BASIC STUDIES ON ^{99m}Tc-dl-DMS AND -meso-DMS

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Tc-99m-Labeled dimercaptosuccinic acid (DMS) is the most commonly used agent for renal scanning. DMS whose molecule contains two chiral carbons has chemically four stere-oisomers, namely, dl-, meso-, d- and l-forms. Of them the meso-isomer is being used in practice. In order clearly to know the basic requirements of chemical structure for renal scanning agents, we have studied the effect of steric difference of DMS on kidney affinity, renal images, blood clearance, urinary excretion, etc. using synthetic dl-DMS in comparison with the meso-form.

In the present investigation, dl-DMS was labeled with Tc-99m and formed four kinds of Tc-99m-complexes as reported in the case of the meso-form. The purple Tc-99m-complex (λ_{max} 520 nm) was obtained in a good yield and showed the highest affinity for the kidney of animals. It was found that renal uptake was higher than any other organs at 3 hours after injection in mice. No difference was observed in the distribution of radioactivities in the kidney between dl- and meso-forms. The scintigrams of rat kidney also gave the same quality images with the dl- and meso-forms.

These findings indicate that the stereochemical difference of DMS is not a critical factor for the formation of Tc-99m-DMS complex with high affinity for the kidney.

Detail studies are now in progress on the relationships between molecular configuration and kidney affinity.

CLINICAL EVALUATION OF ^{99m}Tc-dl-DMS.

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Results are reported from the clinical evaluation of a new radiopharmaceutical for renal imaging, ^{99m}Tc-dl-DMS. One hundred eighty patients were studied with the radiopharmaceutical. In all cases a dose of up to 3mCi was injected as a bolus. Renal scintiphotos of 300 Kcounts at varying intervals after injection were recorded on Polaroid films by Nuclear Chicago Pho/Gamma HP scintillation camera.

Blood clearance and urinary excretion were examined for 24 hours in two volunteers. Blood clearance was relatively slow, 65.6% in 30 min., 42.7% in 1hr., 23.9% in 2hrs. 17.8% in 3hrs. and 6.9% in 24hrs. The excretion dose in 24hrs. was about 20%, a little below that of the ^{99m}Tc-meso-DMS with about 30%. There was no fecal excretion.

In all cases except renal failure, excellent renal images were obtained between 30 min. and 3 hrs (best in 2 hrs.) after administration. Even in the patient had a serum creatinine of 10.5mg/dl and BUN 66mg/dl, the renal image was obtained. Using the high-resolution collimator and posterior pinhole views, very high-resolution images of the renal structures could be obtained.

From the present work, we could not find any clinical difference in renal imaging between ^{99m}Tc-dl-DMS and ^{99m}Tc-meso-DMS.