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PREPARATION OF I-123 LABELED SODIUM O-IODOHIPPURATE WITH HIGH LABELING EFFICIENCY AND ITS BEHAVIOR IN RATS AND RABBITS.

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An efficient production method of I-123 labeled sodium o-iodohippurate(I-123-OIH), isotopic exchange under molten state was established, and the biobehavior of I-123-OIH was evaluated using rats and rabbits.

Isotopic exchange reaction by this method proceeded in practically 100% yield within 5 min of reaction time and the resultant I-123-OIH was radiochemically pure without any purification. I-123-OIH prepared by this method was quite stable, and no radioactive impurity was detected on chromatography four days after preparation.

Blood clearance of I-123-OIH in rats was very rapid and half-life in blood concentration was found to be about 2-3 min. More than 60% of administered dose was excreted within 5 min in urine, and 30 min after injection, the excreted activity in the urine reached to 90%.

Scintigraphic studies in rabbits using middle-energy collimator indicated that I-123-OIH was useful not only for function study but also for static imaging.

To conclude, I-123-OIH provides us much more information in nuclear medical study of kidney because of the following advantages; 1) I-123 emits lower energy photons, 2) subsequently, we can study with higher counting efficiency.

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ACTIVITY MEASUREMENT OF RADIOPHARMACEUTICALS (CORRECTION FACTOR).

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A well type ion chamber is widely used to calibrate radioisotopes, because of easy operation and high accuracy in large activity range. Activities of in vivo radiopharmaceuticals are usually measured in liquid filled in glass vials. Activity values obtained with ion chambers require proper correction due to the attenuation effect of containers, the self-absorption effect of liquid, and the sample position dependence in the ion chamber well.

We investigated these effectes on radiopharmaceuticals(Ga-67,Tc-99m,In-111,I-123, Tl-201). The higher energy X-rays contribute to the assayed activity values of In-111, I-123 and Tl-201. On the other hand, value of Ga-67 and Tc-99m are not affected by X-rays. The attenuation effect of container wall is investigated, and the calculated values agreed with the experimental ones. The attenuation factors of a 3ml vial with a wall thickness of 1.1mm are as follows:

Nuclide	Ga-67	Tc-99m	In-111	I-123	Tl-201
Experiment	1.00	.99	.83	.75	.95
Calculation	.98	.98	.86	.80	.96

Correction factors due to the self-absorption effect of liquid are around 0.96. The sample position in the chamber has noticeable effect in assayed values.

Characteristics of each ion chamber should be known properly and the assayed activity values require proper correction.

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BEHAVIOR IN BLOOD AND BLOOD BINDING OF Tc-99m-LABELED PHOSPHATE COMPOUNDS.

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The present study was undertaken to determine the factors that caused the differences in the in-vivo distribution of Tc-99m-labeled phosphate compounds and to explain the mechanism of their bone accumulation.

In radiochemical stability test performed prior to animal experiment, Tc-99m-pyrophosphate(PYP) proved to be slightly unstable but Tc-99m-EHDP and Tc-99m-MDP were very stable.

In the peripheral blood of rats, i.v. injected Tc-99m-MDP and Tc-99m-EHDP remained for the most part in the plasma fraction and were for less attached to corpuscle while Tc-99m-PYP was attached to corpuscles in a considerable amount and tended not to be released from the corpuscles.

In these three compounds, rate of Tc-99m-compounds in plasma which did not bind to hydroxyapatite crystal was increased with time, and these Tc-99m compounds have been bound to plasma proteins.

On the other hand, after in-vitro incubation of these three compounds with serum, the majority of Tc-99m-MDP and Tc-99m-EHDP were bound to hydroxyapatite crystal while Tc-99m-PYP was attached to serum proteins in a considerable amount.

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ACCUMULATION OF VARIOUS Tc-99m-LABELED COLLOIDS IN THE BONE MARROW AND LYMPH NODES.

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The degree of accumulation of various Tc-99m-labeled colloids in the bone marrow and lymph nodes was evaluated. Labeling efficiency, electron microscopic study, blood clearance, tissue distribution, and scintigraphy of bone marrow and lymph nodes were investigated in rabbits. Labeling efficiency was more than 95% in all the colloids. Blood clearance was the fastest with sulfur colloid (TCK-1). By electron microscopy, Antimony Sulfide Colloids (ASCs) were uniform in size and spherical in shape, while TCK-1 and Rhenium colloid (Tc-Re) were nonuniform. Deposition in the marrow was higher with ASCs than with TCK-1. In terms of lymph nodes, all the ASCs concentrated to a higher degree in the popliteal lymph node. Movement from injection site was fast with Tc-Re.

In conclusion, ASCs were excellent radiopharmaceuticals for marrow imaging. As for lymph node imaging, it was considered that both ASCs and Tc-Re were useful agents.

The improved preparations of colloids and clinical applications were also reported.