Functional Image of The Kidney Using On-Line Minicomputer System Modification Caused by Furosemide and Double Tracer Studies

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Functional images of the kidney, the parametric maps of the regional renal function were developed using ^{131}I-hippuran sequential scintigram data. An Anger camera and on-line minicomputer system was employed for the data processing.

A dynamic curve in each element of the digitalized image was extracted and the pertinent parameters were calculated to display as parametric maps on a CRT. Six parameters were the time interval from injection to the peak time (Tmax), peak count (Cmax), slopes of the dynamic curves (UP and Down Slope) in a pre and post-peak period, slopes in the phases of interest (Fixed Time Slopes), and the minumum number of precursoring compartments (Compartment).

1. After injection of ^{99m}Tc-DTPA and ^{131}I-hippuran simultaneously, functional images were constructed by these data processing and functional images of ^{99m}Tc-DTPA were compared with that of ^{131}I-hippuran. By functional images of ^{99m}Tc-DTPA, focal lesions such as cyst or tumor were detected more clearly and pathologic state of glomerular and tubular function were demonstrated as parametric maps. These methods were proved to be useful to detect pathophysiologic change as well as detailed diagnosis of the kidney.

2. Before and after injection of diuretics such as furosemide, functional images of ^{131}I-hippuran renoscintigraphy were constructed and furthermore, RI dynamic curve of each element was compared in the same region of the digitalized images.

By these methods, the influences of this diuretics on parametric maps were studied before and after loding.

Functional images by Furosemide were proved to be useful to detect transitional change of intra-renal RI dynamics and available for the different diagnosis in the case of partial and complete obstructive uropathy.

Computer Processing Method for the Combined Renal RI-Image

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A refinement of the renal blood flow was studied using scintillation camera and data storage, processing and display system.

Sequential 2 sec frames immediately after injection of 10 mCi ^{99m}Tc-DMSA as a bolus were stored in the MT for 60 sec. Sequential frames were added to obtain a summation image within the first transit phase corresponding to a renal circulation. In this summation image having enough counts to evaluate renal blood flow, the contribution of the included liver image was eliminated.

The summation image was displayed on the TV monitor as 8 level color image and superimposed on the static image providing antomic orientation. For comparison with other renal radiography, this image can be superimposed on the angiogram or IVP.

Clinical studies on the patients with renal hypertension showed a good agreement with renal angiographic findings.