Circulating Blood Volume and Extracellular Fluid Volume of Healthy Japanese Adults

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Circulating blood volume (CBV) and extracellular fluid volume (ECFV) of 92 healthy Japanese adults are measured by dilution technique using $^{125}$I and $^{35}$SO$_4$. Radioactivity of $^{125}$I is counted by well type scintillation counter and energy of weak beta ray of $^{35}$S is estimated by Antracene free flow disc attached to photomultiplier.

CBV is calculated on plasma volume by corrected hematui and F-cell ratio 0.915, and ECFV is also calculated by Hemuny's correction formula. The results is that mean CBV per kilogram body weight is 73.5 ml (male), 67.6 ml (female) and ECFV is 181.5 ml (male), 17.1 ml (female) CBV has not linear relations to body weight and body surface area. The comparison of previously reported prediction formula of CBV with measured blood volume show that Nadler's height cubed-body mass formula is most proportional to measured blood volume, then, computer analysis of norms of CBV is made according to Allen-Nadler's height cubed-body mass method.

The basic height cubed-body mass formula is of the form:

$$P. B. V. = \beta H^3 + \gamma W + \gamma$$

where P.B.V. is predicted blood volume, $\alpha$, $\beta$, $\gamma$ are conotants, His height(M), and W is body mass (Kg).

(male) $P. B. V. = 0.309H^3 + 0.048W - 0.019$

(female) $P. B. V. = 0.255H^3 + 0.046W + 0.105$

Regression analysis gave the following formulas:

ECFV and plasma volume has a good correction as Etatland reported. The ratio of ECFC and plasma volume is 42.04mole and 4.18 for female. The fact leads to the prediction of ECFC secondary to plasma volume.

(male) $P. ECFV = CBV \times 0.614 \text{(plasmacut)} \times 4.20 - 0.799H^3 + 0.124W - 0.049$

(female) $P. ECFV = CBV \times 0.622 \text{(plasmacut)} \times 4.12 - 0.665H^3 - 0.120W + 0.274$

H is height(M) and W is body mass (Kg), p. ECFV is predicted extracellular fluid volume (L).

Total Exchangeable Sodium in Relation to Extracellular Water in Hypertension

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We have reported that it seems appropriate to observe body sodium in relation to extracellular water (ECW) in studying the diseases related to sodium disturbance. The paper presented a study of hypertensive patients from this aspect.

Materials and methods: Determinations of TENa (total exchangeable sodium), TBW (total body water), ECW and plasma volume were carried out by the isotope dilution method reported previously, except $^{22}$Na instead of $^{24}$Na. The materials included eight normal subjects, 27 patients with hypertension (10 the non-treated, 17 the treated with thiazide), three Conn's syndrome and seven renal insufficiency.

Results: (1) Plasma sodium levels were in the neighborhood of the normal in all, but slightly lower in renal insufficiency. (2) Mean value of TENa per body weight was 42.5 mEq/kg in the normal, which showed little distinction from the patients. (3) In 60 per cent of the