Space-Time Microwave Imaging for Breast Cancer Detection

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Technology description

Of the various imaging techniques used to screen women for early-stage breast cancer, X-ray mammography has proven the most effective. Despite its success, however, this technique suffers from relatively high rates of false-negative scores, requires painful compression of the breast, and exposes patients to low doses of ionizing radiation. UW-Madison researchers have now developed a novel imaging technique for detecting early-stage breast cancer called microwave imaging via space-time, or MIST for short. MIST makes use of the sharp contrast in dielectric properties between breast carcinomas and normal breast tissue at microwave frequencies.

In the technique, a woman lies on her back and a scanner containing a number of antennas is placed near the center of the breast. Each antenna transmits a very short burst of low-power microwave energy and records the microwave backscatter, which occurs significantly only from malignant tissue. Because the intrinsic contrast between malignant and normal breast tissue is much greater at microwave than at X-ray frequencies, MIST could allow detection of extremely small (i.e., millimeter size) breast tumors, and reduce the number of false-negatives associated with conventional X-ray mammography.
The Wisconsin Alumni Research Foundation (WARF) is seeking commercial partners interested in developing a novel imaging technique for detecting early-stage breast cancer.

Application area

Detection of early-stage breast cancer

Advantages

May detect tumors as small as 2 mm across, less than half the size of the smallest detectable by conventional mammography
Holds potential for reliably detecting tumors in dense breast tissue, and in the upper/outer quadrant of the breast -- an area missed by mammography, but where 50 percent of all tumors reside
Safe and non-invasive -- exposes patients to low-power microwave energy at levels much lower than in cell phones, rather than potentially harmful X-rays

Increases patient comfort by eliminating need for breast compression
Implemented using relatively low-cost hardware, which could significantly reduce the cost of breast cancer screening
Provides algorithm for eliminating artifacts caused by skin/tissue interface

Institution

Wisconsin Alumni Research Foundation

Inventors

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