectively. Intraoperative SOC assessment, followed by device-aided evaluation, accurately detected 72 of 117 diseased margins, resulting in a combined sensitivity of 61.5%, a 12.8% improvement with adjunctive device use (**Table 11**). This was accompanied by a relatively modest decrease in specificity from 72.1% during SOC to 65.8% with supplemental device aid.

Table 11. Per-Margin Clinical Effectiveness Performance on Final SOC Margins (N=1,735 Margins)

	Per-Margin Effectiveness Performance							
	Sensitivity(%)	**Specificity(%)**	**PPV(%)**	**NPV(%)**	**TP**	**TN**	**FP**	**FN**
SOC (N=1,735)	48.7 (95% CI: 39.7, 58.2)	72.1 (95% CI: 70.1, 74.2)	11.2 (95% CI: 8.0, 14.7)	95.1 (95% CI: 93.3, 96.7)	57	1167	451	60
SOC + Device Aid[a] (N=1,725)[b]	61.5 (95% CI:53.1, 70.8)	65.8 (95% CI: 64.5, 68.1)	11.6 (95% CI: 8.5, 14.9)	95.9 (95% CI: 94.2, 97. 5)	72	1059	549	45
Difference	+12.8	-6.2	+0.4	+0.8	+15	-108	+98	-15

PPV = Positive Predictive Value; NPV = Negative Predictive Value; TP = True Positive; TN = True Negative; FP = False Positive; FN = False Negative
[a] Represents a metric of surgeon clinical decision-making aided by the Claire OCT system.
[b] Note: 10 margins were not assessed using the device due to no further action possible due to anatomical constraints such as skin or fascia and were therefore removed from the combined performance metric.

Standalone ImgAssist Performance

A post-hoc analysis was conducted to evaluate the standalone performance of the ImgAssist 2.0 model based strictly on device output, without clinician interaction. Performance was evaluated against SSO/ASTRO ground truth to define margin status.

For the purpose of this standalone calculation, a margin was classified as positive if it contained one or more AI-detected suspicious clusters. It is important to note that this assumption does not reflect the intended use of the device. The ImgAssist feature is a decision-support tool designed to flag suspicious

features to augment the surgeon's judgment, rather than an autonomous diagnostic system.

The standalone analysis evaluated a total of 1,830 margins. This differs from the 1,735 margins evaluated in the clinical study report for the clinical effectiveness of SOC intraoperative assessments evaluated by both the device and SOC modalities. The total number of margins assessed by pathology was 1,850. For the standalone analysis, this original total of 1,850 margins was reduced by excluding 20 margins due to protocol deviations, labeling errors, or a lack of actionable tissue, resulting in 1,830 margins available for assessment. The difference arises because the standalone dataset includes cases where the device captured the data and standalone performance could be calculated, even if the surgeon's reads (SOC evaluations) were not available. Refer to **Table 12** for the analysis of all margins.

Table 12. ImgAssist Standalone Margin-Level Performance, All Margins (N=1,850)

	0.75 Threshold	**0.925 Threshold**
True Positives	106 (5.7%)	54 (2.9%)
False Positives	1283 (69%)	518 (28%)
False Negatives	14 (0.8%)	66 (3.6%)
True Negatives	427 (23%)	1192 (64%)
Missing Negative	18 (1.0%)	18 (1.0%)
Missing Positive	2 (0.1%)	2 (0.1%)
Sensitivity	88% (95% CI: 81,93)	45% (95% CI: 36,54)
Specificity	25% (95% CI: 23,27)	70% (95% CI:67,72)

For the analysis of Final SOC margins and Device Shaves (**Table 13**), a total of 1,335 margins were available with five negative margins (0.38%) missing because OCT imaging was not collected in accordance with the study protocol for a total of 1,330 margins.

Table 13. ImgAssist Standalone Margin-Level Performance, Final SOC & Device (N=1,335)

	0.75 Threshold	**0.925 Threshold**
True Positives	55 (4.1%)	28 (2.1%)
False Positives	915 (69%)	360 (27%)
False Negatives	10 (0.7%)	37 (2.8%)
True Negatives	350 (26%)	905 (68%)
Missing Negative	5 (0.4%)	5 (0.4%)
Sensitivity	86% (95% CI: 79, 92)	44% (95% CI: 35, 53)
Specificity	25% (95% CI: 23, 27)	70% (95% CI: 68, 72)

Breast Density Proxy Analysis

Information regarding patient breast density was not a required data point in the study's data collection protocol and was therefore not collected nor available for a direct subgroup analysis. However, an age-based subgroup analysis as a proxy for breast density, given the strong inverse correlation between age, menopausal status and mammographic density was performed[10-13].

