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NEWS

RSNA Press Release

Combined Imaging Technologies May Better Identify Cancerous Breast Lesions

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At A Glance

- Combining optical and x-ray imaging, researchers were better able to distinguish cancerous from benign lesions in the breast.
- Unnecessary biopsies may be avoided by adding the combined imaging technologies to standard mammography.
- The combined imaging technologies are noninvasive and may increase screening sensitivity when added to mammography.

OAK BROOK, Ill. — By combining optical and x-ray imaging, radiologists may be better able to distinguish cancer from benign lesions in the breast, according to a new study published in the online edition and January issue of *Radiology*.

Researchers at Martinos Center for Biomedical Imaging at Massachusetts General Hospital in Boston helped develop a combined optical/x-ray imaging system capable of obtaining both structural and functional information of the breast.

The two technologies used were digital breast tomosynthesis (DBT), a three-dimensional application of digital mammography, and diffuse optical tomography (DOT), which measures levels of hemoglobin concentration, oxygen saturation and other cellular characteristics, based on how light from a near-infrared laser is absorbed and scattered within tissue.

"By co-registering optical and x-ray data, radiologists are able to map suspicious findings and analyze the functional characteristics of those areas," said lead researcher Qianqian Fang, Ph.D., a radiology instructor at Harvard Medical School.

In the study, combined DBT and DOT was performed on 189 breasts from 125 women with an average age of 56 years. To perform the procedure, an optical source and detector probes were attached to a DBT unit and, with the breast compressed, optical data was acquired. The optical probes were then removed without altering the breast compression and a DBT scan was performed.

"We are very excited about adding optical imaging to DBT, because it is low-cost, safe, noninvasive and fast," Dr. Fang said.

Of the 189 imaging studies, 138 were negative, and 51 showed evidence of lesions. As

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determined by breast biopsy, 26 lesions of the 51 lesions were malignant, and 25 were benign.

In the 26 malignant tumors, total hemoglobin concentration (HbT) was significantly greater than in the normal glandular tissue of the same breast. Solid benign lesions and cysts had significantly lower HbT contrast compared to the malignant lesions.

"By providing additional differentiation of malignant and benign lesions, combined optical and x-ray imaging could potentially reduce unnecessary biopsies," Dr. Fang said.

In the study, oxygen saturation levels were significantly lower in cysts compared to those in malignant and solid benign lesions and glandular breast tissue.

"Although cysts are easy to diagnose using ultrasound, distinguishing cysts from malignant or benign lesions during a mammogram would save women the anxiety and costs associated with a second procedure," Dr. Fang said. "We are hopeful that this combined system may help improve the efficiency and diagnostic accuracy of breast screening."

The study is part of an ongoing research effort to improve breast cancer diagnosis led by Daniel B. Kopans, M.D., and David Boas, Ph.D., and funded by the National Institutes of Health.

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"Combined Optical and X-ray Tomosynthesis Breast Imaging." Collaborating with Dr. Fang were Juliette Selb, Ph.D., Stefan A. Carp, Ph.D., Greg Boverman, Ph.D., Eric L. Miller, Ph.D., Dana H. Brooks, Ph.D., Richard H. Moore, B.S., Daniel B. Kopans, M.D., and David A. Boas, Ph.D.

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