

## Nuclear Medicine: Approaches for Breast Cancer Dx and Rx

Richard A. Holmes, M.D.

*Vice President, Research & Development,  
Dupont Merck Radiopharmaceutical Division, U. S. A.*

Breast cancer adversely affects many patients although early detection has improved the outcome of some. Self-examination and mammography contributed to this improvement, however, as much as 30 percent of mammograms are uninterpretable. To address this, radiopharmaceuticals that localize in breast lesions have been and are being studied. The Tc-99m labeled phosphonates, used to image osteoblastic metastases in the skeleton, can localize in breast tissue and breast lesions. Even so, the optimum time to image, the true occurrence rate and the mechanism of uptake remains controversial and the study may only be useful in selected situations. Both Tl-201 and Tc-99m sestamibi, used to image myocardial blood perfusion, have demonstrated breast tumors and metastatic axillary node uptake. Extensive studies with Tc-99m sestamibi and excisional biopsies have shown that the radiotracer localizes in the mitochondria of tumor cells. Pivotal studies using Tc-99m sestamibi in more than 600 patients with either mammographic positive or palpable breast masses are now being evaluated to determine its sensitivity, specificity and predictive values. Image resolution of lesions larger than one centimeter is a major limitation of scintimammography.

Osteoblastic skeletal metastases from breast cancer is common and frequently associated with progressive unremitting pain. As the pain progresses, it can be successfully treated with external beam irradiation. When skeletal metastases are generalized, radiation therapy can be administered systemically using agents like Sr-89 which concentrates at the osteoblastic sites. Agents such as Sm-153 EDTMP, in addition to analgesia, may have therapeutic potential. Although the analgesia of these agents are comparable, their effective onset may be earlier and a dose response has been observed with Sm-153 EDTMP. Bone marrow ablation and elimination of the osteoblastic bone lesions followed by marrow transplantation may be accomplished using Ho-166 DOTMP in certain breast cancer patients.