

## Application of 1600 Channel Pulse Height Analyzer in the Analysis of Static and Dynamic Patterns of the Kidney

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I: Some considerations on the renogram study.

Changes in the renogram pattern upon the variable orientations of the probe was studied with Data Store Play Back. The far the probe displaced, the more depression occurred in Seg B (as already being mentioned), but the time from peak to 50% of peak did not show much change in comparison with that of normal renogram, though a slight shortening in the upward-displacement and a slight prolongation in the downward-displacement were observed.

The transit time of radiohippuran through the renal pelvis has some influence with the renogram pattern, so that serial scintiphoto brings an important information in the analysis of renogram pattern in some cases.

Changes in the relative height between right and left kidneys upon the prone and sitting positions were also studied on 91 gynecological patients with scintillation camera after the injection of  $50\mu\text{Ci}$  of  $^{203}\text{chlormerodrin}$ . Twenty-four cases showed relative ptosis of the right kidney in a sitting position in comparison with the left, although the both kidneys were in the equal height in a prone position; in 6 of which not only ptosis but also deformed and smallened right kidneys were seen on the scintiphoto. In such cases, the right renogram taken in sitting position showed some depression of Seg B in comparison to that of prone position. These cases were checked on the right to left count ratio of the kidney areas which were determined on the digital map obtained from 1600 Ch. PHA with  $^{203}\text{chlormerodrin}$ . As the results of these studies, it was found that the right to left ratio decreased in the sitting position. Therefore, it was thought that the above-mentioned phenomena on Seg B was probably due to the geometrical factor.

II: Computer processing on the kidney scintigram.

1. Studies on the static pattern.

Two kidney phantoms were placed at the distance of 5 cm. from the 1000 hole collimator in air. Digital data were obtained through 1600 Ch. PHA, which were then transferred to computer (HITAC 8300) after being punched manually on the punch cards. The kidney areas were first determined through 9 points smoothing; then, these data were printed out in 20 levels after contrast enhancement (iteration method) was performed. This contrast enhancement technique was also tried on the data in between certain upper and lower levels, and finally all defect areas (1.5 to 3.5 cm.) were successfully depicted. In one case having a poor kidney shadow on the scintiphoto, the above-mentioned computer processing, which was performed separately on the left and right halves of the field, clearly demonstrated the kidney area with  $^{203}\text{chlormerodrin}$ .

2. Studies on the dynamic pattern.

1) Serial pattern of the highest count rate area (over 80%).

The highest count rate area in each kidney was demonstrated through one minute counts with one minute interval after intravenous injection of radiohippuran in both prone and sitting positions. In some cases, the highest count rate area appeared in the different portions upon the postural changes, indicating presence of some axial rotation of the kidney.

2) Serial isocount pattern (50 to 60% zone).

Serial isocount pattern was also studied and it was found that the isocount pattern was nicely arranged in normal cases, while some distortion was found in abnormal cases, indicating possibility of early detection of small organic lesions in the future.