

1) In primary bone tumor cases, the localization of tumors, the degree of the secondary reaction of them and the presence or absence of osteogenesis could be detected on whole body scintigrams, and the test was of use in the diagnosis of multiple foci.

2) In general, it is difficult to know with RI whether a primary bone tumor is benign or malignant. We examined pathological findings obtained in the RI accumulation sites in the bone tumor cases and found that the scintigram test was

positive without reference to the malignancy or benignity of tumors when there existed such conditions of secondary bone reactions with tumors as polynuclear giant cells, stromal hyperplasia, infiltration of free cells and bleeding.

3) In metastatic bone tumor cases, the rate of skeletal metastasis detected by the whole scintigram test was as high as 87%, that is, the method was very useful for detecting skeletal metastasis in the early stage.

Clinical Evaluation of Bone Scintigram in Multiple Myeloma

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The studies of bone scintigraphy were carried out in 13 patients with multiple myeloma, one patient with non-secretory myeloma and one with macroglobulinemia Waldenström.

The scintiphotographies were taken on skull, humerus, ribs, vertebra, pelvis, femur and knee joint in each patient, 3 or 4 hours after the intravenous administration of 5 to 10 mCi of ^{99m}Tc -pyrophosphate. The bone scintigrams were examined with the relation of clinical data and roentgenographic skeletal survey. The characteristic findings were as follows:

1) The abnormal findings on the bone scintigram and skeletal roentgenogram were well corresponded on vertebra, humerus and femur, but the abnormal findings on the bone scintigram were more striking on ribs and knee joints.

2) Abnormal findings on bone scintigram were more clearly obtained in L-type myeloma than in K-type myeloma.

3) There were various grade of positivity in scintiphotogram on osteolytic lesions, which suggested the existence of various types of reaction of new bone formation against the plasma cell infiltration.

4) The bone scintigraphy seemed to express the changes of metabolic states of bone lesions, while the roentgenogram only revealed the static changes in them.

5) It is concluded that the bone scintigram in multiple myeloma is very useful to gain the early information about the bone changes and is too useful for the observation of clinical course.

^{99m}Tc -Diphosphonate Bone Scanning in 10 Patients with Multiple Myeloma

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^{99m}Tc -diphosphonate bone scanning was performed in 10 patients with multiple myeloma, and compared with bone roentgenograms. In all of the cases, abnormal areas of increases activity were

seen on bone scans, but cold area was not seen in any cases. The abnormal areas in the bone scans were also observed as the areas of abnormal findings in the roentgenograms. On the contrary,

the abnormal areas in the roentgenograms were not always abnormal in the bone scans. Pathological fractures seen in the roentgenograms always showed the abnormal accumulations in the bone scans. But punched out lesions in the roentgenograms rarely showed scan abnormalities. The areas of bone destruction and loss of bone density in the roentgenograms showed either abnormal accumulations or normal accumulations in the bone scans. There were many abnormal areas seen on the bone scans in the case in which serum alkaline phosphatase was very high, and there were few abnormal areas seen on the bone scans

in the cases in which serum alkaline phosphatase was normal value. However there were several cases in which serum alkaline phosphatase was relatively high, and did show few scan abnormalities. It is well known that bone scan is superior to roentgenogram in the detection of the bone metastasis from cancer. But in our study of multiple myeloma, there was a tendency that abnormal scan findings were lesser than those of roentgenograms. From this result, if we see a lesion of osteolysis in bone roentgenogram, bone scan may be of use to differentiate it to be multiple myeloma or bone metastasis from cancer.

Scintigraphic Findings of Primary Bone Tumor with ^{99m}Tc -Phosphates and ^{67}Ga -Citrate

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21 cases of primary bone tumor, pathologically diagnosed by operation, were examined by scintigraphy with ^{99m}Tc -phosphates and ^{67}Ga -citrate simultaneously.

2 or 3 hours after the injection of 5–10 mCi of ^{99m}Tc -phosphates bone scintigraphy was performed. Then 2 mCi of ^{67}Ga -citrate was injected and 48 hours later, ^{67}Ga -scintigraphy was done.

Results:

Possibility of malignancy was suggested when marked accumulation of ^{99m}Tc and ^{67}Ga was seen.

On the other hand, it was suggested that the lesion was benign when abnormal appearances in the X-ray film were noticed and uptake of ^{99m}Tc ^{67}Ga was recognized.

	No. of cases	Tc scan positive	Ga scan positive
osteosarcoma	2	2	2
myeloma	2	2	2
fibrosarcoma	1	1	1
adamantinoma	2	2	2
fibrous dysplasia	3	3	3
solitary bone cyst	2	0	0
osteochondroma	4	3	3
fibrous cortical defect	1	0	0
histiocytosis X	1	1	0
nonossifying fibroma	1	1	0
benign chondro-blastoma	1	1	1
chondroma	1	1	1