New study offers more information on the radiation dose from breast specific gamma imaging.

Marcela Böhm-Vélez, M.D., a breast radiologist in Pittsburgh PA and Fellow of the American College of Radiology is highly sensitive to the radiation exposure patients receive from medical imaging procedures. "We are always investigating ways to reduce the radiation dose our patients receive by either avoiding procedures not absolutely necessary or by using as little radiation as possible for the studies we use. In fact, we prefer to use ultrasound whenever possible, since it does not require the use of radiation. However there are times when mammography and ultrasound alone are not enough. We added BSGI to our practice several years ago to help in the management of our difficult to diagnose patients."

According to a recent report on the radiation dose from breast imaging procedures by Edward Hendrick, PhD, the radiation dose from BSGI is substantially higher than mammography. "The main point of Hendrick's article was to point out that this imaging technology should not be used in breast cancer screening on the general population and I whole heartedly agree." Dr. Marcela Böhm-Vélez continued. "The trouble is that in cases of dense or difficult to interpret breast tissue, mammography to is less likely to detect cancer. Therefore we use BSGI in patients who have a diagnostic concern that has not been successfully addressed by mammography and ultrasound. For these patients, the risk of a undetected cancer is high and the radiation dose from BSGI is a very small concern compared to the threat of a missed breast cancer."

BSGI studies are performed using an injection of the pharmaceutical Sestamibi, an imaging tracer cleared by the FDA in 1991 and commonly used in a variety of medical imaging procedures. Breast imaging was added to the drug package insert in 1996 with a recommended dose of 20 – 30 millicuries (mCi). Since that time, new detector technologies have been developed opening the possibility of reducing the dose needed for the imaging procedure.

"For clinical imaging, our group already uses 20 mCi, the minimum amount of tracer possible under the current FDA approved guidelines." The radiation dose delivered to the patient is about 0.6 rem, a radiation dose lower than other common diagnostic imaging studies. According to a position statement released July 2010 by the Society of Health Physics on the health risks from radiation exposure, risk estimates should be used when an individual's dose exceeds 5 rem in a single year or 10 rem in a life time which translates to 8 BSGI studies in a single year or 16 in a patients lifetime.

"We wanted to lower the radiation dose to patients, but discovered that there were no studies examining if reducing the dose would impact our ability to detect cancer. In fact, all of the published studies on breast imaging with Sestamibi have used a dose of 20 – 30 mCi likely because reducing the dose would be an off label use of the pharmaceutical." Ever conscious of minimizing dose, Dr. Böhm-Vélez and her colleagues at Error: Reference source not found embarked on a study to determine if it is possible to use less radiation when conducting BSGI. "If we are going to use a lower dose of the pharmaceutical for BSGI, it is important to know if Sestamibi behaves the same way in the body at lower doses."

In their study patients who were routinely scheduled for a BSGI study due to diagnostic concerns were asked to participate. Each volunteer patient had BSGI imaging conducted using a Dilon 6800 Gamma Camera at a low dose of 5, 10 or 15 mCi followed by imaging at the normal 20 mCi dose. Although their study is still underway, results from the first 21 patients were presented at the Chicago International Breast Conference on October 2nd 2010.

Similar to recent studies conducted at the Mayo Clinic with CZT detectors, their investigation found the image quality at 10 mCi was technically sufficient for clinical imaging. However when they compared the uptake of Sestamibi at low and normal doses, they found something the Mayo researchers were not measuring. The uptake of Sestamibi in the breast tissue was not proportional to the dose administered to the patient. Images conducted using 15 mCi (75% of the standard 20 mCi dose) had 90% of the Sestamibi concentration, but that relationship changed as the dose was lowered to 10 or 5 mCi. "Believe me, no one wants to use a lower dose more than I do, but we need to understand what is happening with low dose imaging and if it impacts our ability to detect cancers, which is the focus of our ongoing research, otherwise we run the risk of compromising patient care. Besides, if we expect the pharmaceutical companies making Sestamibi to change the dose recommendations, we will need to be armed with data like this."