Skin contact breast tumor detection

June 29 2012

A simple and cost effective imaging device for breast tumor detection based on a flexible and wearable antenna system has been developed by researchers at the Indiana University – Purdue University Indianapolis.

The team based in the Integrated Nanosystems Development Institute (INDI) describes details in a forthcoming issue of the *International Journal of Computer Aided Engineering and Technology* and point out that their system holds the promise of much earlier detection than mammography.

INDI's Kody Varahramyan and colleagues, Sudhir Shrestha, Mangilal Agarwal, Azadeh Hemati and Parvin Ghane explain that their system uses a planar microstrip antenna design on a flexible substrate that is optimized for operation in direct contact with the skin. The system avoids the 20% microwave signal loss observed with other systems based on matched coupling medium. Their tests with breast and tumor "phantoms" - model human body systems - shows that the received signal from a tumor is three times the strength from healthy tissue and is well defined relative to background noise level in the image.

The overall goal of the research is to develop a wearable, brassiere-like imaging system that uses non-ionizing radiation to detect cancerous breast tissue. The researchers suggest that the system is cost effective and could detect breast cancer earlier than other systems, although they add that it would be a complementary system to mammography rather than a replacement for it. Nevertheless for early detection with minimal discomfort to the patients, such a system could become a useful adjunct

for cancer detection.

"It has been well recognized that the early detection of breast cancer by regular breast screening increases the survival rate among the breast cancer patients," the team says. Unfortunately, conventional mammography, which utilizes ionizing radiation, has a relatively high rate of false positives and false negatives as well as being uncomfortable. As such, the results for early breast tumors are often obscured by dense breast tissue and ambiguities present near the chest wall, which commonly leads to unnecessary biopsies.

The team is currently working on the software that will allow them to convert the microwave signals from the system into two-dimensional and three-dimensional images of breast tumors.

More information: *Int. J. Computer Aided Engineering and Technology*, 2012, 4, 499-516

Provided by Inderscience Publishers