

demonstrated steeper elevation of C segment than the latter. The explanations for these findings are speculated as following; transplanted kidneys at rejection phenomenon are remarkably swollen, which results in intrarenal stasis of urine due to elevation of intrarenal pressure. Secondly, dilatation of urine space in transplanted kidneys results in relative increase of dead space of urine accompanied by decrease of urine volume.

Thirdly, obstruction of urine flow are the sequela of rejection phenomenon itself due to edematous change in the ureteral mucosa.

Anyway, the mechanism of rejection phenomenon has not been well explained from the point of kidney function and each segment of renograms represents complicated factors of kidney function which is unable to give precise evaluation of each segment of renograms obtained from transplanted kidneys.

Clinical use of Indium 113 m for Kidney Scanning (II)

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Methods: Toshiba RDS-6 Scintiscanner, Cristal 3×2 inches (NaI), collimator 37 holes, Focus 10 cm honeycone were employed.

The kidney scanning was begun immediately and performed within 30 minutes after intravenous injection of 6 mCi of Indium 113m with patient usually prone and occasionally supine.

Material: Until recently, chlormerodrin (Neohydrin) labeled with radioactive mercury (²⁰³Hg) was employed in kidney scanning. However, the renal exposure from the radioactive material was high.

About a half year ago we reported kidney scanning, using Indium 113 m FeEDTA or FeDTPA ascorbic acid, for renal localization.

And presently, 500 mg of probenecid are

given per os 30 minutes prior to the scan in an attempt to block renal filtration of Indium 113 m.

Results: Indium 113 m FeDTPA ascorbic acid was better suited for use in kidney scanning than Indium 113 m FeEDTA because of its high ratio of kidney/liver were found in experiment in rats.

In addition, the scan after made preparation of "Probenecid" showed better localization of Indium 113 m in the kidney than no "Probenecid" in man.

The usefulness of kidney scanning using Indium 113 m can be seen in the following,

- (1) detection of renal position, size
- (2) differential diagnosis of abdominal masses in child.

Studies on Measurement of Plasma Volume and Extracellular Fluid Volume (Radiosulfate Space)

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The plasma volume and the extracellular fluid volume (E.C.F.V.) are generally measured by the isotope dilution method, in which those volumes are calculated from single blood samples or obtained by the extrapolation of the disappearance curve to the time of injection.

tion.

The plasma volume is, as a rule, calculated from the ten minutes sample.

In measurement of the E.C.F.V., however, some investigators calculate it from the twenty minutes sample, but others obtain it by the

extrapolation method.

In this study, we compare following various methods for estimation of the E.C.F.V.

A-Method (M. Walser et al);

A-E.C.F.V

$$= \frac{\text{counts injected} \times 0.95}{\text{plasma counts per ml at 20 minute}} \times 0.84$$

B-Method;

B-E.C.F.V.

$$= \frac{\text{counts injected—counts excreted by 20 minute}}{\text{plasma counts per ml at 20 minute}} \times 0.84$$

C-Method;

C-E.C.F.V

$$= \frac{\text{counts injected extrapolated "zero time" plasma counts per ml}}{\text{plasma counts per ml}} \times 0.84$$

D-Method (R.J. Ryan. et al);

D-E.C.F.V

$$= \frac{\text{extrapolated "zero time" counts remaining in the body}}{\text{extrapolated "zero time" plasma counts per ml}} \times 0.84$$

Material and Method:

The E.C.F.V and the plasma volume were determined on 37 subjects; 6 cardiac edematous, 3 nephrotic edematous, 2 uremic edematous, 3 cardiac asthomatous and 23 non-edematous patients.

All subjects were studied in the morning following ten hours fast.

30 μ c of ^{35}S as sodium sulfate and 10 μ c of RISA were injected intravenously and blood samples were withdrawn 20, 40, 60, 90 and 120 minutes after injection.

The radioactivities of RISA i nsera were measured by Well type NaI Scintillation counter and those of ^{35}S in sera were measured by the Packard Tri-Carb liquid scintillation counter after treated with 20% trichloroacetic acid to precipitate all proteins.

Results:

1) The comparison between the plasma volume calculated from the ten minutes sample (Y) and that obtained by the extrapolation (X);

The coefficient of correlation was 0.964 ($p < 0.005$), giving a regression line; $Y = 0.894X + 0.222$.

The ratio of Y to X averaged 0.974 ± 0.0285 .

2) The comparison of A-E.C.F.V.(Y) and C-E.S.F.V.(X);

$$r = 0.949 \quad (p < 0.005)$$

$$Y = 0.869X + 0.804$$

$$Y/X = 0.956 \pm 0.0726$$

3) The comparison of B-E.C.F.V.(Y) and C-E.C.F.V.(X);

$$r = 0.891 \quad (p < 0.005)$$

$$Y = 0.893X + 0.733$$

$$Y/X = 0.971 \pm 0.0877$$

4) The comparison of D-E.C.F.V.(Y) and C-E.C.F.V.(X);

$$r = 0.910 \quad (p < 0.005)$$

$$Y = 0.866X + 0.910$$

$$Y/X = 1.027 \pm 0.031$$

5) In two uremic patients with ascites, radioactivities in plasma and ascites were measured following a intravenous injection of ^{35}S .

A transient equilibrium between plasma and ascites concentration occurred eighty minutes after injection in one subject, but in the other, ascites concentration did not yet equilibrate plasma oncentration one hundred minutes after injection.

Conclutions:

1) If the accurate estimation of the E.C.F.V. with the standard deviation of less than 7.4 per cent is necessary, the extrapolation method must be utilized, especially in patients with ascites.

2) The comparison between the plasma volume calculated from the ten minutes sample and that obtained by the extrapolation method showed only a little difference with the standard deviation of only 2.8 per cent.