The analysis stratified patients into three physiologically distinct age groups: ≤50, 51–64, and ≥65, and assessed performance at both the margin and subject-levels.

The ≤50 age group is intended to capture a primarily pre-menopausal group. The 51-64 age group represents a primarily menopausal group. Lastly, the ≥65 age group represents a distinct non-hormonal postmenopausal group during which lobular involution is largely completed for a large percentage of

women.

Efficacy outcomes within these subgroups were assessed using descriptive statistics, particularly as this sub-analysis contains small sample sizes and/or skewed datasets.

Subject-Level Device-Aided Effectiveness by Age Group

Subject-level performance of the device-aided clinical assessments are reported in **Table 14**.

Table 14. Subject Level Device-Aided Effectiveness, Final SOC Margins (N=206 subjects)

Age Cohort	TP	TN	FP	FN	Sensitivity	Specificity
≤50 (n=36)	1	21	11	3	0.250 (0.000 – 0.674)	0.656 (0.492 – 0.821)
51-64 (n=74)	2	34	26	11	0.154 (0.000 – 0.350)	0.567 (0.441 – 0.692)
≥65 (n=96)	7	54	21	13	0.350 (0.141 – 0.559)	0.720 (0.618 – 0.822)

Margin-Level Device-Aided Effectiveness by Age Group

An additional analysis at the margin-level for device-aided clinician assessment using the OCT+AI System is shown in **Table 15**, using these same age cohorts.

Table 15. Summary of Margin-Level ImgAssist Performance Metrics Stratified by Age Cohort (Part B Device Arm, N=206 patients)

Age Cohort	TP	TN	FP	FN	Sensitivity	Specificity
≤ 50 Years (Pre- and peri-menopausal women)	2	206	14	8	0.200 (0.000 – 0.448)	0.936 (0.904 – 0.969)
51–64 Years (Early-to-mid post-menopausal women)	3	415	43	18	0.143 (0.000 – 0.293)	0.906 (0.879 – 0.933)
≥ 65 Years (Older or "late" post-menopausal women)	11	539	48	23	0.324 (0.166 – 0.481)	0.918 (0.896 – 0.940)

The analysis of both the Subject-Level Device-Aided Effectiveness and the ImgAssist standalone performance (**Table 14** and **Table 15**) revealed no clinically meaningful difference in sensitivity or specificity between the age cohorts.

5. Subgroup Analyses

The following baseline characteristics were evaluated for potential association with safety and effectiveness outcomes: age. The study was not specifically powered for age subgroups. See Table 14 and Table 15 in the section above for details.

6. Pediatric Extrapolation

The study inclusion criteria required participants to be 18 years or older, and no clinical data were leveraged to support approval for a pediatric patient population. There were no participants under the age of 22; therefore, this study did not include any pediatric subpopulations. In this premarket application, existing clinical data was not leveraged to support approval of a pediatric patient population.

XI. FINANCIAL DISCLOSURE

The Financial Disclosure by Clinical Investigators regulation (21 CFR 54) requires applicants who submit a marketing application to include certain information concerning compensation to, and financial interests and arrangement of, any clinical investigator conducting clinical studies covered by the regulation. The pivotal clinical study included 24 investigators. None of the clinical investigators had disclosable financial interests or arrangements as defined in sections 54.2(a), (b), (c), and (f). The information provided does not raise any questions regarding the reliability of the data.

XII. PANEL MEETING RECOMMENDATION AND FDA'S POST-PANEL ACTION

In accordance with the provisions of section 515(c)(3) of the act as amended by the Safe Medical Devices Act of 1990, this PMA was not referred to the General and Plastic Surgery Devices Panel, an FDA advisory committee, for review and recommendation because the information in the PMA substantially duplicates information previously reviewed by this panel.

XIII. CONCLUSIONS DRAWN FROM PRECLINICAL AND CLINICAL STUDIES

A. Effectiveness Conclusions

The pivotal study demonstrated that use of the Claire OCT system resulted in the detection and removal of residual positive margins in a clinically and statistically significant number of patients who otherwise would have had positive margins after their SOC lumpectomy procedure. Following removal of the primary lumpectomy specimen and subsequent SOC intraoperative margin assessment and shaves, there were 35 participants (out of 206) with residual positive margins (17.0% of the total) who could potentially benefit from adjunctive use of the device. Per protocol design, the device was used after completion of SOC assessment resulting in a final decrease in the number of participants with residual disease from 35 to 28 (13.6% of the total). This represents a 3.4% absolute reduction and a 20% relative reduction in the number of participants with unaddressed positive margins who were subsequently converted to having no residual diseased margins after device use. The 3.4% absolute reduction in positive margin rate was greater than the 1% performance goal pre-defined in the primary endpoint, and the difference was statistically significant; thus, the primary endpoint of the study was met.

