

Ultrasound in Breast Imaging



In the blink of an eye, a speck on a mammogram or an aberrant lump felt in the shower can change a woman's life. Breast cancer is the most common cancer among women, particularly younger ones. Siemens Healthcare is offering a broad spectrum of products and solutions to help physicians to detect the disease earlier and with greater precision than ever before.

According to the American Cancer Society, this year alone, 1.3 million women will be diagnosed with breast cancer, approximately one in eight. The good news? Death from the disease decreased by about 24 percent since 1992. And researchers found that for women who survived five years after diagnosis, 89 percent were cancer-free after 10 years and 81 percent were cancer-free after 20 years. One of the possible reasons for this encouraging development is the advanced imaging and diagnostic technology utilized by healthcare professionals today.

Women at High Risk

While mammography remains the gold standard for breast cancer detection and screening, it is less effective in women with dense breast tissue because the mammograms of those women are harder to read.

Magnetic resonance imaging (MRI) can help to find breast cancers that mammography may miss in a certain group of patients. And a study¹ published by the Radiological Society of North America in 2002 found that the detection rate for non-palpable, invasive breast cancers increased by 42 percent when mammography was followed by an ultrasound examination.

Individual Risk Factors

What do all these statistics mean for the patient? "Understanding an individual woman's risk for developing breast cancer is very important, and may change screening and diagnostic procedures," says Roe Lazebnik, M.D., Ph.D., Director of Product Development for Radiology, Obstetrics and Gynecology at Siemens Healthcare's Business Unit Ultrasound. High-risk patients are typically women whose close blood relatives have a history of the disease. Having one first-degree relative, e.g. mother, sister, or daughter, with breast cancer approximately doubles a woman's risk. Having two first-degree relatives increases a woman's risk about five-fold. But age and diet are factors, too. The American Cancer Society says that women at high risk should undergo an MRI as an adjunct to mammography every year.



The ACUSON S2000™ Automated Breast Volume Scanner (ABVS) automatically acquires ultrasound volumes of the breast.

Latest Ultrasound Technology Helps Win the Fight Against Breast Cancer

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Automated Breast Volume Scanning with Ultrasound

Screening Mammography

The first line of defense in the fight against breast cancer is screening mammography. Most physicians believe that early detection of breast cancer saves thousands of lives each year, and that many more lives could be saved if even more women and their healthcare providers took advantage of these tests. For many women, following the American Cancer Society's guidelines to have a yearly screening mammogram beginning at the age of forty improves the chances that breast cancer can be diagnosed at an early stage and then treated successfully.

The latest developments in digital mammography enhance the effectiveness of this imaging modality. Like a digital photo, digital mammography images can be enlarged or manipulated to enhance diagnostic accuracy. In addition, digital images can be sent over a network for rapid review by other physicians. Computer-assisted detection (CAD) software may further help the interpretation. The latest technology from Siemens, now under development, is breast tomosynthesis², a digital 3D imaging technique that acquires 2D projections at multiple angles to reconstruct a three-dimensional view of anatomy of the breast. Tomosynthesis slices have the potential to show tumors that remain invisible in individual images.

Dense Breast Tissue

In North America and Western Europe, approximately two in five women have dense breast tissue which, according to the New England Journal of Medicine³, increases their risk of breast cancer up to five-fold, compared to women with non-dense breast tissue. Whether a woman has dense breasts or not, she usually finds out when she has her first mammogram. On a mammography image, dense breast tissue and tumors both appear white. "This can greatly increase the dif-

ficulty in interpreting a mammogram," says Dr. Lazebnik. "For these patients, an ultrasound exam may provide valuable additional diagnostic information, particularly if an abnormality is suspected."

3D Ultrasound

Ultrasound is generally used to determine whether a mass that was detected using mammography is a harmless liquid-filled cyst or solid, which would call for further tests such as a biopsy. Since conventional ultrasound images are captured in real-time, and their quality is very dependent on the user, they are used for diagnostic exams rather than screening. The ACUSON S2000 ABVS, recently launched at the Radiological Society of North America (RSNA) in Chicago in 2008 automatically acquires an ultrasound volume of the breast in a fraction of the time that is needed for conventional manual ultrasound acquisition. Equipped with all the necessary advanced breast ultrasound applications, this system might well change the paradigm of breast care by offering the advantages of a non-ionizing radiation modality in combination with automated, user-independent and thus reproducible acquisition. In addition, the technique requires only minimal compression.

So, how can a woman be sure to get the best possible breast care? "The accuracy of the results heavily depends on two factors: the quality of the medical image and the expertise of the interpreting physician," says Dr. Lazebnik. Advanced imaging can help to detect disease earlier and with greater precision as well as assist in planning treatment more efficiently than ever before.

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Automatic volume acquisition with the ACUSON S2000 ABVS reduces operator dependability and variability.

¹ Radiology 2002;225:165-175. Kolb T.M. et Al., Comparison of the Performance of Screening Mammography, Physical Examination, and Breast US and Evaluation of Factors that Influence Them: An Analysis of 27,825 Patient Evaluations

² Caution: Investigational Device. Limited by U.S. Federal Law to investigational use. The information about Digital Breast Tomosynthesis is preliminary. This product is under development and not commercially available in the U.S., and its future availability cannot be ensured.

³ N Engl J Med 356;3. Boyd N.F. et Al., Mammographic Density and the Risk and Detection of Breast Cancer

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