

Use of Ultrasound Imaging in Breast Cancer Diagnosis and Biopsy

Aaron Fenster PhD, FCCPM
Imaging Research Laboratories, Robarts Research Institute
London, Ontario, CANADA

Breast ultrasonography has greatly impacted the diagnostic evaluation of the breast. Distinct masses can be visualized and a biopsy device can be directed to sample the lesion using real-time US. Conventional B-mode ultrasound is primarily used in determining whether a non-palpable mammographic abnormality is cystic or solid, and achieves an accuracy of 98 - 100 percent. However, the sensitivity of B-mode ultrasound imaging in the detection of breast abnormalities is much lower and precludes this form of ultrasound from taking a more dominant role in breast cancer screening. Although ultrasonography has limitations in screening for breast cancer, many investigators are addressing this issue with novel approaches in distinguishing and characterizing solid masses.

An important use of ultrasonography in the diagnosis of breast cancer is in its use for guiding breast biopsy. Currently, US-guided breast biopsy is performed either free-hand or using a detachable mechanical guide attached to the US transducer. When a lesion is equally well depicted with mammography and US, US guidance is often preferred because the procedure is shorter, more comfortable for the patient, lacks ionizing radiation, and allows real-time needle guidance and monitoring. In spite of these major advantages, US-guided biopsy techniques suffer significant limitations, primarily because its accuracy depends on the experience of the operator and it lacks standardization and reproduction of image planes. Again, improvement of US-guided breast biopsy is a focus of many investigators who are developing improved techniques including ones combining stereo-mammography and US-guidance.

In this paper, we will review current ultrasound imaging techniques used in breast cancer diagnosis and biopsy, their limitations, new approaches being developed and innovation opportunities.

Educational Objectives: (1) Basic ultrasound physics related to breast imaging. (2) Use of ultrasound imaging in breast cancer diagnosis. (3) Limitations of ultrasound imaging for breast cancer diagnosis. (4) New techniques being developed for breast cancer diagnosis. (5) Use of ultrasound imaging in breast biopsy. (6) Limitations of ultrasound imaging for breast cancer biopsy. (7) New techniques being developed for breast cancer biopsy.