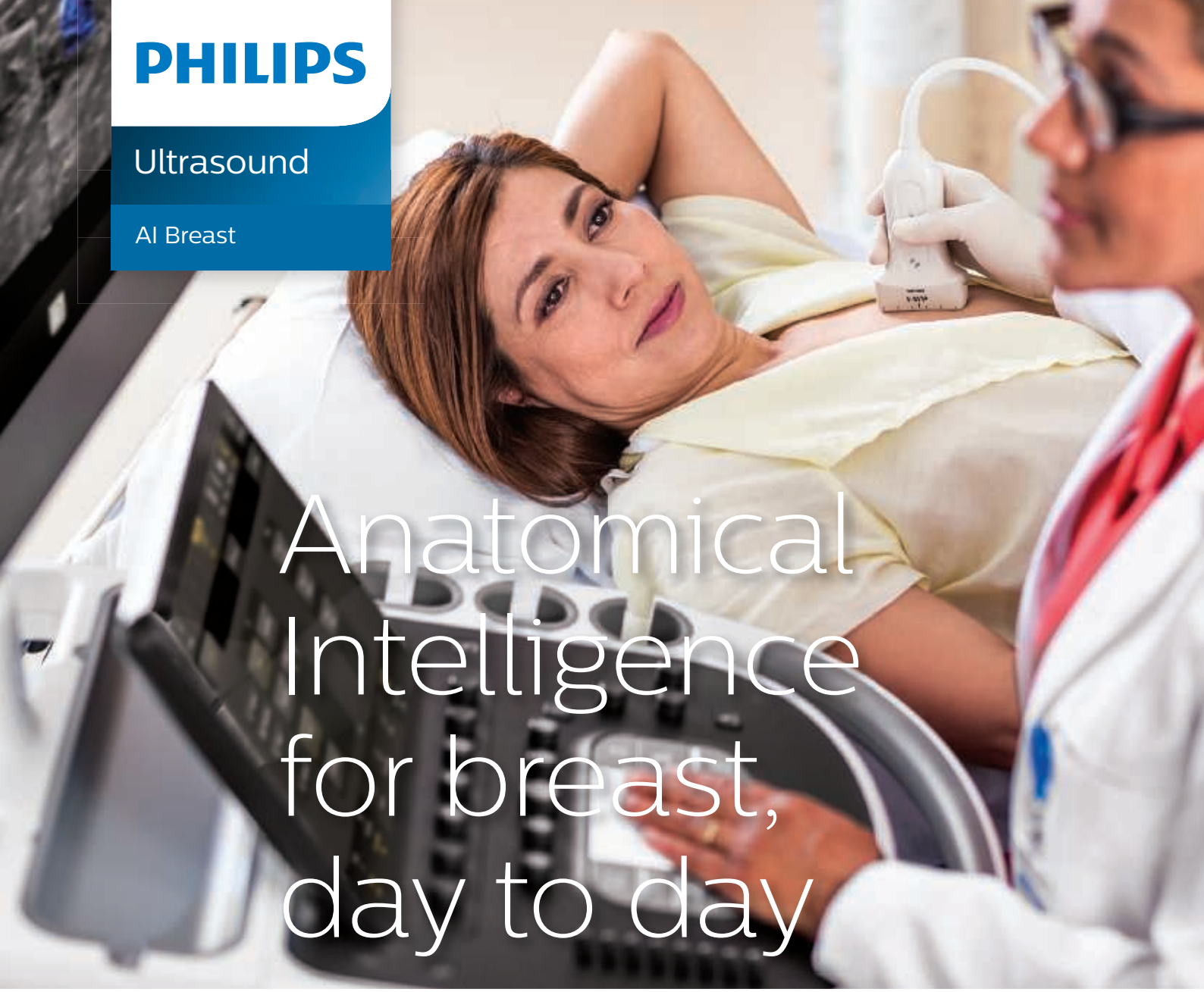
PHILIPS

Ultrasound

AI Breast



Anatomical Intelligence for breast, day to day

Enhance day-to-day workflow for diagnostic exams while preserving the image quality necessary for full diagnostic studies.

Meeting the demands of a busy breast imaging center calls for innovative solutions that enhance diagnostic confidence while advancing workflow. AI Breast for screening and diagnostic studies allows clinicians to improve workflow efficiency while preserving superb image quality for full diagnostic studies. The AI Breast solution features electromagnetic tracking to provide real-time acquisition feedback.

