

ml of the standard pooled serum and 0.5 ml of distilled water are added to this test tube. Eight tenth ml of solution of dried human plasma is available in place of the standard pooled serum. After the material is redissolved completely, this is incubated for 30 min. at 4°C. According to the conventional method, resin sponge uptake is measured by a well-type scintillation counter. T_4 content in the supernatant is determined from the standard curve of $^{131}\text{I}-T_3$ resin uptake values obtained using various concentrations of known T_4 solution; 0.0, 0.25, 0.05, 0.075, 0.10, 0.125, 0.15, 0.20, 0.25, 0.30 and 0.40 $\mu\text{g}/\text{ml}$ of T_4 . A sharp linear increase was seen in the range of T_4 concentration from 0.0 to 0.20 μg . However, its increase became less steep beyond the T_4 content of 0.20 μg . Therefore, the standard curve can be applicable for determining the T_4 concentration of below 20 $\mu\text{g}/100$ ml in serum. Then these calibrated T_4 values are further corrected using the value of recovery of T_4 $^{131}\text{I}-T_4$ from the each sample serum to the ethanol extract. The re-

covery by measuring the same sample obtained a satisfactory reproducibility.

The findings of T_4 iodine ($\mu\text{g}/100$ ml) by the present method in various groups of diseases were: 1) hypothyroidism, 2.3 ± 0.70 (mean \pm SD); 2) euthyroid subjects, 5.7 ± 1.08 ; 3) hyperthyroidism, 10.9 ± 2.30 ; 4) pregnant, 7.0 ± 1.31 ; 5) nephrosis, 2.3 ± 0.94 ; 6) newborn infant, 13.7 ± 2.08 ; and 7) arterial cord blood, 7.1 ± 0.77 . The average PBI values determined simultaneously in the cases with euthyroid, hyperthyroid, hypothyroid, pregnant and nephrotic individuals were 5.9 ± 1.10 , 11.8 ± 1.99 , 2.4 ± 0.58 , 7.7 ± 1.13 , and 2.6 ± 0.70 , respectively. These PBI results were correlated well with the T_4 iodine values.

A satisfactory reproducibility was observed through 35 duplicate determinations. The range of differences of the duplicate analysis was 0–1.9 μg of T_4 iodine/100 ml.

These results proved that this method could be used as the routine clinical diagnostic means in place of PBI.

PVF Sponge and Its Clinical Applications

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1. PVF-sponge

PVF sponge here is obtained by acetalization of PVA (polyvinyl alcohol) and is considered to have 1–3 glycol bond in its structure. Maximal degree of the acetalization is theoretically 86.74%.

Swelling with water depends upon the degree of the acetalization and no swelling is observed above 81% of acetalization.

Pores make continuous phase throughout the sponge and are controlled in the manufacturing process.

For obtaining homogeneous product, the most favorable degree of acetalization is considered to be 72%, while 65% sponge was used in this experiment.

2. PVF sponge in clinical use

Acetalized (72%) or semiacetalized (65%) form of PVA was used as absorbant of T_3^x (x . means R.I.-labelled) for the purpose of

thyroid function test.

According to the procedure of Triosorb resin test was the T_3^x -uptake of PVF sponge measured in the following experimental conditions:

1. PVF-sponge (semiacetalized cylindrical piece): 1.5 cm long
2. Temperature: 25°C
3. Incubation time: 60 min.
4. Serum to be tested (twice diluted): 1.0 ml
5. Washing: 7 times (1 sample for 1 min.)

The result of the test proves that this sponge could be available for clinical use, showing normal value between 16 and 24%.

The electrophoretical pattern of T_4^x -added serum on cellulose acetate film stripe was cut along referred to the blackened zone in the inter- α area and the incorporation rate of T_4^x in TBG against the whole T_4^x in value

on the stripe (X) was measured.

The correlation coefficient between Y (T_3 -uptake rate of PVF) and X was -0.78 and there held the regression equation

$$Y = -0.42X + 37.5$$

The relation of T_3 -uptake rate of PVF sponge with other thyroid function test were as follows:

PBI	+ 0.674	(n = 82)
BMR	+ 0.58	(n = 40)
TUR	+ 0.69	(n = 31)
Triosorb RSU	+ 0.899	(n = 25)

3. Properties of PVF related to T_3^x -uptake test.

The adsorption of various labelled iodine compounds to this sponge proved peculiarity that some organic compounds such as T_3^x and T_3^x were for strongly adsorbed to the sponge than inorganic ones or simpler organic ones such as DIT.

The acetalized sites of PVF might be suitable electronacceptor to the electrondonor in thyronine or thyroxine.

Generally, however, in the T_3^x -test there mu be a concurrence in taking up T_3^x be-

tween sites of PVF on the other hand.

In order to elucidate the adsorption mechanism the author used certain characteristic chemicals such as urotropine which covers the OH-site of PVF and salicylate, guanidine, urea etc. which could degenerate serum protein and inhibit T_3^x or T_4^x in corporation into TBG.

Cold T_3 or T_4 naturally enhance the adsorption rate of T_3^x to PVF, while salicylate, guanidine, T KI and NaCl increase the T_3^x -uptake rate of UVF in higher concentration.

The characteristic property of PVF to differentiate some organic iodine compounds from inorganic ones could be availed for the purpose to follow the organization mechanism of iodine compounds in animals.

P.S. (1) T_3^x is more strongly incorporated in TBG than T_3 and in higher concentration in hypothyroid or pregnant serum than in hyperthyroid one.

(2) Sharp blackened are appeared in the autoradiogram of immunoelectrophoresis corresponds to the localization just upon lipo α_2 (and also α_1).

Formalized Polyvinyl Alcohol (PVA) Sponge as an Adsorber of T-3 Test

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A new method of the T_3 test which uses a piece of formalized polyvinyl alcohol resin sponge as an adsorber of T_3 was developed. The T_3 uptake by RBC was measured with one half of 10 ml whole blood specimen by the Hamolsky's original method, and the T_3 uptake by PVA sponge was measured with another half of the same specimen by the new PVA method. The T_3 uptake by PVA is proportional to the T_3 uptake by RBC. The average ratio of the both methods observed with 56 whole blood specimens was 2.82 (PVA vs REC).

The procedure of new method is as follows: 1.0 ml of serum or plasma is diluted

with 1.0 ml of saline. One drop of T_3 solution is added to the diluted specimen and mixed thoroughly. The mixed solution is transferred to 3 glass tubes, 0.5 ml each. A piece of PVA sponge (2 cm length, 1 cm diameter) is put into each tube to absorb the 0.5 ml solution. The tubes are incubated for 30 minutes at 37°C . The radioactivity of each tube is counted for one minute by a well type scintillation counter (0.1 microcuries, 10^5 cpm). Each sponge piece is washed 5 times with saline. The radioactivity of each tube is counted again for one minute. The uptake ratio is calculated by the formula, *cpm after washing/cpm original*.