Evaluation of ^{99m}Tc-sodium tripolyphosphate as a bone seeking agent

M. Nakamura and Y. Sawai
Department of Radiology, School of Medicine, Tohoku University, Sendai
N. Nakazawa and S. Tsushima
Daiichi Radioisotope Laboratories, Tokyo

We have performed bone scans with ^{99m}Tc-sodium tripolyphosphate (STPP).

The preparation of ^{99m}Tc-STPP is based on Subramanian's method with slight modification. The method is as follows. We prepare ^{99m}Tc-STPP by "Kit system". All reagents are sterilized and loaded in the vials. (1) Add about 5 ml of pertechnetate to the first vial containing 1 ml of stannous chloride in 1 NHcl ($Sncl_2 \cdot 2H_2O$) and stir the mixture well. Wait for five minutes. (2) Add 1 ml of sodium tripolyphosphate (20 mg/ml) in the first syringe to the first vial and stir the mixture well. Wait for five minutes. (3) Add 1.4 ml of $NaHco_3$ in the second syringe to the first vial. PH is adjusted to 6.5–7.5. If all procedures are performed aseptically, there is no need to sterilize the compound.

The organ distribution of ^{99m}Tc-STPP is studied in rats. It is estimated that 43.5% of administered dose is localized in the skeleton one hour after injection. The ratio of the concentration in the skeleton to that in the other organ is high enough to delineate the skeletal system using scintiscanner or gamma camera. The bone/blood, bone/liver and bone/muscle ratio are 6.2, 21.5 and 33.7 respectively, Radioactivity of the liver is little compared to that of bone. The liver uptake of ----Tc-STPP is about 1.0% injected dose. When the final PH is adjusted above 7.5, there occurs colloid formation and the liver uptake is increased. The urinary excretion of ^{99m}Tc-STPP is 25.4% of the administered dose one hour after injection.

Animal studies performed shows that it is possible to use ^{99m}Tc-STPP as a bone seeking agent. Various bone diseases are delineated by rectilinear scanning. Administered dose are 3 to 10 mCi. A blood pool background is high when a scan starts two to four hours after injection. An injection to scan interval of about 6 hours seems satisfactory in many sites. It is possible to delineate skeletal system 24 hours after injection.

Studies of Sn-compounds as the Bone Scanning Agents

A. Ando
School of Paramedicine
K. Hisada
Department of Nuclear Medicine, School of Medicine Kanazawa University

^{85}Sr, ^{87m}Sr, and ^{18}F have been used in clinical scanning of bone. But these nuclides have disadvantages in their half lives or energies. So, in order to investigate the nuclide having suitable half life and energy for clinical bone scanning, this experiment was undertaken.

In our experiment already performed, strong affinity of Sn-compounds for the bone were observed. So, affinity for the bone and the other organs of ^{113}Sn-compounds was examined by using rats. ^{113}Sn-citrate and ^{85}Sr-chloride were injected intravenously to each group of rats and these rats were sacrificed 1 hour, 3 hours and 24 hours after injection. The radioactivities of blood,