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Radiation, Risks Are Focus of Breast Screening Studies

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When Dr. Deborah Rhodes orders a diagnostic test that involves radiation, she consults a chart in her office that lists the amount of radiation exposure from each test. She considers the patient's total past exposure, and then carefully weighs the risks and benefits of each test and any alternative approaches she can take.

Two new studies appearing in Tuesday's issue of the journal *Radiology* suggest more physicians should take this approach. One study found that certain nuclear-based breast imaging exams that involve injecting radioactive material into patients expose women to far higher doses of radiation than regular mammography, increasing their risk of cancer in vulnerable organs beyond the breast, like the kidneys, bladder or ovaries.

Over all, the United States population's annual radiation dose from medical procedures increased sevenfold between 1980 and 2006, a second paper reports.

"I'm a radiation phobe — I'll come right out and say this," said Dr. Rhodes, an internist at the Mayo Clinic who is doing research to develop screening technologies that require less radiation exposure to the patient. "I'm constantly monitoring radiation doses in my patients."

Unfortunately, she said, "this is something that isn't well understood, not just by the public — but by physicians who order the tests."

R. Edward Hendrick, a physicist who has studied breast imaging for almost 30 years, said he was motivated to quantify the radiation exposure from nuclear breast imaging technologies in a published paper because of similar concerns.

"I would go to the international breast meeting and the big radiology meetings, and nobody had a clue what the doses and risks were," Dr. Hendrick said. "They're treating all the tests as if they have the same radiation dose and risk as mammography, and the truth is they have a much, much higher risk. The point of the paper was to say that not all the breast imaging procedures have comparable risks and doses."

Dr. Hendrick, a clinical professor of radiology at the University Colorado-Denver School of Medicine in Aurora, Colo., is a consultant to G.E. Healthcare regarding digital breast tomosynthesis, another breast imaging technique, and is on the medical advisory boards of Koning and Bracco, which make other imaging technologies.

The nuclear technologies breast-specific gamma imaging (B.S.G.I.) and positron emission mammography (P.E.M.) are meant to be used as complements or adjuncts to mammography and ultrasound, once there is concern about a cancerous lesion, and not for routine screening. These technologies are also more useful in women who have very dense breast tissue, when mammography often does not provide clear images.

But a single breast-specific gamma imaging or positron emission mammography exam exposes patients to a risk of radiation-induced cancer that is comparable to the risk from an entire lifetime of yearly mammograms starting at 40, according to Dr. Hendrick's study.

While digital mammography has an average lifetime risk of inducing 1.3 fatal breast cancers per 100,000 women aged 40 at exposure, a single B.S.G.I. exam was estimated to involve a lifetime risk 20 to 30 times greater in women aged 40, and the lifetime risk of a single P.E.M. was 23 times greater. Moreover, mammography only increases a woman's risk for breast cancer while B.S.G.I. and P.E.M. increase the risk of cancer in other organs, such as the intestines, kidneys, bladder, gallbladder, uterus, ovaries and colon, the study said.

There is also a concern that use of the imaging technologies will become more widespread and casual. "B.S.G.I. and P.E.M. are great tools for problem solving, if you have a patient with an abnormal mammogram and you're not really sure," said Dr. Rhodes. "The problem is these tests are now being considered and even being used in some cases as screening tests, and this is not appropriate."

"I'm not saying 'Don't do the test,' I'm just saying 'Don't prescribe these tests willy-nilly like you would an ultrasound exam,'" Dr. Hendrick said.

In another paper in the same issue of Radiology, William R. Hendee, a distinguished professor of radiology, radiation oncology, biophysics and bioethics at the Medical College of Wisconsin in Milwaukee, called on radiologists to spearhead a campaign to reduce overuse of imaging technologies that expose patients to radiation unnecessarily and drive up health costs in the process.

Suggested proposals for curbing excessive use of imaging include developing national evidence-based appropriateness criteria for imaging, educating referring physicians and the public, curbing the physician practice of self-referral and finding ways to reduce duplicate exams.

Companies that make the two nuclear-based breast imaging exams did not argue with the assessment of radiation exposure, but said the comparison with mammography — which exposes patients to very low levels of radiation, equivalent to about two months of natural background radiation — was inappropriate because the tests are used differently.

"The comparison to mammography is a bit like comparing apples to oranges," said Doug Kieper, vice president of science and technology for Dilon Technologies Inc., which developed the B.S.G.I. technology. "This is not being used as a screening procedure for the general asymptomatic population who have no indication of disease." He added that studies were already under way to see if the same results could be obtained using lower doses of radiation.

Guillaume Bailliard, vice president for marketing for Naviscan, which makes the P.E.M. scanner, said it should never be used as a tool for routine screening. "It is true that P.E.M. provides a higher dose than mammography," he said, "but physicians balance the risk-to-benefit when making decisions."