Studies on Determination of Serum Thyroxine Levels by ^{131}I-T_4 Resin Strip Uptake Method (Res-O-Mat T_4 Kit)

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Fundamental and clinical evaluation for Res-O-Mat T_4, a diagnostic kit for determination of serum thyroxine level by competitive protein binding analysis, were studied and the following results were obtained.

1) Extraction ratio of thyroxine from serum were 0.825 at 10°C and 0.795 at room temperature.

2) Duration of incubation until resin strip is added not influenced the binding of thyroxine to the resin.

3) Rotating incubation time and temperature was considered that the incubation at 26°C was most competent and practical.

4) Results of corrected levels of serum thyroxine in involving 151 subjects in various thyroid status were as follows. 4.6–12.5 μg% (mean 8.56 μg%) for 34 euthyroid, 10.6–20 μg% (mean 16.95 μg%) for 54 cases with hyperthyroidism, 1.7–4.96 μg% (mean 3.53 μg%) for 7 cases with hypothyroidism, 4.5–16 μg% (mean 8.5 μg%) for 49 cases of nontoxic goiter, 5.84 and 9.8 μg% for 2 cases with subacute thyroiditis, 4.2–7.8 μg% (mean 5.97 μg%) for 3 cases with chronic thyroiditis and 8.96–10.8 μg% for 2 cases of malignant goiter. From these results we arrived at the conclusion that from 5.0 μg% to 13.7 μg% was an adequate range for euthyroid. Serum thyroxine levels of hyperthyroidism (54 cases) and hypothyroidism (7 cases) were more than 13.6 μg% or less than 4.96 μg% respectively and 3 cases out of 34 euthyroid cases were between 4.6 μg% and 4.9 μg%.

When ^{131}I-T_3 resin strip uptake values were compared with serum thyroxine values, the correlation between two tests for euthyroid range was good relatively.

4) Res-O-Mat free thyroxine index ranged 4.3–14.1 in euthyroid subjects.

These free thyroxine indices reflected the thyroid function accurately.

Evaluation of Radiostereoassay for Determination of Serum Thyroxine

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Three kinds of kit ((a) Tetrasorb-125 Dainabot, (b) Res-O-Mat T_4, Mallinckrodt and (c) Tetralute, Ames) were used and compared for determination of serum thyroxine. The time and temperature were critical factors for separation of bound and free by means of resin sponge (a), resin strip (b) and gel filtration (c). The values of standard deviation of duplicate determinations were 0.6 (a), 0.5 (b) and 0.4 (c) μg/dl (T_4 iodine) respectively. Following oral administration of 6 tablets of Telepaque, serum PBI was markedly increased but thyroxine levels which were serially determined by these three methods did not change. Normal values of serum thyroxine iodine determined by these methods were 2.5–9.4 (a), 3.0–7.2 (b) and 3.2–6.7 (c) μg/dl respectively. In hyperthyroid patients,