A clinical user's guide

Dr. B. Nicolas Bloch, of the Belkin Breast Imaging Center of Boston Medical Center, has been using AI Breast to enhance breast imaging. Here, he offers suggestions to guide physicians and sonographers in optimizing the solution in daily practice.

Setting up the exam

1. Ask the patient to lie on the mattress housing the tabletop field generator, and position for a routine breast exam: supine, with the ipsilateral arm raised overhead when possible to extend the pectoralis muscle across the chest wall.

2. Slightly roll the patient so that the nipple of interest is on the top middle of the breast, while the breast tissue is flattened. Stabilize with positioning aids for comfort and to maintain the position throughout the exam. To optimize GPS localization during the exam, it is crucial that the nipple remains in line with the blue lanyard that hangs from the right side of the mattress.

3. Use the live display of the field generator on-screen to help position the patient. Draw the outer boundaries of the breast using the transducer, while visually confirming that the transducer position can be tracked for the entire exam. This confirms upfront that the patient is positioned optimally within the tabletop field generator tracking volume (see Step 1). Adjustments in patient positioning can then be made based on this display (Figure 1).

Figure 1 Tabletop field generator* tracking volume
Image courtesy of Northern Digital Inc.

4. Define the nipple position and outer extension of breast tissue at the inferior, medial and lateral borders of the breast. This registration process takes 15 seconds on average. At this time, no images are acquired and gel is neither needed nor recommended, to avoid unnecessary slippage (Figure 2).

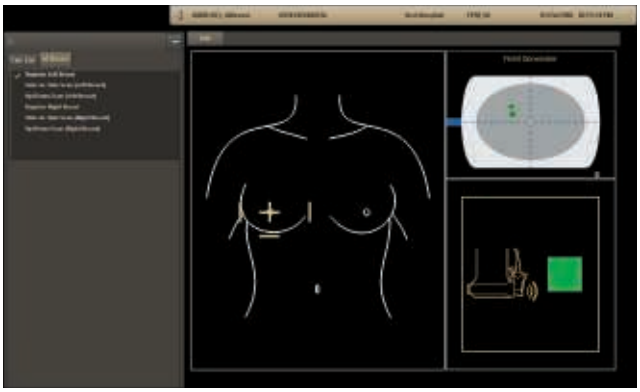


Figure 2 AI Breast set-up: Registration

Take time to ensure the following

- Center marking on the transducer is aligned with the nipple and subsequent center positions as prompted
- No clockwise shift occurs when marking the lateral border of the left breast or the medial border of the right breast (there may be tendency to slide the transducer vertically when marking a boundary on the far side, given the parallax effect)
- The transducer is held upright and is not rocked, and the transducer face lies flat on the patient

These initial steps determine the success of tracking the transducer position and orientation, relative to the breast being scanned.

Tips for scanning and completing the exam

1 Before scanning, start at the nipple to verify that the transducer marker on the on-screen breast graphic is displayed at the nipple. This is quick and easily done.

2 While performing a regular breast ultrasound, it is not necessary to use a body marker or to manually apply annotations to each image capture. AI Breast enables real-time tracking and display of the transducer position and orientation.

3 As the breast is scanned, the transducer on the screen display moves with the scanning hand, allowing focus to remain on the patient and images on the screen during the scan. Before acquiring an image, perform a quick check to verify that the transducer marker display corresponds to the physical location of the transducer on the breast.

4 When a cineloop is acquired, AI Breast automatically displays and records transducer position and orientation for each acquisition, and will also dynamically indicate areas of the breast scanned during the exam (Figure 3), as indicated by the Sweep Graphic. The breast tissue on-screen is "painted" in a single color to demonstrate it has been scanned in one direction, then "painted" in a different color once scanned in the opposite plane. This provides additional documentation that a specific area or entire breast has been scanned during a given exam.

5 In addition to the live body marker, there is auto-annotation of images with the clock position and distance from the nipple. Center the Region of Interest (ROI) in the field of view to optimize the accuracy in the reading (Figure 4).

6 When scanning a more pendulous breast, the breast tissue is more likely to displace. If it is determined that the nipple may have moved slightly from registration, simply adjust the transducer marker to better align with the physical location of the transducer on the scanned breast. While this happens from time to time, it usually requires only minimal adjustment, as the lesion displayed in the FOV is typically within the 5 mm range of the transducer face.

