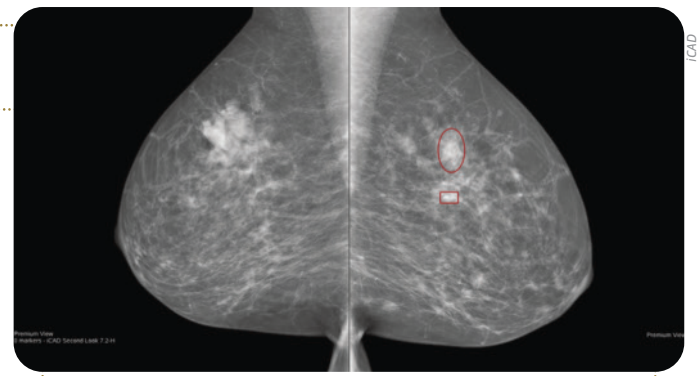
An Extra Dose of Confidence

Efficacy of CAD with digital mammography

By Janine Anthes

In this edition of Examine | Mammography, **rt image** *takes a second look at computer-aided detection and a recent study that shows its ability to help radiologists detect more breast cancer with full-field digital mammography.*



CAD is like "a second set of eyes" that direct the radiologist to take a closer look at specific areas of interest in the mammogram. The software marks potential masses with ovals and microcalcifications with rectangles.

IN THE EVOLVING FIELD OF BREAST IMAGING, computer-aided detection (CAD) technology with full-field digital mammography (FFDM) continues to demonstrate its value by improving clinical confidence, workflow efficiency, and cost-effectiveness. This "second set of eyes" assists radiologists by facilitating the detection rate of breast cancer on mammograms.

Although there is a large body of data that supports the efficacy of CAD as an aid in detecting breast cancers using analog film technology, such as the 2005 Digital Mammographic Imaging Screening Trial, or DMIST, there is limited literature on its efficacy with FFDM.

In a study published in the February 2009 issue of the *American Journal of Roentgenology*, Juliette S. The, MD, Kathy J. Schilling, MD, and colleagues have contributed to the growing pool of data that evaluates CAD with FFDM. The researchers found that CAD with FFDM has the ability to help radiologists improve their sensitivity in being able to detect cancers at an earlier stage.

DIGITAL MAMMOGRAPHY AND CAD ADOPTION

Out of almost 9,000 mammogram centers in the United States, approximately half have adopted digital technology and more than 90 percent have also acquired a CAD system for additional analysis.

CAD systems using FFDM are different than analog mammography in many ways. "With FFDM, we're able to manipulate our images to improve our ability to find cancer. You can use manipulations to help improve the appearance and the detection rate," says Schilling, a radiologist at the Center for Breast Care, Boca Raton Community Hospital in Boca Raton, Fla. "What's nice about the CAD with digital is that it just is superimposed right on your workstation and can be turned on and off right on your digital workstation – so it flows very nicely in a digital practice."

Schilling says that as hospitals and imaging centers are converting to digital, it's a perfect time to implement CAD if the centers are not using CAD with analog technology. "It's very simple," she says. "You don't have to digitize prior images as we used to have to do when we were using it with analog. It will be a perfect time to implement CAD into a workflow if you're doing that digital transition."

TWO SETS OF EYES ARE BETTER THAN ONE

It is difficult to interpret mammograms accurately due to the etiologic heterogeneity of breast cancer. And the purpose of mammography screening is to detect cancers early when they are small, so radiologists are often looking for subtle changes from year to year. CAD heightens awareness of what's changing in the mammogram by providing a computerized second reading.

Jeff Hoffmeister, VP and medical director for Nashua, N.H.-based iCAD, notes that research has shown that if two radiologists read a mammogram, the second radiologist helps the first one find 10 percent or more cancers. "Mammography is a difficult task. Even though there's mortality reduction with just one radiologist reading, the second radiologist does consistently enhance performance," he says.

Hoffmeister estimates that less than 5 percent of facilities have every mammogram read by two radiologists because it is neither time- nor cost-effective. But most facilities still feel a commitment to their patients to provide optimum service that maximizes their sensitivity in detecting cancers.

"CAD provides a computerized second reading. You get the same benefit of a having a second reading by another radiologist – so you have the same benefit of a 10 percent improvement in cancer detection increase. Now they only need one radiologist," says Hoffmeister.

CAD system would improve workflow efficiency and reader confidence, particularly due to the knowledge that data demonstrates the efficacy of CAD with FFDM in identifying cancer.

DIGITAL MAMMOGRAPHY AND CAD

The *American Journal of Roentgenology* study used peer-reviewed data on iCAD's SecondLook Computer-Aided Detection technology that evaluated the performance of CAD with FFDM according to clinically relevant metrics, including breast density, mammography appearance, histopathology results, and mammographic lesion size. Overall, investigators found the following:

- SecondLook CAD with FFDM showed high sensitivity in identifying cancers.
- CAD correctly identified 94 percent of 123 known cancers.

- The system was equally accurate with small and large lesions.
- The CAD false-positive rate was 2.3 marks per four-image cases.

According to the study, sensitivity was maintained in cancers with histopathology traditionally known to lower sensitivity of mammography (i.e., invasive lobular carcinomas and small neoplasms).

SecondLook CAD for digital mammography was designed to assist radiologists in detecting cancers from other anomalies in the breast as well as subtle cancers or those likely to be overlooked. The SecondLook CAD system was developed using thousands of mammograms of women with cancer.

It was then "trained" to identify cancers that had already been identified and compare them to non-cancer marks on the images. SecondLook can be integrated into digital mammography systems from Waukesha, Wis.-based GE Healthcare; Malvern, Pa.-based Siemens Medical Systems; Stamford, Conn.-based Fujifilm Medical Systems; Bologna, Italy-based IMS Giotto; Morstel, Belgium-based Agfa Healthcare; and Sweden-based Sectra.

Hoffmeister notes that radiologists will experience a learning curve with the CAD system. They will need to learn how to dismiss marks that are not on regions that are suspicious for cancer. "CAD marks a lot of regions, and many of the regions are on benign, nonsuspicious areas of the mammogram because most subtle early cancers don't look that much different than some of the nonsuspicious regions, at least from the computer's standpoint," says Hoffmeister.

Trained radiologists may easily identify marks that are benign lesions, but most radiologists will need to adjust during the first couple of months and learn to dismiss marks that are on areas of no clinical concern. The longer they use the CAD system, the more a radiologist will feel comfortable dismissing areas the computer marks that are not suspicious of cancer.

WHAT THE FINDINGS MEAN FOR EVERYONE

For radiologists, the take-home message from the study's findings is that CAD used with FFDM will improve their confidence in their reads and improve the cancer-detection rate. "Anything that can help you focus to find more cancers is going to be something that the radiologist is going to be interested in using," says Schilling.

Additionally, administrators are always looking to bolster their revenue, and with any healthcare technology, hospitals typically consider the bottom line. Mammography CAD not only qualifies for reimbursement – both the technical component as well as a professional component – but the patient care benefits far outweigh the cost.

Physicians are being asked to read many more cases today, and CAD has become an integral part of their practice by helping to sort through volumes of data. "This, I think, is going to be not only for the novice reader, the reader that doesn't read that many mammograms, but also for experts who are doing high-volume work to again refocus possible areas of abnormality," says Schilling. "Across the board this is going to be helping physicians with all levels of expertise."

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