L. Kidney

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REGIONAL RENOGRAM STUDIED BY I-123-HIPPURAN.

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Using I-123-Hippuran, made in NIRS, kidney functions were studied with the regional renograms produced by a gamma camera and a data processing system. Forteen patients, mostly with the uterine cervical cancer were administered 2mCi of I-123-Hippuran and their dynamic images, renograms and functional images of kidneys were produced. The peak count, the peak time, the peak-to-half-peak time, and the start-to-half-peak time were selected as the parameters of functional images. With the use of the regional renograms, early dysfunctions of kidneys were classified in 3 types. They consisted of parenchymal dysfunctions, excretory system dysfunctions and dysfunctions in both systems. The regional renograms with I-123-Hippuran seemed to promise the great clinical usefulness.

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CLINICAL EVALUATION OF DIURETIC RENOGRAPHY IN OBSTRUCTIVE UROPATHY.

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Diuretic renography assisted with Lasix was performed in 44 cases with obstructive uropathy. The procedure was done in four steps, (1) hydration with an intake of water 10 to 20 minutes before the examination, (2) non-diuretic (regular) dynamic renal scan with ^{99m}Tc-DTPA for 20 minutes. (3) Voiding and (4) post-voiding diuretic dynamic renal scan followed an i.v. injection of Lasix (0.4-0.5mg/kg, Max 20mg) at 2 minutes for 15 minutes. Quantitative analysis of the time-activity curves which were obtained from data stored as 64x64 matrix per frame of 10 seconds during imaging was simultanously performed on a computer system.

Most of Kidneys showed a prompt linear, monocompartmental excretion in a semi-logarithmic scale after the administration of diuretics. Mean half time (D-T1/2) and S. D. of diuretic excretion in normal Kidneys was 4.41±2.73 minutes and reactive duration 2.04±1.23. The excretion pattern of these diuretic renograms showed four different groups, (I) linear decrease with D-T1/2 under 10 Min., (II) linear with D-T1/2 between 10 to 20 min. (III) linear with D-T1/2 over 20 Min. and non-linear and (IV) flatt or elevated excretion.

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IN VIVO ESTIMATION OF RENAL CORTICAL VOLUME USING EMISSION COMPUTED TOMOGRAPHY(ECT)

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We tried to estimate "in vivo" renal cortical volume using Emission Computed Tomography(ECT). 4mCi of Tc-99m-DMSA were given intravenously and 3 hours later, transaxial tomogram was taken using a rotating gamma-scinticamera, Maxicamera-400T(GE). Transaxial tomographic slices were reconstructed through PDP 11/60 computer(DEC) by means of the convolution method. Each slice had 64X 64 matrices (m(x)) with the depth of 12mm (d). S indicates the area of a matrix. Renal cortical volume(V) was calculated from the following equation: $V=\int^{n} m(x)\cdot S\cdot d\cdot d(x)$. Phantom studies revealed that the most reliable cut off level was 51%, comparing to the maximum count. In the healthy kidney(n=15), cortical volume ranged from 142 ml to 283 ml. Average volume was 201 ml in the right kidney and 181 ml in the left. There was a positive correlation between renal cortical volume and DMSA renal uptake($r=0.705$ $p<0.001$). Furthermore, there was a positive correlation between renal cortical volume and an area of body surface($r=0.462$ $p<0.001$).

In conclusion, renal cortical volume estimated using ECT may demonstrate a new concept of a functioning volume of the kidney since DMSA preferentially accumulates in the renal cortex.

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CLINICAL EVALUATION OF RENOSCINTIPHOTOGRAPHY WITH Tc-99m-DTPA IN CADAVERIC KIDNEY TRANSPLANTATION.

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Between March 1972 and October 1981, 156 cases of renal transplantation were done in Kitasato University Hospital. 24 of 156(15.4 %) were from cadaver donar, and in 17 cases of these renoscintiphotography with Tc-99m-DTPA was performed. Those studies were done regularly in a week and four weeks postoperatively, and then repeated properly depending on the clinical course. The evaluations of Tc-99m-DTPA flow study during oliguric phase were of normal(N=5), Acute Tubular Necrosis(ATN, N=6), Acute Rejection(AR, N=5) and Vascular Occlusion(N=1) respectively. On the clinical and/or pathological diagnoses of these cases, however, 2 cases of circulatory disturbance in ATN group and AR group, and 2 cases of ATN in AR group were retrospectively corrected respectively. Through these studies, the differential diagnosis between ATN and AR was considered to be more difficult, especially during oliguric phase.

On the other hand, the discussion about some parameters for radionuclide evaluation of allografted kidney was represented. The parameters, namely Perfusion Index, T max, T 1/2 max, Appearance Time,and Mean Transit Time were estimated. Through our several experiences, these parameters, especially Perfusion Index and Mean Transit Time, will be expected to be useful parameters for diagnosis of grafted kidney.