

N. Kidney and Urinary Tracts

Studies on Radiopharmaceuticals III. Synthesis of ^{99m}Tc -Labeled New Renal Scanning Agents and Their Evaluation

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At present some ^{99m}Tc -labeled compounds for renal scintigraphy have been used in functional and morphological studies on the kidney. In an attempt to develop better renal scanning agents, we tested new agents labeled with ^{99m}Tc in animals and man. The results are reported here.

Methods: Furosemide, ethacrynic acid, mercaptomerin, cysteine, malic acid, cysteine-acetazolamide and salicylic acid were labeled with ^{99m}Tc by electrolytic reduction of pertechnetate in sterilized vials using Sn-Pt electrodes. The synthesized compounds were passed thro-

ugh a milliporefilter and checked chemically and radiochemically before use, and injected into male rabbits intravenously at a dose of 300 to 500 μCi . Kidney images were examined at different intervals by using Nuclear Chicago PHO/Gamma HP.

Results: Among the agents tested, salicylic acid, cysteine-acetazolamide gave good results in rabbits.

However, in man with normal kidney function malic acid labeled with ^{99m}Tc gave clear images and clinical uses with this agent are now in progress.

Studies on Radiopharmaceuticals (4) Synthesis of New ^{99m}Tc Labeled Renal Scanning Agents and Their Evaluation

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Clinical evaluation was made on ^{99m}Tc -malic acid (TMA) and ^{99m}Tc -cystein acetazolamide

complex (TCAC), new renal scanning agents developed by the authors. These agents were applied to a total of 26 cases which include renal cancer (9 cases), hydronephrosis (7), renal cyst (2), uremia (1), etc. The new scanning agents were administered to the patients, and radioisotope angiograms and functional renal images were taken by means of a γ -camera.

Preparation of the agents was based on the method of Dr. Tanaka, one of the present authors. The radioisotope dose to a patient was 4 to 10mCi.

Results: In cases with normal renal function,

both TMA and TCAC enabled angiograms to be obtained 10 to 30 seconds after injection, and renal images became clear 10 to 60 minutes after injection, TMA and TCAC distribution in livers was extremely little.

In the case of renal tumors, the radioisotope perfusion image in tumor lesions was observed immediately after injection, and the functional image of tumor became a cold area. No distinct difference was found between renal images obtained by TMA and TCAC.

Even in the case of renal insufficiency due to obstructive uropathy, TMA and TCAC were excreted satisfactorily.

Renal Dynamic Study with ^{99m}Tc -DTPA(Sn) and The Comparison with Other Renal Scanning Agents

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The purpose of this study is to describe the results of dynamic studies with several ^{99m}Tc labeled compounds and ^{131}I -hippurate, and to discuss those clinical usefulness.

After 5mCi bolus injection of ^{99m}Tc -DTPA, the data were recorded in VTR for 20 minutes. The injected doses of ^{99m}Tc -EDTA and ^{131}I -hippurate were 5mCi and 200 μ Ci respectively. Serial posterior images were obtained every 5 seconds for 10 to 30 seconds followed with 3-minute images at 2 to 5, 7 to 10, 12 to 15, and 17 to 20 minutes. Area of interest histograms of the each kidney were obtained from tape play back. Routinely the conventional renogram and renal scan were performed.

With ^{99m}Tc -DTPA we could obtain the clear images on vascular, parenchymal, and excretory phase, and also AOI histograms. In other words the dynamic study with ^{99m}Tc -DTPA

includes RI angiography, RI excretory urography, and AOI renograms.

On vascular phase we get informations concerning abdominal aorta, the blood supply of the each kidney and spleen, and vascularization of the space occupying lesions which is useful for the differential diagnosis.

The time abdominal aorta appears correlates with the circulation time.

Useful informations about urinary tract were obtained, therefore we could detect the obstructive site of ureter and tumors or stones of the pelvis.

In the severely disturbed renal function the delayed images with ^{131}I -hippurate were superior to those with ^{99m}Tc -DTPA.

We experienced two cases whose conventional renograms showed obstructive pattern but AOI renograms with ^{99m}Tc -DTPA showed