

## Radioimmunoassay of Serum Thyrotropin in Thyroid Diseases

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Serum thyrotropin (TSH) levels in normal subjects and patients with thyroid diseases were estimated by radioimmunoassay with double antibody technique using "Daiichi HTSH Radioimmunoassay Kit". The standards for the assay were incubated in serum from patients with untreated hyperthyroidism in order to equalize the serum concentration of the unknown and standard tubes.

The TSH levels in 24 normal adults ranged from undetectable ( $<2 \mu\text{U/ml}$ ) to  $6 \mu\text{U/ml}$ .

The values were undetectable in all cases of 40 patients with untreated hyperthyroidism and 2 cases of secondary hypothyroidism. Values in 23 patients with primary hypothyroidism ranged from  $42 \mu\text{U/ml}$  to over  $500 \mu\text{U/ml}$ . 40 cases of chronic thyroiditis had values ranging from undetectable to  $32 \mu\text{U/ml}$ . Serum concentrations in 71 euthyroid patients with simple goiter, subacute thyroiditis and nodular goiter were in the same range as in normal subjects.

## Clinical Evaluation of Serum T<sub>3</sub> Concentration in the Thyroid Disease and a Rapid Increase of T<sub>3</sub> after TRH Injection

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Recently, the concentration of serum T<sub>3</sub> became to be measured by a method of radioimmunoassay and it was applied to the diagnosis of thyroid disorders as well as the serum T<sub>4</sub> concentration and resin sponge T<sub>3</sub> uptake *etc.* One had expected that there might be in presence of "so-called" T<sub>3</sub> hyperthyroidism as several investigators had reported. If it was true, the precise measurement of serum T<sub>3</sub> concentration

gave us an advance to make easy to find the T<sub>3</sub> hyperthyroidism. In order to know how many patients of T<sub>3</sub> hyperthyroidism could be found by the measurement of serum T<sub>3</sub>, in the present study, the T<sub>3</sub> concentration in the serum of 27 euthyroid subjects, 25 hyperthyroidism and 6 primary hypothyroidism was measured by the method of radioimmunoassay and the value was compared with T<sub>4</sub> and resin sponge T<sub>3</sub>

uptake which were measured simultaneously with T3. The effect of TRH on both the pituitary TSH secretion and the thyroidal T3 secretion was also studied herein using 6 non-diabetic normal subjects.

Normal ranges of serum T3 concentration were between 80 and 260 ng/100 ml. In 5 patients out of 25 hyperthyroidism, although the serum T4 concentration was within normal ranges (10–11  $\mu$ g/100 ml), the T3 was more than 400 ng/100 ml or more and the resin sponge T3 uptake was also markedly high, indicating that

these 5 patients might be the “so-called” T3 hyperthyroidism. When a five hundred  $\mu$ g of TRH was injected iv to the normal subject, the serum TSH rapidly increased and maximum response, approximately 20  $\mu$ U/ml, was obtained at 60 min after TRH injection. The serum T3 concentration was also increased after TRH injection nearly 2 times as much as that found before TRH administration. The maximum value of T3, approximately 300 ng/100 ml, was found at 180 min after TRH.

### **Effects of Oral Administration of Synthetic TRH on Thyroidal Radioiodine Uptake in Human**

—A screening test for the abnormalities of hypothalamo-pituitary-thyroidal axis—

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It is well known that synthetic TRH rises the serum TSH levels. We have demonstrated that TRH also increases serum TSH levels after oral administration (*Folia Endocr Japon* 49:949, 1973). Present study was designed to evaluate the effects of orally administered synthetic TRH on thyroidal radioiodine uptake in human. The changes of I-131 thyroidal uptake during the oral administration of 10mg of synthetic TRH b.i.d. for successive for 4 days were observed in 16 normal subjects, 8 hyperthyroidism, 5 primary hypothyroidism, 3 secondary hypothyroidism, 4 tertiary hypothyroidism, 5 nontoxic diffuse goiter, 5 anorexia nervosa and 2 diabetes insipidus. TRH i.v. test and TSH test were also performed. In normal subjects, I-131 uptake increased:

( $\Delta$  uptake,  $M \pm 2SD$ ):  $20.4 \pm 12.9\%$  D in TRH p.o. test, and  $15.1 \pm 9.2\%$  D in TSH test. In primary hypothyroidism, no increase of I-131 uptake was observed both in TRH p.o. test and in TSH test. In secondary hypothyroidism, the response of TRH p.o. test was lower than normal response, but that of TSH test revealed normal response. In tertiary hypothyroidism, both TRH p.o. test and TSH test showed normal or higher response. The other subjects showed almost normal response. These data suggests that  $\Delta$  uptake after oral administration of synthetic TRH is one of the available indicators of clinical screening tests for hypothalamo-pituitary-thyroidal disorders, and also for clinical investigation on the pituitary and thyroidal reserves.