

The Clinical Use of ^{99m}Tc -pyrophosphate (Comparison of ^{87m}Sr)

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^{87m}Sr has been regarded as standard agent for bone scanning. Recently, a new complex of ^{99m}Tc -labeled pyrophosphate has been developed which has shown preliminary potential as skeletal imaging agent.

A comparison was made of biological and clinical properties of ^{99m}Tc -pyro. prepared from Kits of CISR, and ^{87m}Sr . Studies included measurements of blood clearance, urinary excretion and tissue distribution in rabbits to obtain the nature of distribution.

The average skeletal concentration of ^{87m}Sr was higher than that of the ^{99m}Tc -pyro. from one to five hours.

Although the activity of ^{87m}Sr in the blood and soft-tissue was higher than that of the ^{99m}Tc -pyro., too.

Bone-to-soft tissue ratio was higher with pyrophosphate than ^{87m}Sr . It means that the Tc-pyro. was rapidly cleared from blood by either bone deposition or urinary excretion. The blood clearance was also determined in patients.

To date we have studied 139 patients with both neoplastic and non-neoplastic disease. In many cases comparative studies were performed with ^{87m}Sr . Imaging was obtained with 3 inch rectilinear scanner) with 4:1 minification.

Scans were performed twice, at 1 to 2 or 3 to 4

hours after i.v. injection of 2–10 mCi ^{99m}Tc -pyro., and 1–3 mCi of ^{87m}Sr to determine optimum imaging time. The optimal interval after injection of ^{99m}Tc -pyro. to begin scanning is about 3 to 5 hours.

The short half-life of ^{87m}Sr does not permit sufficient time for the blood and soft tissue activity to clear and thus the quality of the images suffers because of the relatively low target-to-background ratio.

Comparison of ^{99m}Tc -pyro. and ^{87m}Sr in cases of primary bone neoplasma was done. There were no difference between them of high concentrations of tracers in lesion, but the margin of the lesions were delineated more clearly with ^{99m}Tc -pyro.

Scintigraphy with both ^{99m}Tc -pyro. and ^{87m}Sr could detect metastasis not apparent on skeletal radiographic survey in many cases.

But scintigraphy with ^{99m}Tc -pyro. could delineate multiple small lesions more clearly, while that with ^{87m}Sr showed considerable interference due to soft-tissue radioactivity.

The anatomical structures identified on whole body scans made with ^{99m}Tc -pyro. were discussed.

Pyrophosphate appeared to be most favorable agent considering ease of preparations, quality of image, and the low estimated radiation dose.