

A New Method of Display and Analysis of Intra-Renal RI Dynamics Using Functional Images

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Functional Images of the kidney were studied with a scinticamera and an on-line minicomputer system.

In these studies, after intravenous administration of 300–500 μCi of ^{131}I -hippuran, RI images of the kidney were digitalized and recorded on a magnetic tape sequentially by a sampling time of 10 seconds for 20 minutes.

RI dynamic curves in each element of the digitalized (64×64) images were extracted from previous data. Then, parameters were calculated and displayed as a parametric map on a CRT.

Parameters calculated from dynamic curves of each element in these studies were the time of the maximum count (Tmax), slopes (up, down) before and after Tmax using least square fitting by linear approximation, slopes in appearance and drainage phases in fixed times and the minimum number of precursoring compartments.

Finally, as an attempt of setting structural and functioning area in the kidney, a “characterized

nephrogram” was proposed. RI dynamic curves of each element were extracted and characterized as several patterns (cortical, pelvic etc.) using pattern recognition methods from combinations of previous parameters.

RI image processings by Functional Images were clinically performed in 100 cases of various renal diseases. Parametric maps showed interested RI images corresponding to intra-renal RI dynamics and reflexed patho-physiologic changes in the kidney.

The slight changes of RI dynamic curves were clearly demonstrated by Functional Images.

In conclusion, Functional Images in the kidney were proved to be useful for display and analysis of intra-renal RI dynamics.

The computing time of these procedures by our system was about 10 minutes for a case and it made possible to apply these processings for routine works.