Moreover, there were six participants who had additional shaves attributed to device use that subsequently contained residual disease. These shaves could not be considered true positive (TP) by definition, as the previous margin was reported to be negative by pathology (primary lump clear from disease, residual disease reported in the subsequent shave). However, excision of the additional tissue resulted in the removal of cancer that would otherwise have remained unaddressed in the body cavity, including disease identified at the specimen surface by the surgeon with the device aid and pathologic findings, in five patients (six margins) with disease present within 2 mm margins, but did

not contribute to the primary endpoint or margin effectiveness analysis due to the margin criteria used in the trial protocol (NNCN and SSO/ASTRO Guidelines).

The effectiveness results are supported by analysis of the diagnostic performance of the device and device-aided clinical decisions. The standalone sensitivity and specificity of the device at the margin-level were 88% and 25%, respectively for the lower algorithm threshold (0.75) and 45% and 70%, respectively for the higher algorithm threshold (0.925), which correspond to two different display options within the device interface. The device-aided clinical decisions had a margin-level sensitivity and specificity of 61.5% and 65.8%, respectively. Compared with the unaided SOC clinical decisions, which had sensitivity 48.7% and specificity 72.1%, the device-aided decisions showed an increase of 12.8% in sensitivity for the detection of residual disease at the margin-level with adjuvant device use, and a decrease in specificity of 6.2%.

B. Safety Conclusions

The adjunctive device demonstrated a favorable safety profile with no unanticipated device effects (UADEs). Serious adverse events (SAEs) were rare, with none attributed to the device. Overall, the device demonstrated a safety profile similar to SOC, with no major device-related issues.

Patient-reported satisfaction with the surgery, measured by the BREAST-Q, showed consistent improvements across all groups, with no significant differences between the device, control, and training groups.

Regarding the number of unnecessary shaves (false positives) that were excised as a result of device use, the average was 0.50 ± 0.23 shaves per patient. These unnecessary shaves had no impact on the distribution of adverse events nor on the patient-reported outcomes for cosmesis when comparing control and device arm participants. Overall, the device demonstrated a safety profile comparable to SOC, with no significant device-related complications or unanticipated adverse events.

C. Benefit-Risk Determination

The probable benefits risks of the device are based on data collected in a clinical study conducted to support PMA approval as described above. The study demonstrates that when used adjunctively with SOC procedures, the Claire OCT System reduces the positive margin rate of lumpectomy procedures being performed for the treatment of patients with a biopsy-confirmed diagnosis of breast cancer. Specifically, the positive margin rate in the study was 17.0% after SOC procedures and 13.6% after adjunctive used of the device. The 3.4% reduction exceeded the pre-defined performance goal of 1% with statistical significance, and the primary endpoint of the study was met. Seven (7) out of 35 patients in the study with one or more positive margin after a SOC lumpectomy procedure were converted to fully negative margins after device-aided adjunctive decisions.

These results represent probable benefits to patients, because the presence of positive margins is associated with a risk of local recurrence of disease and often necessitates a second surgery (re-excision) to address the positive margins[3- 5,10]. The need for a re-excision can also delay administration of adjuvant systemic therapies that are planned as part of the patient's breast cancer treatment. Therefore, a reduction in the positive margin rate could potentially reduce re-excision rates for residual disease at the margin, and associated complication rates, healthcare costs, resource utilization, and surgery-related delays in access to post-operative adjuvant therapies[10].

The probable risks of the Claire OCT system are also supported by data from a pivotal clinical study conducted to support PMA approval as described above. The risks include:

- False-positive findings, which may lead to unnecessary cavity shaves and excessive tissue removal
- False-negative findings, which could necessitate re-excision surgery or result in missed disease and local recurrence.

Patient perspectives considered during the review included information on how patients feel regarding cosmesis effect. Patients conducted assessment of the BREAST-Q patient-reported outcome questionnaire preoperatively and in follow-up examinations. No statistically significant impact on patient-reported outcomes (BREAST-Q) cosmesis were observed.

