

and 85% after 15–20 years. Fifty percent of patients indicated  $T_3$  value under 0.8 ng/ml and 39% indicated  $T_4$  value under 4  $\mu\text{g}/\text{dl}$  after 15–20 years. The incidences of abnormally low  $T_3$  and  $T_4$  values were between incidence of hypothyroidism diagnosed by clinical symptoms and that of abnormally high value of TSH.

7) Thyroid crisis immediately after  $^{131}\text{I}$  therapy,

transient exacerbations of hyperthyroidism and hypoparathyroidism were not observed, and in addition leukemia or thyroid cancer as late complications were not observed in any patients. Difference in sex was not seen in the 126 children of whom mothers had conceived them in more than one year after  $^{131}\text{I}$  therapy. Any of these children except the one child with atrial septal defect were healthy.

### Thyroidal Function and Seasonal Change of $^{131}\text{I}$ - $T_3$ Resin Sponge Uptake

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To investigate the seasonal change of thyroidal function,  $^{131}\text{I}$ -triiodothyronine resin sponge uptake (Triosorb, RSU) of serum of healthy male and female adults was measured in summer and winter. RSU was significantly higher in summer than in winter, regarding the mean value in groups in both seasons and the difference of both values between in summer and winter of each individuals as well.

In a series of male volunteers, the measurement of RSU was monthly performed simultaneously with those of PBI, total cholesterol and total protein contents in blood serum. RSU was higher in summer (from June to August) than in winter (from December to February). PBI was lower in

summer than in winter, but statistically not significant. Total cholesterol and total protein were significantly lower in summer.

In the other series of male adults, RSU and effective thyroxine ratio (Resomat-ETR) were concurrently measured and both were significantly higher in summer than in winter, while diphasic with peak values in July and November.

As the results of the above mentioned data, it should be concluded that the amount of thyroid hormone in circulating blood be higher in summer than in winter, while the higher value of RSU in summer may be partly due to lower blood concentration in summer.

### Radioimmunoassay of Calcitonin in Various Thyroid Disease

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Plasma calcitonin levels were measured by a radioimmunoassay before and after an infusion of

calcium in 12 patients with simple goiter, 13 with Graves' disease, 19 with chronic thyroiditis, 1

with subacute thyroiditis, 8 with thyroid adenoma, 13 with thyroid cancer involving 11 cases with medullary thyroid cancer and 2 with adenocarcinoma, and 6 with hypothyroidism.

Reactivity of calcitonin secreting cell was expressed by the index of  $\Delta CT/\Delta Ca$  in which  $\Delta CT$  and  $\Delta Ca$  represented the increments of plasma calcitonin and calcium levels after the calcium infusion.

Basal plasma calcitonin levels were strikingly high in medullary thyroid cancer, while within normal limits in a majority cases with other thyroid diseases.

$\Delta CT/\Delta Ca$  values were significantly higher in

patients with Graves' disease than in those with other thyroid diseases except medullary thyroid cancer having the highest values of all.

A significant correlation was seen between  $\Delta CT/\Delta Ca$  values and serum thyroxine levels ( $r=0.86$ ) in patients with thyroid diseases except those with medullary thyroid cancer and those placed on thyroxine medication. All hypothyroid patients showed low  $\Delta CT/\Delta Ca$  values regardless of the causes of hypothyroidism whether due to  $^{131}I$  treatment, surgery or chronic thyroiditis.

It was suggested that hyperactivity of C-cell prevailed in hyperthyroidism, while C-cell function was decreased or extinct in hypothyroidism.

### **The Clinical Studies of Plasma Parathyroid Hormone and Calcitonin Measured by Radioimmunoassay**

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Plasma calcitonin and parathyroid hormone (PTH) concentrations were determined by radioimmunoassay in various disorders with an abnormal calcium metabolism.

(1) In 79% of the patients with chronic renal failure, both basal plasma calcitonin and PTH levels were increased. Furthermore, plasma calcitonin levels after a single hemodialysis found to be reduced in spite of elevated calcium concentration. After a 6 months period of hemodialysis, basal calcitonin levels were decreased to less than 0.5 ng/ml in all cases. Plasma calcitonin levels were not significantly correlated to serum phosphorus and calcium concentration. These results suggest the presence

of circulating immunoreactive fragments of calcitonin in chronic renal failure.

- (2) It is useful in differential diagnosis of hypercalcemia to measure plasma calcitonin and PTH level. Primary hyperparathyroidism showed high PTH with normal calcitonin level, malignant tumor with bone metastasis showed high calcitonin with low PTH level and PTH producing tumor showed high values for both calcitonin and PTH level.
- (3) Plasma PTH level in breast cancer with bone metastasis was increased strikingly high in response to hypocalcemia induced by EDTA infusion.