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FUNDAMENTAL AND CLINICAL STUDIES OF FREE THYROXINE IN SERUM BY RADIOIMMUNOASSAY.

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The thyroidal function tests, such as T3 uptake(T3-U), triiodothyronine(T3) and thyroxine(T4) in serum have been widely used with the methods of the radioimmunoassay(RIA). The RIA methods of free thyroxine(FT4) in serum have been evaluated recently, as its free form is believed to be the physiological determinant of hormone status.

Various techniques have been employed to estimate the FT4 fraction in serum. More recently, the direct methods for the determination of FT4 in serum by RIA are also more convenient than the rather laborious standard technique of dialysis.

I have examined FT4 concentration in serum with the method of RIA, by using the kit of Amerlex Free T4 and the kit of Spac T4. The fundamental studies were tested in both methods. Also, FT4 concentration in 300 cases of sera from the patients, who contained cases with no detectable symptoms of thyroid diseases, hyperthyroidisms, hypothyroidisms, other thyroidal diseases, pregnancies and liver cirrhoses were measured with these kits. T3-U, T3, T4 and free T4 index were measured in these cases at same time.

These results suggest that these methods were useful in clinical application for routine.

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EVALUATION OF THE AMERLEX FREE T₄ (FT₄) RIA KIT AND INFLUENCE OF HEMOGLOBIN TO FT₄. M. Nakahata, H. Suzuki and Y. Higuchi The Second Department of Medicine, Hokkaido University School of Medicine, Sapporo

Serum free thyroxine (FT₄) was measured by radioimmunoassay (the Amerlex FT₄ kit, Amer-sham). The steep standard curve was obtained by the conventional procedure (incubation at 37°C for 60 min). The least detectability was 0.05 ng/dl. The coefficient variances were 4.8% for intraassay, and 4.1% for interassay. The mean FT₄ concentrations were 1.48 ± 0.20 ng/dl (S.D.) in normal subjects, 5.40 ± 2.11 ng/dl in hyperthyroid patients, 0.51 ± 0.14 ng/dl in hypothyroid patients, 1.07 ± 0.29 ng/dl in patients with non toxic goiter. 1.05 ± 0.22 ng/dl in patients with chronic thyroiditis and 1.29 ± 0.34 ng/dl in patients with Graves' disease treated with antithyroid agents. The FT₄ concentrations measured by the Amerlex kit significantly correlated with those by the Gamma Coat RIA kit (Travenol), and with those by the equilibrium dialysis. Purified human hemoglobin added to hyperthyroid serum at the concentrations of 0.16, 0.31, 0.63, 1.25, 2.5, 5.0 and 10.0 ng/dl decreased the Amerlex FT₄ values by 15.5, 31.8, 49.1, 56.6, 59.9, 62.2 and 60.8%, respectively. Conclusion: 1) FT₄ concentration measured by Amerlex RIA kit is a good indicator for thyroid status; 2) Human hemoglobin decreases the FT₄ concentration in a dose dependent manner.

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EVALUATION OF FREE T₄ INDEX (FT₄I), T₄:T₃ RATIO AND T₄:UNBOUND T₃ RATIO AS AN INDIRECT MEASURE OF SERUM FREE T₄ (FT₄) CONCENTRATION. K. Morikawa, N. Konno, H. Kon, K. Hagiwara and Y. Okita. Department of Medicine and Radiology, Hokkaido Central Hospital for Social Health Insurance, Nakanoshima 1-8, Sapporo.

The clinical usefulness of FT₄I, T₄:T₃ ratio and T₄:unbound T₃ ratio as an indirect measure of FT₄ was compared in various groups of patients. Serum T₄, T₃U (Triosorb-S), TBG(Riagnost-TBG), TBG capacity(electrophoresis) and FT₄(Amerlex) were measured in normal subjects, the patients with thyroidal and non-thyroidal illness(NTI) and in pregnant(3rd trimester). The correlation coefficients of FT₄ with FT₄I, T₄:T₃ and with T₄:unbound T₃ were excellent(r=0.89, 0.87, and 0.86 respectively) when the data from all subjects were analyzed together, but the coefficients were lower in normal, pregnant and NTI than that in thyroidal disorders when the data from these groups were analyzed separately. The linear regression line between FT₄ and three indirect parameters of FT₄ showed that the line for patients with thyroidal disorders had a steeper slope than that for other groups. The distribution of FT₄ in individual groups agreed well with FT₄I, while T₄:T₃ ratio and T₄:unbound T₃ ratio distributed subnormally in pregnant where FT₄ were all within the normal range, though these ratio agreed well with FT₄ in other groups. These results suggest that a) FT₄I is more reliable than T₄:T₃ and T₄:unbound T₃ as an indirect measure of FT₄ when TBG levels in serum are abnormal, b) the variation of these parameters for indirect measure of FT₄ within the normal ranges does not reflect the change in serum FT₄ as better as in the cases with thyroid functional abnormalities.

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CLINICAL STUDIES ON THE MEASUREMENT OF SERUM FREE THYROXINE CONCENTRATION BY RADIOIMMUNOASSAY. J. Konishi, T. Kosaka, T. Misaki, Y. Iida, K. Kasagi, K. Endo, K. Ikekubo and K. Torizuka Department of Nuclear Medicine, Kyoto University Hospital, Kyoto

Clinical usefulness of the measurement of serum free thyroxine (FT₄) concentration by 4 radioimmunoassay kits, i.e. Immophase (I), GammaCoat (G), LiquiSol (L) and Amerlex (A), was evaluated. Intra- and inter-assay variation were satisfactory with C.V. ranging 4.0-8.7% and 3.6-12.5%, respectively. FT₄ by RIA were in good correlation with those by equilibrium dialysis in various thyroid disorders. FT₄ in pregnant women were low normal or slightly low in I, G and A, while those in L were normal or slightly high. On the other hand, the values in subjects with low TBG were within normal limits in all assays. However, FT₄ in TBG deficient subjects were low normal or low in L and were slightly high in A. By increasing the sample volume FT₄ values in TBG deficient sera were normalized in both L and A. The normalization of the values were also observed by shortening the incubation time in A. FT₄ values in non-thyroidal illness having T₄ concentration of less than 4µg/dl were abnormal in 5/16, 8/16 and all 15 by using G, L and A, respectively. FT₄ by RIA was useful in follow up of patients with Graves' disease, especially when complicated with TBG abnormalities.