Advanced 3D mammography leads to more accurate breast cancer detection

Breakthrough 3D-guided breast biopsy complements 3D breast cancer screening

UCLA is one of several centers nationwide to offer 3D-guided breast biopsy. The world's first 3D-guided breast biopsy system developed for use in conjunction with 3D mammography units was launched with FDA approval in July 2013.

"It is now possible to perform biopsies using 3D mammographic guidance for precise targeting of mammographic abnormalities, including those visible only on 3D mammograms," says Anne Hoyt, MD, clinical professor of radiology and director of the Barbara Kort Women's Imaging Center in Santa Monica. "Previously, patients with abnormalities seen only on 3D mammograms required surgical excisional biopsy. With our new biopsy system, we are able to perform a 3D-guided percutaneous needle biopsy for these women instead of open surgical biopsy."

Digital breast tomosynthesis is emerging as the new gold standard in mammography. Also known as 3D mammography, this breast imaging technology provides radiologists with multiple, thin-section images through the breast, increasing breast-cancer detection rates while reducing the rate of false-positive results.

More than 38 million U.S. women undergo screening or diagnostic mammography each year. While mammography has been proven to save lives, the technology is imperfect. Digital breast tomosynthesis, which can be used in both the screening and diagnostic settings, addresses some of the limitations associated with conventional breast imaging and provides a more accurate assessment of breast health.

UCLA was the first facility in California to become 100 percent digital and among the first medical centers in the region with the resources and expertise to offer 3D mammography. The technology is now available at all three UCLA breast imaging centers.

How digital breast tomosynthesis improves detection

Breast tissue is a mixture of varying amounts of fatty (non-dense) tissue, which appears dark on a mammogram, and fibroglandular (dense) tissue, which appears white on a mammogram. Breast cancers, like dense fibroglandular tissue, appear white on a mammogram.

About half of all women have a greater proportion of dense fibroglandular tissue relative to fatty tissue, making it more difficult to distinguish a potential tumor.

3D mammography improves the detection of invasive breast cancers by 40 percent. During 3D mammography, the breast is positioned and compressed in the same manner as conventional mammography. During a four-second scan, the system moves across the breast in a small arc obtaining several very-low-dose images from multiple angles. The images are processed into a three-dimensional image of the breast composed of 1mm-thick slices. The radiologist then can scroll through the breast layer by layer, removing superimposed fibroglandular tissue and revealing breast cancer that otherwise may have been hidden.

Digital breast tomosynthesis gained Food and Drug Administration (FDA) approval in 2011 and has earned both support in the medical literature and traction in clinical practice over the past four years. A 2014 study published in the *Journal of the American Medical Association* (JAMA) comparing nearly 500,000 3D mammograms to conventional two-dimensional mammograms validated the findings of previously published research but on a much larger scale.

Digital breast tomosynthesis reduces false-positive results

With 3D mammography, 15 percent fewer patients are asked to return for additional evaluation. According to the National Cancer Institute, about half of all women screened annually for 10 years will experience an anxiety-producing false-positive result. The most common cause of a false-positive mammogram is overlapping breast tissue at different depths in the breast that appears as a mass or other abnormality on a conventional two-dimensional mammogram.

Digital breast tomosynthesis minimizes the chance that overlapping breast tissue will result in an apparent abnormality on a mammogram. By looking through the tissue layer by layer, the radiologist is able to determine that the area of concern is just superimposed breast tissue and not an underlying mass, thus preventing an unnecessary return visit. Furthermore, if an abnormality is identified on a 3D mammogram, the likelihood of confirming a real finding (either benign or malignant) after additional evaluation is high.

3D mammography with less radiation exposure

The FDA mandates that 3D mammography must be interpreted in conjunction with a two-dimensional mammogram. When tomosynthesis was first approved in 2011, complying with this requirement meant that patients were exposed to twice the radiation dose of conventional mammography. In May 2013, the FDA approved a technique that allows imaging software to generate a "synthetic" two-dimensional image from the 3D tomosynthesis dataset. This important breakthrough reduces the radiation exposure to the same low level as a conventional two-dimensional mammogram and is available at all UCLA breast imaging centers.

UCLA Health

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