Fundamental Investigation on ^{99m}Tc-Phytate Kit and ^{99m}Tc-Pyrophosphate Kit

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We have been trying to realize a simplified kit by which one-step labeling of ^{99m}Tc-phytate and of ^{99m}Tc-pyrophosphate is possible, and composed for trial lyophilized kits where we used stannous chloride as reductant, and checked their qualities. Followings are our results :

Method

Contents of the kit

○ ^{99m}Tc-phytate kit

Stannous phytate vial (lyophilized)

(Sodium phytate
($SnCl_2$—$2H_2O$

○ ^{99m}Tc—pyrophosphate vial (lyophilized)

(Sodium pyrophosphate
($SnCl_2$—$2H_2O$

Labeling procedure is as follows : Remove the vial from a refrigerator and allow to stand the kit till the contents of which come up to room temperature and add 5 ml of ^{99m}Tc-sodium pertechnetate saline solution into the vial then shake it sufficiently. Check the purity and chemical qualities with both paper chromatography using 75% methanol as developing solvent and electrophoresis using cellulose acetate film. Check the biological behavior from the organ distribution in rats.

Results

○ ^{99m}Tc-phytate

The labelling yield of ^{99m}Tc to phytate by the kit was 95%.

The qualities of the contents were stable for more than three months in a refrigerator. The purity of ^{99m}Tc-phytate solution was kept more than 97% up to five hours after preparation. In organ distribution of rats 30 minutes after intravenous administration, more than 95% of dose was concentrated in liver and distribution of other organ such as stomach was less than 1%.

○ ^{99m}Tc-pyrophosphate

The purity of ^{99m}Tc-pyrophosphate solution of a kit was more than 95% and no colloidal substance by electrophoresis was detected. The qualities of the contents were stable for more than two months in a refrigerator. In rat about 30% of dose was observed to be excreted with urine. Accumulation ratio expressed in percentage of dose per gram of organ weight was decreased in the order of bone, kidney, liver and blood. Great difference in pattern of distribution wasn't observed till 5 hours after intravenous administration.

Fundamental Investigation on Comparison of ^{99m}Tc-MAA Kit, ^{99m}Tc-HSA Kit and ^{131}I-MAA, ^{131}I-HSA

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We have succeeded in composing the kits for ^{99m}Tc-MAA and ^{99m}Tc-HSA having the

same qualities as those of ^{131}I-MAA and ^{131}I-HSA. (Followings are our investigation.)

Method

Contents of the kit

○ ^{99m}Tc-MAA kit

Stannous MAA vial (Frozen)

$$\begin{pmatrix}\text{MAA}\\ SnCl_2 \cdot 2H_2O\end{pmatrix}$$

○ ^{99m}Tc-HSA kit

Stannous HSA vial (Lyophilized)

$$\begin{pmatrix}\text{HSA}\\ SnCl_2 \cdot 2H_2O\end{pmatrix}$$

^{131}I-MAA and ^{131}I-HSA produced at our laboratory were used.

Our labeling procedure is as follows: Take the vial out of the refrigerator and allow to stand until its contents reach to the room temperature then add 5ml of ^{99m}Tc-sodium pertechnetate saline solution and shake it sufficiently. The examination of radiochemical purity of the ^{99m}Tc labeled compounds were performed by paperchromatography using 75% methanol, and electrophoresis using cellulose acetate film. The distribution of MAA particle size was measured with microscope, and the organ distributions of ^{99m}Tc-MAA and ^{99m}Tc-HSA were observed in rats after intravenous administration.

Results

○ ^{99m}Tc-MAA kit

The labeling yield of ^{99m}Tc to MAA was 99% by this kit.

The quality of the contents was stable for more than four months. Over 80% of MAA particles were 10—60 μ in size.

The accumulation of ^{99m}Tc-MAA into lung of rat was 99% at 5 minutes after intravenous administration, and its biological half life was about 8 hours.

○ ^{99m}Tc-HSA kit

The labeling yield of ^{99m}Tc to HSA was 93% by this kit.

The quality of the contents was stable for more than three months.

As to the organ distribution of ^{99m}Tc-HSA in rat at 10 minutes after intravenous administration, it was mostly distributed in blood, next in the order of liver and lung, The uptake of stomach was extremely low, which was almost similar to that with ^{131}I-HSA.

Any colloidal substance by electrophoresis was not observed.

^{99m}Tc-KTS(Kethoxal-Dithiosemicarbazone), as a Potential Cholescintigraphic Agent

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There have been seen a several reports describing that thiol compounds labeled with ^{99m}Tc such as ^{99m}Tc-penicillamine are useful as cholescintigraphic agent. However, in animal experiments the accumulation of ^{99m}Tc into gall bladder is not yet reproducible. This