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Novel Breast-Imaging Methods

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Are you involved with a new procedure, diagnostic test, nursing intervention, or drug that impacts the oncology population? If so, consider writing for this column dedicated to the nursing implications of new patient care therapies. For more information, contact Associate Editor Deborah Davison, MSN, NP-C, CRNP, via e-mail at dddavison9@netzero.com.

For the past several decades, mammography has been the cornerstone of screening for breast cancer. Technology has improved greatly, as has radiologists' skills in interpreting films. Many studies have attempted to analyze the contribution of regular mammography screening to decreasing mortality from breast cancer. These studies have demonstrated varying results. In 2001, Olsen and Gotzsche published a meta-analysis of mammography screening studies and concluded that no evidence existed that the regular use of screening mammography decreased mortality from breast cancer. This meta-analysis subsequently was attacked for its selection process and methodology, and, in 2002, the U.S. Preventive Services Task Force published guidelines supporting the use of screening mammography for women aged 40 and older, citing "fair evidence that mammography screening every 12–33 months significantly reduces mortality from breast cancer" (p. 344).

Despite the endorsement of the U.S. Preventive Services Task Force, screening mammography has its shortcomings. Even in facilities that perform a large number of mammograms, the sensitivity of mammography to detect breast cancer is approximately 80%–85% (Yaakob, 2003). This is a limitation of mammography itself and, in part, results from the difficulty of imaging dense breast tissue and interpreting the films. For this reason, continual attempts have been made to improve the technology of screening mammography or develop new imaging techniques to replace or complement mammography. Two methods currently under investigation are full-field digital mammography (FFDM) and magnetic resonance imaging (MRI).

Full-Field Digital Mammography

Most FFDM devices are very similar to traditional screen film units and, from the patient's perspective, the experience of the test is essentially the same regarding technique and breast compression. In FFDM, a digital detector replaces the film cassette and the images are visualized on a monitor where a radiologist interprets them. The signs of breast cancer are the same with digital mammography as with screen film mammography. The U.S. Food and Drug Administration approved the first digital mammography device in 2000 (Lewin, D'Orsini, & Hendrick, 2004).

To date, no studies have shown a significant advantage of digital mammography over screen film mammography in detecting breast cancer. However, digital mammography does have other advantages, including the following.

- Digital mammography images have higher contrast than film, and the contrast can be changed on the monitor to improve visualization of suspicious areas.
- Using a monitor allows radiologists to magnify suspicious areas, which is ideal for visualizing small abnormalities such as microcalcifications.
- Digital images are not subject to artifacts and the variability that can occur with traditional film processing.
- Using digital mammography will eliminate the need for film libraries and allows images to be transmitted electronically among institutions for patient transfers or consultation with other radiologists.
- Examination time is shorter because no time is lost in developing films.

One of the most significant advantages of digital mammography is the ability to add computer-aided detection (CAD) to the system. Research has well established that if two radiologists interpret traditional screen film mammograms, the rate of cancer detection is improved. Unfortunately, such "double reading" is not practiced in many institutions because of increased costs and constraints on radiologists' time. When CAD is used with digital mammography, the radiologist first reads and interprets the digital images. CAD then is activated and marks any areas of suspicion, which the radiologist reviews and interprets.

Studies continue to explore the advantages of digital mammography, especially regarding breast cancer detection. A large study by the American College of Radiology Imaging Network (ACRIN, 6652) was activated in October 2001 and reached its accrual goal of 49,500 women in November 2003. Results of this trial are pending.

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