MECHANISM OF BONE ACCUMULATION OF Tc-99m-Labeled Phosphate Compounds. A. Ando, T. Hiraki, A. Ando, K. Hisada, and T. Takeuchi, Schools of Paramedicine and Medicine, Kanazawa University, Kanazawa.

Mechanism of bone accumulation of Tc-99m-MDP, Tc-99m-EDTA and Tc-99m-pyrophosphate (PYP) had not been fully understood. The present study was undertaken to explain the mechanism of their bone accumulation.

We considered a hypothesis that uptake of these Tc-99m-phosphate compounds to the bone was based on the exchange reaction of its phosphoric acid radical with that of bone mineral. To prove this hypothesis, the following experiments were performed.

In this experiment, hydroxyapatite (HAP) crystal and bone powder were used as a model of bone. P-32-PYP was taken up into these bone models in 0.9% NaCl solution (pH 7.4). On the other hand, P-32-phosphoric acid radicals were released with PYP from P-32-labeled bone models.

From the results of these experiments, it became clear that bone accumulation of P-32-PYP was based on the exchange reaction of its phosphoric acid radical with that of bone mineral. Uptake of Tc-99m-PYP into bone models was very similar to the uptake of P-32-PYP into bone models.

From above-described facts, it was concluded that bone accumulation of Tc-99m-PYP was based on the exchange reaction of its phosphoric acid radical with that of bone mineral. And this mechanism would hold good in the case of Tc-99m-MDP and Tc-99m-EDTA.

SYNTHESIS OF BIFUNCTIONAL CHELATING AGENT AS FOR THE 99mTc-RADIOPHARMACEUTICAL DESIGN. Y. Arano, A. Yokoyama, A. Misaki, T. Hosotani, A. Yamada, H. Tanaka, H. Saji, Y. Ishii, and K. Torizuka, Pharmaceutical Sciences and School of Medicine, Kyoto University, Kyoto.

To make the best use of the excellent property of 99mTc, development of bifunctional radiopharmaceuticals containing functional groups with biological activity and chelating property as well is attempted. Great potentiality of bis-thiosemicarbazone derivatives as bifunctional chelating agent is presented. Synthesis of glucose, glucuronic acid and long chain fatty acid derivatives of bis-thiosemicarbazone were achieved.

In the synthesis of sugar derivatives, the aldehyde (C-1) and the carbonyl (C-2) groups resulted from a mild oxidation were reacted with two molecules of thiosemicarbazide. While in the fatty acid derivatives, the alkyl group was reacted with a freshly prepared bis-thiosemicarbazone.

Upon good control of labeling parameters, as already published (1), stable chelate of a 99mTc coordinated through the thiosemicarbazone was obtained.

In vivo distribution showed promising results as 99mTc labeled radiopharmaceuticals for cardiological investigations.