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Tc-99m(Sn)PYRIDOXYLIDENEPHENYLALANINE AND ITS LIPOPHILIC DERIVATIVES; AN APPROACH TO STRUCTURE/BIO-DISTRIBUTION RELATIONSHIP OF TECHNETIUM COMPLEXES. M.Kato-Azuma and M. Hazue. Technical Dept. NIHON MEDI-PHYSICS CO., LTD. Takarazuka, Hyogo.

The objective of our current research was to evaluate the structure/bio-distribution relationship of Tc-99m(Sn)pyridoxylidene-phenylalanine derivatives, and to find a hepatobiliary imaging agent with rapid blood clearance, quick hepatobiliary transport and low urinary excretion. Phenylalanine derivatives with hydrophobic substituents on their aromatic ring were used for the preparations; they were o-F, m-F, p-F, p-Cl, o-methyl, p-methyl, m,m'-dimethyl and p-isopropyl-phenylalanine (all in DL form). The lipophilicity of the Tc-complexes was evaluated with the measurement of their n-octanol /buffer partition coefficient, and their in vivo distribution was studied in rats and rabbits. The amount of urinary excretion correlated well with the lipophilicity of the complex; the increase in lipophilicity diminished urinary excretion. The rate of blood clearance and hepatobiliary transport, on the other hand, reflected the structure of the complexes; the ortho-substituents were quite effective in accelerating blood clearance and hepatobiliary transport, and the opposite results were observed with the para-substituents. These results could be understood with consideration of the structure of the complexes with special attention to lipophilicity and rigidity of the molecules.

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Tc-99m(Sn) SALICYLIDENEPHENYLALANINE: PREPARATION AND EVALUATION OF A HIGHLY LIPOPHILIC TECHNETIUM COMPLEX. M.Kato-Azuma and M.Hazue. Technical Dept. NIHON MEDI-PHYSICS CO., LTD. Takarazuka, Hyogo.

Tc-99m(Sn) salicylidenephenylalanine[Tc-99m (Sn)S.Phe] was prepared using divalent tin as the reductant. The chromatographic study indicated that the labeling efficiency for Tc-99m(Sn)S.Phe is nearly 100%, and the high Rf value of this complex suggested it has a high lipophilicity. The n-octanol/buffer partition coefficient ($D_o$ value) of Tc-99m (Sn)S.Phe was significantly affected by the stannous concentration and the incubation time after the technetium labeling; a maximum value ($D_o$ = 130) was observed with a stannous concentration of 1 mM at 2 hr after the labeling. Tc-99m(Sn)S.Phe ($D_o$ = 130) showed marked biliary excretion in rats with only 0.6% of the injected dose escaping through the kidneys during the 2 hr post injection period, whereas 90% of the injected dose has arrived in the small intestine through the liver. On the other hand, scintigraphic studies in rabbits gave quite different results; strong hepatic and renal retention of radioactivity was observed, and the intestinal activity was very small even at 3 hr after the administration. These results suggest the instability of this highly lipophilic technetium complex both in vitro and in vivo.

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THE STABILIZATION OF Tc-99m TIN(II) COLLOID: THE USE AND EVALUATION OF THE SLIDING GASKET VIAL AS THE DIRECT CONTAINER. M.Hayashi, N.Toyota and M.Hazue. Technical Dept. NIHON MEDI-PHYSICS CO., LTD. Takarazuka, Hyogo.

Factors causing lung uptake of Tc-99m tin colloid are the patient's physiological condition, the techniques of labeling and the particle size of the tin colloid. The purpose of the present study is to investigate the effects of shaking and ionic concentration on the particle size of Tc-99m tin colloid.

Vials filled with Tc-99m tin colloid were shaken with a repeating stroke of 20 mm at a rate of 90 strokes/min. The Tc-99m tin colloid was injected into rats at specific time intervals after shaking to determine liver and lung uptake. With 3 hr of shaking we observed a significant decrease of liver uptake and an increase of lung uptake. Whereas, liver uptake showed no significant change up to 2 hr without shaking. The optimum saline concentration for stabilization of Tc-99m tin colloid under shaking condition was found to be 0.3%.

The volume of the dead space in the vial was found to be the most effective factor in controlling the stability of Tc-99m tin colloid. Based on this finding, we designed the sliding gasket vial to eliminate the dead space, therefore, preventing the aggregation of colloidial particles. This enabled us to maintain a liver uptake of over 90% after 17 hr after shaking.

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QUALITY CONTROL OF RADIOPHARMACEUTICALS--- EVALUATION OF RADIOACTIVE IMPURITIES IN RADIOPHARMACEUTICALS. H. Mori, K. Hisada, R. Amano and A. Ando. Department of Nuclear Medicine, School of Medicine and School of Paramedicine, Kanazawa University. Kanazawa.

Radioactive impurities in 11 radiopharmaceuticals have been studied using a pulse-height spectra with a Ge(Li) spectrometer. Some impurities have been found in the radiopharmaceuticals of I-123, Tl-201, In-111 and Rb-81-Kr-81m generator. The whole-body absorbed radiation dose from these radioactive impurities was calculated by MIRD procedures. The results suggest that these impurities offer no problem, in terms of the radiation dose and clinical utility. However, because In-114m and Rb-83, namely, the impurities contained in In-111 and Rb-81, respectively, have a long half-life, it has to be paied attention to release of these radioactive waste.