Our Experience With the Use of the Seralute Total T_3 RIA Kit

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We examined the Seralute Total T_3 RIA Kit (developed by the Ames Company to measure total triiodothyronine (T_3) in serum) in order to evaluate its clinical usefulness. We conducted the examination in accordance with the instructions listed. Cross reactivity of this antibody with T_4 was estimated as only 0.44%. The serum dilution curve was strikingly parallel to the standard curve, and the recovery of added standard T_3 to serum as the amount of 68–540 ng/dl was 88.2–109%. Coefficient variation for serum T_3 determination was 4.1% in interassay, and was 5.9% in intraassay respectively. We were very pleased with the results.

The concentration of serum T_3 in 24 normal adults was ranged from 117 to 214 ng/dl and averaged in 157±23 ng/dl, while in 13 patients with hyperthyroidism ranged from 297 to 884 ng/dl and averaged in 624±167 ng/dl, in 9 patients with hypothyroidism ranged from 0 to 63 ng/dl and averaged in 25±18 ng/dl, and in 6 pregnant women ranged from 167 to 237 ng/dl and averaged in 214±27 ng/dl.

When we used this kit, the value of serum T_3 reflected the functioning of the various thyroid diseases. When we compared this method with the T_3 RIA kit of the Dinabot RI Laboratory, the concentration of T_4 of 24 normal adults was 1.30±0.19 ng/ml, and this means that the values obtained with the Seralute Kit were higher than those obtained with the Dinabot Kit, but the significant correlation was found between the results of each kit with the correlation rate of 0.91.

The measurement of serum T_3 by means of this Seralute Kit was clinically very useful because the amount was very stable and we needed but a short time to conduct the assay.

The Deviation of The In Vitro Thyroid Function Tests in Japan
—Analysis of The Dose Response Curves of T_3 and TSH Radioimmunoassays—

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In the previous study, the result of the control survey of serum T_3 and TSH measurements in various laboratories in Japan were investigated, showing that deviations among laboratories were much greater than the interassay variations in a given laboratory.

In order to analyze the causes of the deviations, we compared the T_3 and TSH dose response curves

from the different laboratories, using the analytical method of radioimmunoassay developed by Rodbard et al.

The dose response curve, expressed in terms of cpm (Y) versus log (X) is sigmoidal in character and can be described by the following equation.

$$Y = \frac{a-d}{1+(X/c)^b} + d$$

X: the dose of the standard hormone

Y: the respones in counts

a: the response for zero dose

b: the slope factor at the dose of c

c: the dose level for the midrange of X

d: the response for infinite dose

Four parameters (a, b, c, d) of the dose response curve in each laboratory was calculated using computor program. The means and standard errors in TSH radioimmunoassay are a: 4344 ± 361 cpm, b: 0.96 ± 0.02, c: 17.6 ± 1.9 μU and d: 470 ± 69 cpm, and in T_3 radioimmunoassay they are a: 2438 ± 231 cpm, b: 1.22 ± 0.04, c: 1.02 ± 0.08 μU and d: 10838 ± 712 cpm respectively. These four parameters coincide very well, suggesting the causes of the deviations were not in the construction of the dose response curve. The deviations seem to be due to the accumulation of the following causes;

i) the large interassay variations in some laboratories.

ii) the calculation of the unknown samples using the "bad" portion of the dose response curve.

iii) the differences in the skill of the operator.