

# Technetium-99m-Methylene Diphosphonate Scintimammography in Male Breast Cancer

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Breast cancer in men is a rare disease, representing less than 1% of all breast cancers. Recently, scintimammography with  $^{99m}\text{Tc}$ -methylene diphosphonate (MDP) has been proposed as an effective method in the differential diagnosis of breast masses. A 67-yr-old man with breast cancer that showed avid accumulation of  $^{99m}\text{Tc}$ -MDP is presented in this article. Infiltrative ductal carcinoma was demonstrated histopathologically.

**Key Words:** breast cancer; radionuclide imaging; technetium-99m-methylene diphosphonate; scintimammography

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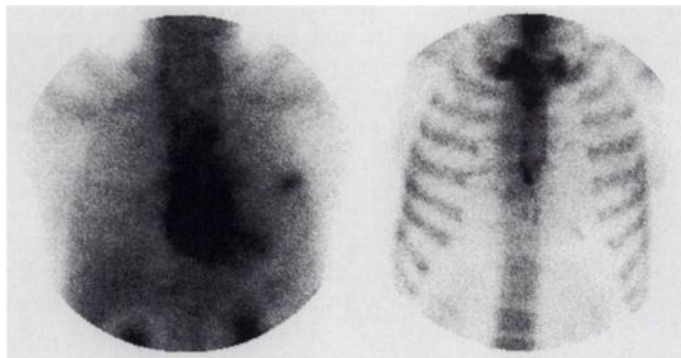
There is growing interest in the scintigraphic evaluation of suspicious breast masses. In addition to tumor-localizing agents, early imaging with  $^{99m}\text{Tc}$ -methylene diphosphonate (MDP) has been proposed as an accurate method in the differential diagnosis of breast lesions (1). Bone scintigraphy is widely used during presurgical staging of breast carcinomas, and scintimammography can be added to the skeletal examination without any additional radiation dose and cost. In our nuclear medicine department, scintimammographic images are obtained in patients with breast tumors who are referred for bone scintigraphy.

## CASE REPORT

A 67-yr-old man presented with a 2-wk history of a left breast mass. After detection of malignancy with fine-needle aspiration cytology, the patient was referred for bone scintigraphy to exclude the likelihood of skeletal metastasis. A dose of 740 MBq  $^{99m}\text{Tc}$ -MDP was administered, and a static image of the thorax was obtained 15 min later. A whole-body bone scan was performed 4 hr following tracer injection. The images were acquired using a low-energy, general-purpose collimator and setting energy at 140 keV, 20% window.

The tumor, showing increased activity accumulation, was easily recognized in the early image (Fig. 1). No skeletal metastasis was detected by whole-body scanning.

In the presurgical preparation of the patient, there was no evidence of metastatic disease. However, ST/T wave changes were detected in his electrocardiograms, which were highly suggestive of severe coronary ischemia, and coronary angiography was performed. Significant stenosis was observed in the left anterior descending and right coronary arteries. Since a known malignancy is a contraindication for the use of a perfusion pump during surgery, bypass grafting to these coronary arteries was performed on the beating heart. Immediately after the completion of coronary artery bypass grafting, a modified radical mastectomy was done. No complications were observed during or after the operation. Histopathological examination revealed moderately differentiated infiltrative ductal carcinoma and its axillary metastasis in a lymph node. The tumor was 2 cm in size with irregular borders. Estrogen-



**FIGURE 1.** Supine images acquired at 15 min and 4 hr postinjection. The early image revealed increased activity accumulation in the left breast. There was no pathological accumulation in the bone phase.

receptor was poor but was diffusely positive in the cytoplasm of tumor cells.

## DISCUSSION

Breast cancer in men represents less than 1% of all breast cancers (2). In men, the most common pathologic type is estrogen-receptor positive infiltrating ductal carcinoma, and endocrine therapy is more widely used (3–5). A radical or modified mastectomy with adjuvant chemotherapy can be applied as primary treatment (6,7).

To confirm malignancy, fine-needle aspiration biopsy is the most useful diagnostic method because only large breasts or gynecomastia can be evaluated by mammography (6). However, no definitive conclusions have been reached regarding the use of mammography as a diagnostic and screening tool in men (6). There are also some limitations in mammography for women, such as low specificity and poor image contrast in dense breasts (8). Among the new approaches in the differential diagnosis of breast lesions, scintimammography seems to be a promising noninvasive method. Several radiopharmaceuticals have been used for detecting breast cancer, and high diagnostic accuracy has been documented by  $^{201}\text{Tl}$  and  $^{99m}\text{Tc}$ -sestamibi imaging. By using these radiopharmaceuticals, it is possible to evaluate primary lesions as well as metastatic axillary nodes concomitantly (9–11).

Recently,  $^{99m}\text{Tc}$ -MDP scintimammography has been introduced with high positive and negative predictive values in the differential diagnosis of breast lesions. It offers a simple, cost-effective and more readily available method (1). Piccolo et al. (1) reported that the optimum time of imaging for breast cancer was 10–20 min postinjection of MDP. Other reports relating to the breast accumulation of  $^{99m}\text{Tc}$ -MDP only include 2–4 hr after tracer injection (12–27). It is known that  $^{99m}\text{Tc}$ -MDP is taken up by a normal or lactating breast, chronic mastitis, gynecomastia, carcinoma, fibroadenoma, breast prosthesis, cystosarcoma phylloides, amyloidosis, new bone formation, primary osteosarcoma of breast, fat necrosis and hematoma (12–19). In normal women, documentation shows that the positive breast uptake reaches its maximum between the ages of

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30 and 40 yr (20). The accumulation of  $^{99m}\text{Tc}$ -MDP in breast tumors has been explained by the effects of estradiol and other nonspecific mechanisms, such as hypervascularity, enlarged interstitial space, inflammatory changes, microcalcifications,  $\text{Ca}^{++}$  and collagen contents, etc. (21–27).

Previous results have suggested that  $^{99m}\text{Tc}$ -MDP scintimammography may have a potential role in evaluating patients with dense breasts and suspicious or indeterminate radiological findings such as microcalcifications not associated with palpable masses (1,28). It requires further investigation to describe its definite use. The major drawbacks of  $^{99m}\text{Tc}$ -MDP scintimammography are its low sensitivity for primary lesions smaller than 1 cm, peripherally located tumors in the inner quadrant and metastatic lymph nodes smaller than 3 cm (1). Recent research has focused on special positioning of the breast, such as prone or craniocaudal scintimammography and SPECT, to avoid problems related to tumor size and site (9,11,29–31).

## CONCLUSION

Male breast cancer is a rare disease compared to female breast cancer. This case demonstrates the utility of scintimammography in male breast cancer.

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