

Beyond the Mammogram: Molecular Breast Imaging Emerges

By Deborah Abrams Kaplan | March 24, 2011

Enter nuclear breast imaging, the catch-all phrase for several modalities that use a While the mammogram is still considered the gold standard for breast screening, those who need additional imaging have new options. Currently, MRI is the traditional next step for the about 30 percent of women with dense breasts, those with positive BRCA1/BRCA2 mutations, and women with suspicious lesions. The times, they are a-changing, though, with recent advances in [breast imaging technology](#). Not all women can undergo an MRI, and it's a more expensive and time-consuming study to read than newer modalities.

radiopharmaceutical agent in scanning, including gamma imaging and positron emission mammography (PEM). Known as both molecular breast imaging (MBI) and breast-specific gamma imaging (BSGI), the gamma cameras are an adjunctive technology for suspicious lesions found during mammogram. Physicians are also using it in place of MRI for women who are unable to tolerate that study or have metallic implants.

Many use the terms [MBI and BSGI](#) interchangeably, however the machines use different technology. BSGI uses a sodium iodide scintillator technology developed by Dilon Technologies (the only company developing such a technology), and MBI uses cadmium-zinc-telluride digital detectors developed by the Mayo Clinic.

"We have been using [breast-specific gamma imaging](#) since 2007, primarily for high risk individuals with difficult mammograms and/or sonograms, dense breasts, and for the evaluation of asymmetric densities," said Barbara Ward, MD, a partner in Weinstein Imaging Associates in Pittsburgh, Pa.

"One of the most helpful and important uses of this modality is for patients who present with a palpable abnormality with a negative mammogram and ultrasound," she said. "If the subsequent BSGI is negative, the patient has been very reassured. On the other hand, we have picked up some cancers that were both mammographically and sonographically occult with BSGI."

Gamma Imaging

The Dilon 6800 is the machine currently used by those performing BSGI studies. This technology detects Tc-99m sestamibi uptake, with a single-head gamma camera. It can typically detect lesions as small as 3 mm in diameter.

Researchers at the Mayo Clinic developed a dual-head gamma camera which also detects Tc-99m sestamibi uptake in suspicious breast lesions. Gamma Medica licensed the technology and recently introduced it commercially as the LumaGEM MBI System, which can reportedly detect lesions 1.6 mm in size, while using less radiation exposure. This is important because the major concern with BSGI is that "it's about 25 times the radiation dose of a mammogram," according to Emily Crane, research director and co-author of *KLAS Breast Imaging 2010: A More Complete Picture*, an independent healthcare vendor performance report released in December.

The Gamma Medica product is so new that KLAS researchers were unable interview any sites using the technology on a non-research basis.

While MBI is not used as a primary screening tool, its use as an adjunctive modality has shown efficacy. A study from the Mayo Clinic, [published in the January 2011 issue of Radiology](#), compared MBI to mammography in 936 at-risk women. The authors found that sensitivity for mammography alone was 27 percent, while MBI and

mammography combined had a sensitivity of 91 percent. In that study, 11 cancer diagnoses were made. MBI alone detected seven of the tumors, while one was detected by mammography alone, one by both techniques combined, and one by neither.

Screening Women with Dense Breasts

The gamma cameras are a popular technology to use for women with dense breasts. It's estimated that two-thirds of women in their 40s have dense breasts, decreasing to around one-third of women 50 and older. Due to the nature of X-ray technology, it can be difficult to interpret mammograms on dense breast tissue because the tissue and tumors both show up white.

"Sometimes [a mammogram] is nearly useless in really, really dense breasts," said Seetaram Ravipati, MD, a radiologist at Grand Lake Health System in St. Marys, Ohio. He said that if the BSGI is negative in a young woman with dense breasts, he's more comfortable using just a mammogram for the next few years. "Breast cancers don't grow overnight — it takes two to five years," he said, adding that he can rely on mammograms for their limited use, because he knows the BSGI was negative. He said that if the patient developed a breast cancer in the next few years, hopefully the mammogram would show a more obvious dense lesion.

BSGI versus MRI

Of course MRI is used for similar reasons, however not all patients can tolerate an MRI, or it could be contraindicated. Another concern with MRI is financial. MRI costs three times as much as gamma imaging studies. Facilities who provide BSGI screening report no problems with reimbursement from Medicare, Medicaid, or third party payers, and they use available nuclear medicine billing codes