

Applications:

- Breast cancer screening
- Characterizing tumors to guide treatment regimens for improved patient outcomes

Benefits:

- No damaging radiation used; scanning can occur as often as needed
- Tumor detection down to size of 2 mm; a substantial improvement over current ultrasound modalities
- Improved patient experience
- Operator independent

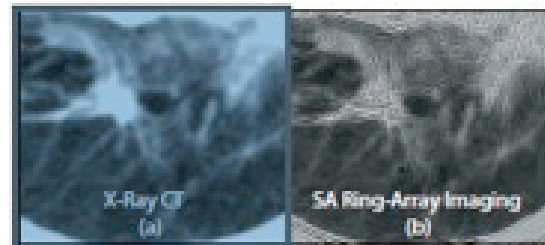
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Summary:

Breast cancer is the second-leading cause of cancer death among American women. The breast cancer mortality rate in the U.S. has been flat for many decades and has decreased only about 20% since the 1990s, even with increased screening and awareness. Since the U.S. Preventive Services Task Force (USPSTF) recently released its new recommendations (USPSTF 2009), breast cancer screening has become a hotly debated topic. The USPSTF recommends against routine screening mammography in women aged 40 to 49 years, and recommends biennial screening mammography for women aged 50 to 74 years. However, the American Cancer Society still recommends yearly mammograms starting at age 40. As indicated in the National Cancer Institute (NCI) statement, the USPSTF's new report reflects the fact that more questions need to be answered.



At the center of the controversy is the fact that the only technology, X-ray mammography, currently used for breast cancer screening is inadequate. In radiographically dense breasts, sensitivity can be as low as 30 to 48% because the normal breast parenchyma and stroma mask the presence of masses. Dense breast tissue is common: approximately 50% of women younger than 50 years and a third of older women have dense parenchyma and stroma; the very women for whom the risk of developing breast cancer is the highest. As a result, the positive predictive value or PPV (the probability of having cancer for a woman with a positive test) of a biopsy recommendation ranges from 20% in women under age 50 to 60% to 80% in women aged 50-69. A PPV of 20% means that 80% of the abnormal findings with mammography turn out to be benign. False positive findings in current breast cancer screenings result in a cost of \$2 billion each year for unnecessary biopsies.

X-ray mammography is not an effective technique for detecting cancer for several reasons: the experience for the patient causes significant discomfort physically, and the use of tissue damaging x-rays pushes the cost:benefit ratio squarely onto the cost side. Accurate, non-damaging early detection is a key factor to reducing the number of deaths caused by breast cancer. Los Alamos researcher Dr. Lianjie Huang agrees which is why he is developing a far superior system.

Development Stage: A prototype 3D ultrasound tomography machine is currently being constructed.

Patent Status: Multiple patent applications are pending.

Licensing Status: Los Alamos is seeking commercial partners to co-develop the technology.