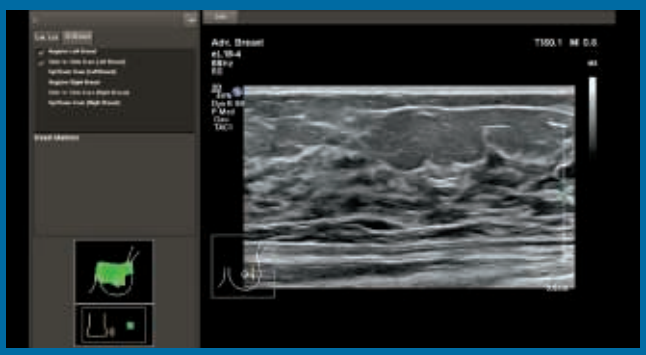


Figure 3 AI Breast clinical image displaying sweep graphic

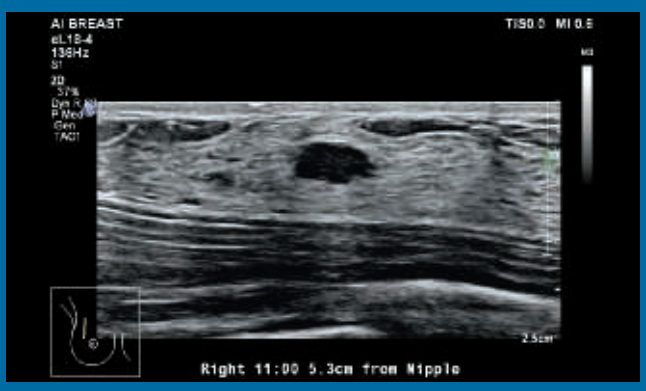


Figure 4 AI Breast clinical image with auto-annotation

Clinical assessment pathway

Boston Medical Center (BMC) is a private, not-for-profit, 500-bed, academic medical center and is the primary teaching affiliate for the Boston University School of Medicine.

BMC is the largest safety-net hospital in New England, with 59% of its patients from under-served populations, which means that the spectrum of breast cancer disease (cancer subtypes, grade and stage) is broader and more advanced at first presentation compared to the general population. BMC typically performs diagnostic ultrasound, focusing on a specific area of pain, a palpable mass or a suspicious finding by mammogram.

Designated as a Breast Imaging Center of Excellence by the American College of Radiology, Boston Medical Center's Belkin Breast Imaging Center offers state-of-the-art multimodality imaging for breast health.

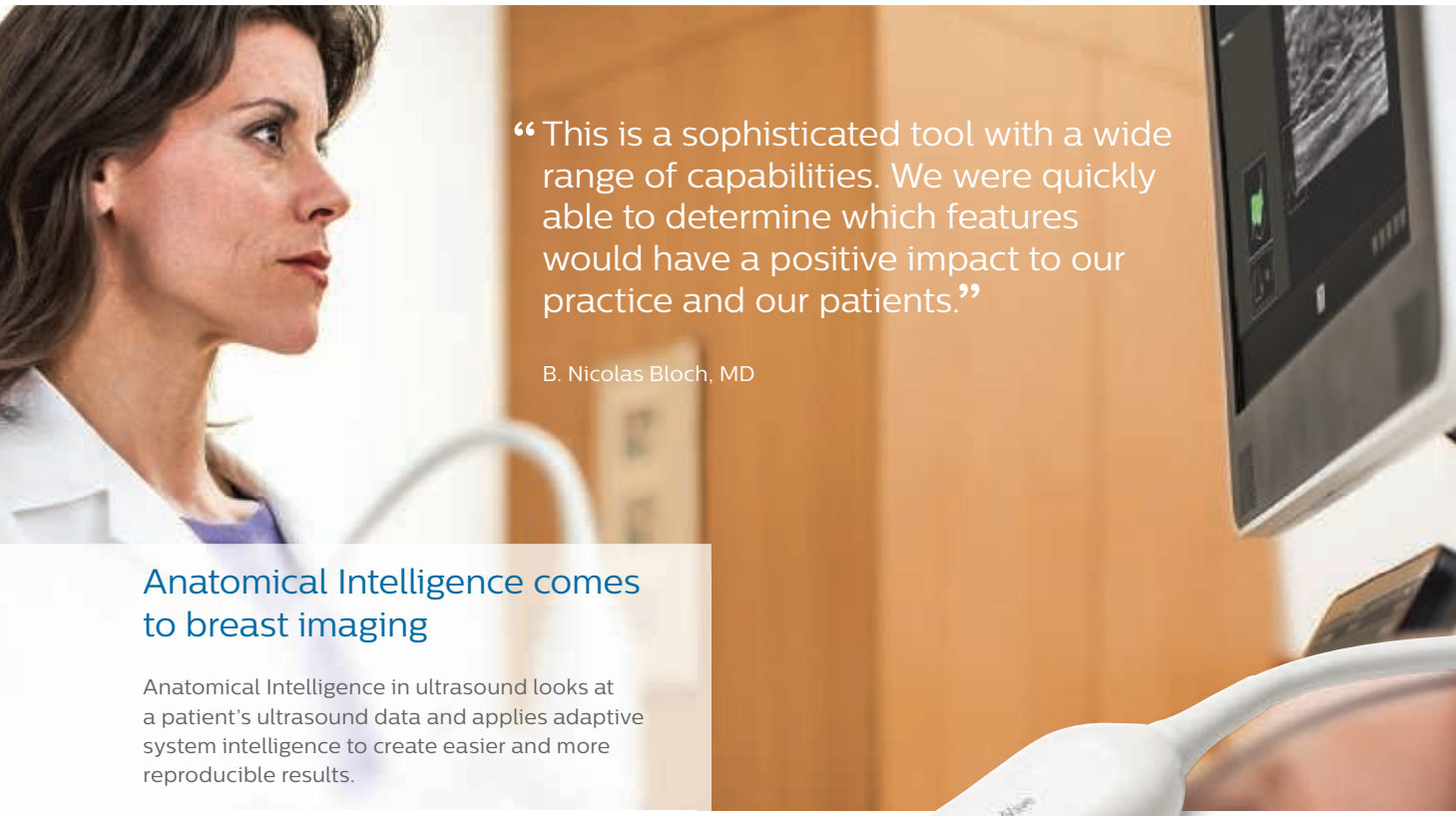
"AI Breast brings intelligence and automation to breast ultrasound. Not only are we saving time with the automatic annotations, we are removing subjectivity and human error in labeling, while increasing reproducibility for followup exams."

