

Breast Specific Gamma Imaging : A Clinical Pilot Study

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Introduction

- * Mammography remains the gold standard for breast cancer screening.
- * In women who have dense breast tissue, the sensitivity of mammography decreases and the false negative rate is as high as 15%.
- * Breast specific gamma imaging (BSGI) is a molecular breast imaging technique that analyzes the metabolism of cancerous lesions in the breast by radioisotope.
- * The purpose of this prospective study is to evaluate the BSGI in patients who were at high risk or had a newly diagnosed breast cancer and determine the percentage of patients who had a change in their management or improved screening.

Materials and Methods

- * 163 women who had a new diagnosis of breast cancer or who were at increased risk for the development of breast cancer underwent BSGI.
- * The patients had a mean age 52 years with a range of 26-85 years.
- * 79 (48.4%) were premenopausal and 84(51.5%) were postmenopausal.
- * In patients with a new or recurrent diagnosis the test was used to determine the extent of disease within the breast. In others it served as an additional screening modality.

Personal Hx of Breast CA	51 (31.3%)
Current Dx of CA	34 (20.8%)
Recurrent Dx of CA	4 (2.5%)
Dense Brsts and/or Family Hx	43 (26.3%)
BRCA	4 (2.5%)
Breast Implant	1 (0.6%)
High Risk (LCIS, ADH,HRT)	10 (6.1%)
Nipple Discharge	1 (0.6%)
Inc Calcs/Abnormal Mammo	15 (9.2%)

Results

Of the 163 patients who underwent BSGI at our institution, 133 (82%) patients had findings that were concordant with the prior imaging studies and pathology where indicated. 31 were found to have a change in management because of the BSGI (19.0%). Of these 31 patients 20 were pre-menopausal and 11 were post menopausal.

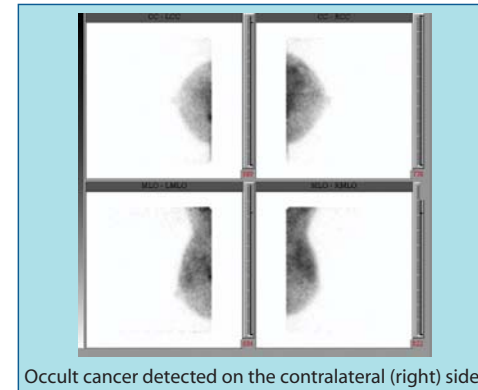
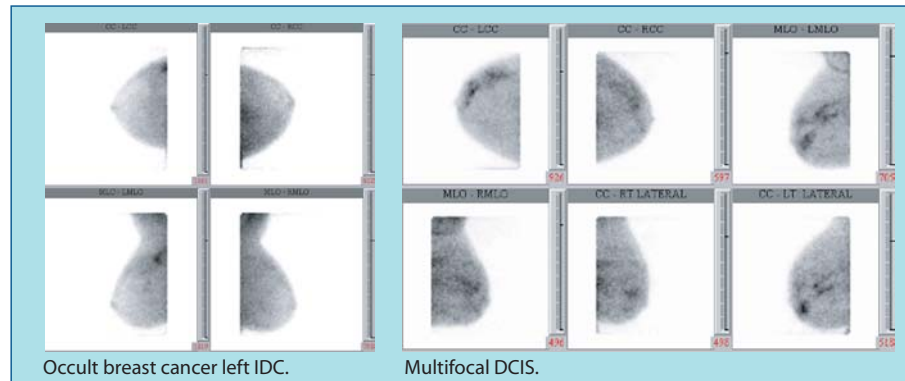
Nine (5.5%) were found to have areas of abnormal uptake that was not seen in other studies. Two of these were papillomas, one was a spindle cell tumor, one was LCIS and five were areas of cancer that were not seen on other imaging modalities.

Five (3.1%) patients had false negatives. Interestingly three were infiltrating ductal carcinoma, one was DCIS and one was adenocarcinoma in the lymph nodes. None of them were

lobular cancers.

Three (1.8%) patients were able to confirm what had been supported by prior studies. One of these was a patient who had had a slight increase in her calcifications on mammogram and declined a biopsy after a negative BSGI. Another patient was able to confirm that a questionable area was a leaking implant and also avoid biopsy. One patient was able to have breast conservation after showing that other areas of calcifications in her breast that had no increased uptake and were not malignant and so avoided mastectomy. 17 (10.4%) patients had false positive results. These were areas that appeared positive on BSGI and were then found to be benign on further imaging or on biopsy.

Patients	Gamma Scan Finding	Outcome
133 (82.0%)	Concordant to mammogram/ sonogram	Management Unchanged
9 (5.5%)	Increased area of uptake	Made dx that was missed on other modalities 5 mammogram occult cancers (2 ILC, 2 IDC, 1 adenocarcinoma); 2 papillomas; 1 spindle cell; 1 LCIS
17 (10.4%)	Increased area of uptake	Areas found to be benign 2 cleared with additional films 9 Fibrocystic on biopsy ; 3 cysts on biopsy 2 benign tissue on biopsy; 1 fibroadenoma
3 (1.8%)	Suspicious area confirmed benign	Biopsies avoided
5 (3.1%)	Negative scan of known cancer	False negative 3 IDC; 1 DCIS; 1 adenocarcinoma in the axilla



In terms of standard statistical measures, comparing the results of mammogram to the BSGI scan, there were 39 true positive exams. There were 102 true negative exams. There was 5 false negative and 17 false positives.

- * This gives a sensitivity of 88.6%.
- * The specificity is 85.7% and the positive predictive value is 69.6%.
- * The negative predictive value is 95.3%.

Conclusion

- * The BSGI is a promising imaging modality that can help optimize patient management. Our study is of the first 163 patients who underwent breast imaging using the BSGI at our institution.
- * In 19.0% or 31 of the cases the gamma scan provided information not identified by initial mammogram or sonogram and changed the management of these patients. Unfortunately 5 of the 31 were false negatives. None of these false negatives, however, were lobular cancer.
- * The BSGI was able to diagnose 5 cancers that were occult on mammogram and interestingly none of the false negatives were lobular cancers.
- * Like MRI, BSGI has a low false negative rate but a very high sensitivity which leads to a significant number of biopsies of benign disease.
- * Future studies will be needed to continue to define the role of this new technology in the diagnosis of breast disease.