Based on study results, the following conclusions can be drawn regarding the probable risks associated with Claire during lumpectomy procedures including patient perspective:

- False-positive detections led to the removal of some unnecessary tissue from the surgical cavity, but no statistically significant impact on patient-reported outcomes for cosmesis, or AEs
- The risk of device-related AEs or complications is low, as no such events occurred in this study, and the device evaluates ex vivo tissue only with no direct patient contact
- The risk of reduced patient satisfaction with cosmesis is low, as no statistically significant difference was observed between the Control and Device Arms
- A theoretical risk exists that surgeons may misinterpret Claire results, potentially overriding suspicious findings from SOC procedures, is mitigated by device training and labeling, which emphasizes that Claire is not intended to negate or "rule out" positive SOC findings but rather to "rule in" or detect disease that SOC may have missed

Additional factors to be considered in determining probable risks and benefits for the Claire OCT system included:

- The study enrolled a sufficient number of participants to detect serious events and was statistically powered to evaluate the primary endpoint
- Participant loss to follow-up at critical assessment points and missing data at critical assessment points was low.
- Real-world user experience may differ from controlled clinical trial conditions
- Natural statistical variability in patient populations

Note that because of this design, the device use and subsequent clinical effectiveness was limited to a small number of residual margins that were missed by existing SOC margin assessment modalities. In the study, SOC procedures were required to be completed prior to interpreting Claire OCT images, whereas in real-world use, the device may be used concurrently with SOC margin assessment. Furthermore, the sample size was not sufficient to evaluate performance in subgroups of patients by certain risk factors (e.g., lobular carcinoma, high grade tumors) and did not collect data to analyze performance by patient breast density. Additionally, pathology is the gold standard but is an imperfect ground truth due to sampling only a fraction of the entire margin.

D. Overall Conclusions

The data presented in this application provide reasonable assurance of the safety and effectiveness

of the Claire OCT System when used in accordance with the indications for use. The benefits of the Claire OCT System include a reduction in positive margins when the device is used as an adjunctive tool concurrent with physician interpretation and other standard intraoperative margin assessment methods during breast-conserving surgery in patients with a biopsy-confirmed diagnosis of breast cancer.

The study reported that device-aided clinical decisions achieved a reduction in positive margin rate compared to SOC alone, meeting a predetermined performance goal and surpassing a minimally important clinical difference for patients with unaddressed positive margins. Although the increase in providers' sensitivity to positive margins came at the cost of decreased specificity, trial data indicate no negative impact on patient outcomes associated with the false positive shaves. There were no device-related adverse events observed in the study and patient perspectives, assessed through BREAST-Q, showed no significant difference in cosmesis or satisfaction between the control and device arms. In conclusion, given the available information above, the data support that for the Claire OCT system the probable benefits outweigh the probable risks.

XIV. PREDETERMINED CHANGE CONTROL PLAN (PCCP)

The Claire OCT system incorporates machine learning (ML) to assist in the identification of suspicious regions of interest in images of ex vivo tissue from excisional surgery for breast cancer treatment (lumpectomy). The device was approved with a PCCP, which allows specific, bounded modifications to the artificial intelligence/machine learning (AI/ML) functions, as well as hardware, manufacturing, and non-AI/ML software. The PCCP ensures that all modifications are predetermined and confined within authorized parameters to maintain a consistent standard of safety and effectiveness.

Scope of Authorized Modifications

- Addition of a printed circuit board assembly (PCBA) supplier; there is no impact to design, requirements, nor functionality.
- Upgrading of personal computer (PC) monitor to improve performance
- Software updates to streamline device setup during production
- Software and user interface updates to allow for scan area preselection
- Updates to the ImgAssist AI including core model retraining with new clinical data, a set of bounded data augmentations and transition to a more efficient model architecture.

Testing Methods and Validation Activities

All modifications are made under Perimeter's quality management system according to predefined testing protocols:

- PCBAs undergo qualification, incoming inspection, and 100% downstream system testing to ensure fit, form, and function remain identical.
- PC monitors undergo IEC 60601 and comprehensive system integration testing
- All software updates are verified and validated under IEC 62304 procedures, production validation, and usability testing, as appropriate.
- AI updates are evaluated using a subset of the sequestered locked test set that was collected under an approved IRB protocol from multiple sites and with the corresponding histopathology ground truth. The updated model must demonstrate non-inferiority in AUROC, sensitivity, and specificity, and stability in detection patterns compared to the authorized baseline.

User Information & Labeling Updates
Modifications may impact the device's performance, internal processing, or user interface. Users are informed of these modifications through advisory notices, and may also include updates to labeling and user training.

XV. CDRH DECISION

CDRH issued an approval order on March 3, 2026.

The applicant's manufacturing facilities have been inspected and found to be in compliance with the device Quality System (QS) regulation (21 CFR 820), which was in effect at the time of inspection. As of February 2, 2026, the revised part 820, referred to as the Quality Management System Regulation (QMSR), is effective.

XVI. APPROVAL SPECIFICATIONS

Directions for use: See device labeling.

Hazards to Health from Use of the Device: See Indications, Contraindications, Warnings, Precautions, and Adverse Events in the device labeling.

Post-approval Requirements and Restrictions: See approval order.

XVII. REFERENCES

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