

XI. Radiopharmaceuticals

Study of the Preparation of ^{99m}Tc -Technetium Compounds

1. Preparation of ^{99m}Tc -Technetium Sulfide Colloid

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In 1964, Harper, et al, reported that ^{99m}Tc -technetium sulfide colloid was usable as a scanning reagent of liver, spleen and bone marrow.

Since then, various methods for preparation of ^{99m}Tc -technetium sulfide colloid have been developed. However, these methods were not always satisfactory from the viewpoints of safety for men and simplicity of preparation. Various preparation methods for ^{99m}Tc -technetium sulfide colloid by using mannitol as stabilizer have been discussed so far.

We have succeeded to make a few methods by which we can obtain the highest yield much more speedily.

Method

All operations should be done under sterile condition. Add ^{99m}Tc -sodium pertechnetate saline solution to the mixture solution of $\text{Na}_2\text{S}_2\text{O}_3$, KH_2PO_4 and EDTA, and adjust the pH of the above solution to acidity by adding hydrochloric acid. Heat the above solution in boiling water bath for 10 minutes and leave it at room temperature for 5 minutes. Adjust the pH of the solution to neutral with sodium hydroxide. Add mannitol to the solution and heat it in boiling water bath for 3 minutes. The yield of ^{99m}Tc -technetium sulfide colloid by this method is 96% and the accumulation

of ^{99m}Tc -technetium sulfide colloid in rat's liver is 94%.

Result

The yield of ^{99m}Tc -technetium sulfide colloid and its accumulation to rat's liver were not sufficient in case of 2-5 minutes' heating in acidic solution, but in case of 10 minutes' heating the yield was 96% and the accumulation was 94%. When we heated the product in autoclave at 120°C for 20 minutes, unbound ^{99m}Tc appeared in considerable quantities and when we filtrated the product with millipore filter much of ^{99m}Tc -sulfide colloid was left on the surface of millipore filter. The effect of mannitol as stabilizer was not so effective.

The accumulation of ^{99m}Tc -technetium sulfide colloid in rat's organ was highest in liver during 5 hours after intravenous injection and was more than ten times as those in other organs except spleen. Precisely speaking, the accumulation in spleen was about half of that in liver, and those in lung and kidney were less than 1/10 respectively of that in the liver, and those in other organs were less than 1/100. From the above results, we believe that our ^{99m}Tc -technetium sulfide colloid is well usable for liver scanning.