

^{99m}Tc -DMSA: Comparison with ^{203}Hg -Chlormerodrin

T. MICHIGISHI*, T. ABURANO*, N. TONAMI*, K. HISADA*, M. MATSUDAIRA** and A. ANDO***

**Department of Nuclear Medicine, School of Medicine, Kanazawa University, Kanazawa*

***Division of Central Radiological Service, Kanazawa University Hospital, Kanazawa*

****School of Paramedicine, Kanazawa University, Kanazawa*

Results of in vivo study in rats and the clinical evaluation of ^{99m}Tc -dimercaptosuccinic acid (^{99m}Tc -DMSA) provided in kit form are presented.

This agent was stable, and free $^{99m}\text{TcO}_4^-$ was not detected after 6 hours of preparation on thin-layer chromatogram.

The distribution of ^{99m}Tc -DMSA and ^{203}Hg -chlormerodrin in rats was measured by serial autopsies.

The maximum renal concentration of ^{99m}Tc -DMSA was 25.2% of administered dose at 3 hours and persisted up to 24 hours. That of ^{203}Hg -chlormerodrin was 86.2% at 3 hours and then the renal activity decreased gradually.

^{99m}Tc -DMSA was only accumulated in the renal cortex but ^{203}Hg -chlormerodrin was accumulated not only in the cortex but in the medulla on macroautoradiograms of rats.

The estimated absorbed radiation dose from 1 mCi of ^{99m}Tc -DMSA was total body 0.014 rad, kidneys 0.582 rad, male gonads 0.010 rad, and female gonads 0.013 rad respectively.

In the clinical evaluation of these agents, the images with ^{99m}Tc -DMSA were better than those with ^{203}Hg -chlormerodrin. For example, the scintiphots with this new agent succeeded in visualiz-

ing the contracted kidneys in a case with chronic renal failure due to chronic glomerular nephritis having BUN of 370 mg/dl and a 56 mg/dl serum creatinine.

We had an interesting experience that the scintiphoto with ^{99m}Tc -DMSA visualized the affected kidney in a case with renal stone which was not visualized on that with ^{203}Hg -chlormerodrin.

^{99m}Tc -DMSA angiograms were useful for differential diagnosis of spaceoccupying lesions.

Lateral aspects were easily obtained and they delineated more clearly space-occupying lesions occasionally.

Combined liver-kidneys scintiphotos were obtained by injection of ^{99m}Tc labeled liver scanning agent 1 hour after injection of ^{99m}Tc -DMSA.

This combination was very useful for delineation and detection of space-occupying lesions of the liver and/or kidneys.

We think ^{99m}Tc -DMSA should be used for static study and ^{99m}Tc -DTPA and/or ^{131}I -hippuran for dynamic study.

Our conclusion is that ^{99m}Tc -DMSA is an excellent and safe renal cortical imaging agent and ^{203}Hg -chlormerodrin should not be used clinically.

Clinical Evaluation of Renoscintiphoto for Cadaveric Allotransplant

A. ISHIBASHI*, S. IKEDA*, K. ISHII**, K. YODA** and S. HASHIMOTO**

**Department of Urology*

***Department of Radiology, Kitasato University, School of Medicine*

Recently cadaveric allotransplantation had gradually increased in our country. Between Nov. 4, 1975, and March 10, 1976, 7 cadaveric transplantations were performed in the Kitasato University Hospital. All of them were studied with scinticamera. A total of 32 ^{99m}Tc -DTPA images were reviewed.

Because of its many complications, scinticamera is more useful and important after cadaveric transplantation. These sensitive atraumatic studies are without risk and can be easily repeated.

The patients were examined in the supine position with an Anger camera (Nuclear Chicago HP). An injection of 4 mCi ^{99m}Tc -DTPA was given

intravenously, and 0–10, 15–25 seconds for perfusion phase, followed each two minute images for accumulation phase and excretion phase, were taken for about 20 minutes. The area of interest, kidney and urinary bladder, were prepared by the minicomputer attached with the scinticamera.

Acute tubular necrosis usually occurred immediately after cadaveric transplantation. In its condition, ^{99m}Tc -DTPA imaging gives a good information about the reversibility of the transplants. When perfusion images are delineated clearly, it will not be long before the renal function recovers.

In one case, minor change of rejection in addi-

tion to ATN was clearly revealed by the scinticamera. When the rejection occurred while ATN is still present, more decreased perfusion images are always present. For this reason, repeated studies are essential.

Obstruction of major arteries are often encountered after cadaveric transplantation. In two cases of arterial stricture, hypertension and oliguria ensued for 2 to 3 months after transplantation. Renoscintiphoto closely paralleled the clinical course.

Serial dynamic studies with ^{99m}Tc -DTPA are a useful method of monitoring cadaveric renal transplants.

Clinical Evaluation of β_2 -Microglobulin in Urine of the Renal Transplantation

J. KUROKAWA*, S. IKEDA*, A. ISHIBASHI*, K. ISHII**, K. SAITO**,
K. YODA** and S. HASHIMOTO**

**Department of Urology, Kitasato University School of Medicine*

***Department of Radiology, Kitasato University School of Medicine*

By the end of October, 1976, 73 renal transplantations were performed at Kitasato University Hospital. β_2 -microglobulin in the urine were measured in 16 cases. From these cases, 500 samples of urine were tested in radioimmunoassay with Padebas β_2 -micro test kit, offered from Daiichi Radioisotope Laboratory. Small samples were taken from each 24 hours' accumulated urine, and measured postoperatively daily during the first one to two weeks, then 2-3 times a week. Reproducibility proved to be satisfactory, mean coefficients of variation (C.V.) was 13.8%. The values of the β_2 -microglobulin in the urine were measured in mg/l, higher than described

normal values, in $\mu\text{g/l}$. Maximum value was over 130 mg/l. 13 patients were measured for β_2 -microglobulin in the urine, blood urea nitrogen (BUN) and serum creatinin. Of these cases, 4: no apparent rejection; 7: rejection; 2: others. In the 7 rejection cases, which showed increase in values of the β_2 -microglobulin in the urine which correlated with rejection; one case showed decrease in value; in 3 cases, there was no apparent variation in the values. Therefore constant values of the β_2 -microglobulin in the urine may be indications of the function of transplanted kidney and extreme change in the values may indicate acute rejection in the renal function.

Evaluation of the Measurement of Urinary and Serum β_2 -Microglobulin in Various Urogenital Diseases

M. YANAGISAWA, T. MACHIDA, M. MIKI, Y. OHISHI, M. UEDA and A. KIDO
Department of Urology, The Jikei University School of Medicine

A low molecular weight β_2 -globulin (β_2 -microglobulin: MW: 11800) occurs in low concentrations in the urine, serum and other biological fluids.

The present clinical application for the measurement of the β_2 -microglobulin is the determination of the glomerular or tubular function in various uro-