diagnosis of the bone lesions, if not definitive, which are not disclosed by the routine radiography bone survey. Then bone scanning must be performed at first in the aged patients complaining of gonalgia or coxalgia because positive findings appear in the bone scanning of these patients before positive findings appear in the radiography. \(^{99m}\)Tc-labeled pyrophosphate accumulates not only to the osteoplastic lesions such as metastases to bone from prostate but to the osteolytic lesions such as osteoporosis and hyperparathyroidism where negative bony metabolic balance exists.

Since geriatric patient has frequent incidence of bone diseases such as osteoporosis, fracture, gonitis, coxitis and bony metastases due to various malignancies, introduction of reliable bone scanning method provided us not only diagnostic accuracy but also the new means to study the mechanism of agings of bone. Reading of the bone scanning in aged people should be based on the different criteria from younger adult since the difference of bone image was so significant when compared with other organ imriages.

The Diagnosis and Observations on the Course of Treatment in Bone Diseases

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Numerous reports have already been made on the usefulness of scanning in the diagnosis of bone diseases. We, in our department, have thus far performed bone scanning in 735 cases of diseases of or trauma to bone in an attempt to study its diagnostic value in various pathologic conditions of bone. This series comprised 363 cases of periosteomyelitis, 148 cases of bone tumor, 132 cases of fracture and 93 others. The purpose of this communication is to outline our data concerning the usefulness of bone scanning in the diagnosis and in the evaluation of response to therapy of bone tumor, periosteomyelitis and fracture among orthopaedic conditions studies. As radionuclide we used \(^{85}\)Sr initially and then \(^{87}\)Sr from February, 1969 on and have used \(^{99m}\)Tc polyphosphate compound since autumn of the last year. We make it a rule to perform profilescanning first and then photoscanning. From profilescintigrams the left-to-right ratio of hot area is obtained, which, after subjected to classification, serves as a means of evaluating disease activity. Photoscintigrams, which permit to estimate the extension of lesion, are subject to computer analysis after rescanning; the information recorded on a tape, when analyzed by a medical analyser,\(^1\) scintipac-200, permits to make a study of iso-counting rate curve, iso-counting rate distribution diagram, 3-dimen- sional presentation and RI deposition on a given section of bone.

The results obtained in this series warranted us to conclude: (1) that in bone tumors scintiscanning of bone not only provides an effective means of early diagnosis and of making diagnosis as to the location and extension of lesion but also permits to evaluate response to therapy, radiotherapy for example; (2) that in periosteomyelitis it enables us to make observations for therapeutic response, to evaluate therapeutic effectiveness and to make a decision on therapeutic policy and hence provides a procedure of great diagnostic aid to be used in conjunction with the conventionally
used diagnostic procedures, such as x-ray, clinical and laboratory examinations; and (3) that the procedure may be used effectively in cases of bone fracture for appraising post-treatment course and healing status (e.g. delayed union), for diagnosing pseudarthrosis as well as for evaluating prognosis.

An Evaluation of the $^{99m}$Tc-Sn-polyporphosphate or $^{99m}$Tc-Sn-pyrophosphate scan for the Detection of Bone Metastases from Prostatic Carcinoma

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Cancer of the prostate is the most common neoplasm metastatic to bone. Early detection of skeletal involvement is important in ascribing prognosis and selection of therapy.

The purpose of this study is to assess the usefulness of bone scans utilizing $^{99m}$Tc-Sn-polyporphosphate (Tc-Po) or $^{99m}$Tc-Sn-pyrophosphate (Tc-Py) for the detection of metastases from carcinoma of the prostate.

**Materials and Methods:** Selected for study were 32 patients with various clinical stages of prostatic carcinoma. Histologic proof of their disease was obtained prior to scans.

Tc-Po or Tc-Py was prepared in the usual manner. Each patient was given 5 to 10mCi of it intravenously.

Scans were performed from 2 to 5 hours after injection with scintillation camera (Nuclear Chicago, PHO/Gamma HP) or scintillation scanner (Aloka, JSS-104 and Shimazu, SCC-130W).

Roentgenograms of the whole body were obtained and serum acid phosphatase and serum alkaline phosphatase were determined. All of the scans and radiographs were reviewed by the author. They were judged to be abnormal (positive) or normal (negative) for evidence of increased uptake of isotopes or bone metastases respectively.

**Results:** Eighteen patients (56%) had radiographic evidence of bone metastases with all of the lesions being osteoplastic in type. In each case the radioisotope scans showed increased concentration of Tc-Po or Tc-Py in the corresponding areas. The extent of tumor involvement as delineated on the scan was generally the same as or greater than that shown on the radiograph. Seventeen patients (53%) had an abnormally elevated serum acid phosphatase and fifteen patients (47%) had an abnormally elevated alkaline phosphatase.

Twenty patients had an abnormal scan. Of these patients with an abnormal scan, eighteen (90%) had radiographic evidence of bone metastases. Thirteen patients (65%) had an unusually high serum alkaline phosphatase and it was more than patients who had an unusually high serum acid phosphatase (12 patients, 60%).

Twelve patients had a normal Tc-Po or Tc-Py scan. Of these, none had radiographic evidence of bone metastases and abnormally elevated serum alkaline phosphatase. Four patients (33%) in this group had an elevated serum acid phosphatase.

Bone biopsies of the abnormal areas noted on scans were obtained in seven cases, and four metastatic adenocarcinomas were proved.

Regions with abnormal scan and with normal