The Application of Neohydrin-197 to the Diagnosis of Renal Diseases

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Recently, we have had an opportunity to apply Neohydrin-197 on the kidney scanning and to compare it with Neohydrin-203 that has been used for some time.

First, the blood clearance and the urinary excretion on both materials were compared with each other, resulting in the same pattern on the graphs. However, the effective half lives in the kidneys obtained from the linear scanning revealed that the one from Neohydrin-197 was about two and a half days and the other around 26 days.

Second, a tiny amount of Neohydrin-197 was counted for about 35 days since 3 days after the asay date, plotting on the semi-logarithmic graph paper. This showed that decreasing rate of the count was the same as the decay rate of ^{197}Hg until around the 20th day on which the influence of the background fluctuation on the counting appeared. This indicates that the amount of contamination due to ^{203}Hg in Neohydrin-197 is very small. The equipment used was Shimazu Scintiscanner SCC-20. The dose of Neohydrin-197 used was 300 uc. per body and it was administered intravenously.

After the injection, uptake curves in the kidney were obtained for about 15 minutes. then, the patient were put on the scanning table, lying on the stomach position. Among the patients on whom the kidney scanning was performed there were 7 cases with hydronephrosis, giving a total number of 13.

In the cases with tumor and cyst, the scanning showed definite defect in the areas corresponding to the localization of the lesions. This gave the information valuable enough for the diagnosis. In the case with unilateral renal hypertension, the scintiscanning revealed a small, contracted kidney showing poorly concentrated Neohydrin-197 gave good visualization of the functioning renal tisue which is clear enough, corresponding to other cases with Neohydrin-203.

We mentioned above results: Neohydrin-197 has les total body and kidney iradiation than Neohydrin-203 has. The capability of the kidney visualization of Neohydrin-197 on the scintiscanning is not better than that of Neohydrin-203. Therefore, we do believe that Neohydrin-197 is a very useful material for kidney scanning.

Analysis of RI-Renogram by an Analog Computer with Especial Consideration of Background

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An analog computor was devised to analyze RI-Renogram quantitatively. Background included in RI-Renogram was measured by using RISA. In our results the right sides all showed slightly higher RISA radioactivity than the left.

Response curves obtained from the computer when RPF value is set to Oml/min, i.e. when kidneys are asumed to excrete no radioisotope, give a good agreement with actually measured background (RISA radioactivity) curves on both right and left sides.

From these obsevations it may be concluded as follows: it is possible to analyze background in Renogram by the analog computer, and thereby calculate separately the factors related to renal function and those which are not; thus to a certain extent quantitative interpretation of RI-Renogram is made possible by using the analog computer.

VIII. Whole Body Counting

An Interim Report on the Standardization of the Renogram Equipment

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There are many factors that influence on the radio-isotope renogram. The ability of the measuring equipments is one of the most important factors among them. The method how to standardize the mesuring equipment was investigated by using phantoms or by clinical applications.

1) The larger the size of NaI crystal, the more advantageous in sensitivity. The crystal of 2″ × 2″ is about five times as sensitive as that of 1″ × 1″ in the similar geometric conditions.

2) The thickness of the lead shield should be enough to reduce the counts of peak gamma-ray of iodine-131 from outside of the visual field to less than one percent of these from the visual field.

3) The whole kidney should be included within the complete visual field of the collimator, while any part of the opposite kidney and the bladder should be outside of the incomplete visual field.

4) The time constant of a ratemeter is desireble to be within the range of 1—5 sec, with the chart speed of 5—10 mm/min.

Fundamental Studies on the Whole Body Counter (Report 1)

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A high-dose-level whole body counter has been used for the determination of the RI retention in the patient's body in our hospital. The detector installed in the celling has a 3″ × 2″ NaI crystal and a rectangular lead collimator. Patients are counted from both sides (supine and prone positions) and the RI retentions are measured by the geometric means of two-directional counts with the differential settings. By this method of counting, however, the counting rates vary with the change of RI distribution in the patient's body even when the RI is not excreted. For example, the patient with oral administra-