

# Anatomical distribution and sclerotic activity of bone metastases from thyroid cancer assessed with F-18 sodium fluoride positron emission tomography

Schirrmeister H, Buck A, Guhlmann A, Reske SN

Department of Nuclear Medicine, University Ulm, Germany

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## *Summary*

Currently, bone scintigraphy (BS) is considered to lack sensitivity in detecting bone metastases (BM) from thyroid cancer. We evaluated the anatomical distribution and metabolic behavior of BM as well as the accuracy of BS with and without combination of whole-body iodine scintigraphy (WBI) in detecting metastatic bone disease in thyroid carcinoma. F-18 positron emission tomography (PET), x-ray, BS, and WBI were performed in 35 patients with known or suspected bone metastases from papillary (9 patients) or follicular (26 patients) thyroid carcinoma. Twenty-two metastases were previously known in 14 patients. The indication was staging in 21 patients with high risk for BM, elevated thyroglobulin (Tg)-levels or evaluation of exact extent of BM (14 patients). In addition, results of WBI (35 patients), X-ray (35 patients) F-18 PET (35 patients), MRI of the spine (13 patients), and FDG-PET (15 patients) as well as the clinical course (1.5-4 years) were correlated. BM were detected in 18 patients. Solitary, bifocal, or multiple lesions were present in 9, 2, and 7 patients, respectively. The anatomical distribution of BM (n = 43) was as follows: spine, 42%; skull, 2%; thorax, 16%; femur, 9%; pelvis, 26%; humerus and clavicle, 5%. Sensitivity of BS in interpreting patients as positive or negative for having BM was 64%-85% (specificity, 95%-81%). The combination of BS and WBI was 100% sensitive in detecting metastatic bone disease. One patient had a single BM that was positive at BS but negative on WBI. All metastases were osteolytic on x-ray and two-thirds presented a missing or very limited osteosclerotic bone reaction on F-18 PET. Our data confirm the limited sensitivity of planar BS in detecting BM from thyroid cancer. The combination of BS and WBI, however, was highly accurate. Compared to other malignancies, the distribution pattern of BM presented a lower percentage of vertebral metastases and more patients with single metastases. Those findings in combination with a missing or only slight osteosclerotic bone reaction explain the limited sensitivity of planar BS alone.