B. Nicolas Bloch, MD
Associate Professor, Radiology and Urology, Co-Director, MS Bioimaging Program, Program Director, Breast Imaging Fellowship, Boston Medical Center and Boston University School of Medicine

Clinical benefits of AI Breast: a clinician's perspective

- **Helps improve departmental efficiency and acquisition standardization** in a busy breast imaging center using virtual mapping and real-time positional data
- **Adds clinical value** to breast ultrasound exams with minimal investment of time for initial set-up
- **Helps reduce operator dependency and subjectivity** during exams
- **Streamlines clinical workflow** through real-time dynamic display of the transducer graphic, which eliminates the need to make manual adjustments for each documented image
- **Allows for the elimination of labeling errors** (including mislabeling of the left and right breast) and enhances reproducibility, particularly valuable for current diagnostic and follow-up examinations when multiple lesions are present
- **Enhances confidence** with additional documentation of scanned areas for both diagnostic and screening exams (such as complete coverage for peri-areolar exam as well as of axillary region for whole breast screening exams)
- **Extends traditional ultrasound** using the advanced quantification and robust reproducibility of supported modes including B-Mode (fundamental, harmonics, SonoCT, XRES, TAC), color and CPA (includes MFI), and elastography

Automation to enhance day-to-day workflow



> “This is a sophisticated tool with a wide range of capabilities. We were quickly able to determine which features would have a positive impact to our practice and our patients.”
>
> B. Nicolas Bloch, MD

Anatomical Intelligence comes to breast imaging

Anatomical Intelligence in ultrasound looks at a patient’s ultrasound data and applies adaptive system intelligence to create easier and more reproducible results.

The powerful AI Breast workflow solution uses the Philips eL18-4 ultrasound transducer with integrated electromagnetic tracking coils in conjunction with a specially designed mattress and tabletop field generator to facilitate breast exams. Signals are continuously received from sensor coils within the transducer, which allows position and orientation information to be translated and displayed live on-screen for visual mapping during the exam.

This visual mapping facilitates documentation for screened anatomy during the acquisition phase. Images are stored while performing sweeps, and key images can be bookmarked for review. Clinical findings can be auto-annotated, and quick orthogonal views of anatomy can be easily retrieved for enhanced workflow and documentation.

Ultra-broadband for ultimate ultrasound

The Philips eL18-4 transducer incorporates the highest Philips frequency and ultra-broadband acoustic specification in a PureWave array design. This provides thin-slice imaging for exceptional detail resolution and tissue uniformity from near to far depth of field, and supports advanced capabilities such as AI Breast in the EPIQ 5/7 and Affiniti 70 systems.

philips.com

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