thyroid hormones. There have been reported several methods to determine tissue concentrations of thyroid hormones, i.e., 1) ethanol extraction, 2) butanol-chloroform-ammonia extraction (ammonia 3x), and 3) butanol-chloroform-ammonia extraction (ammonia 1x). In the present experiment, the above published methods were compared with a method using small Sephadex G-25 columns in which tissue homogenates were dissolved in 1.5 N NAOH and then applied to the Sephadex columns. The rest of the procedures was the same as that in the measurements of serum T3 and T4 concentrations by Seraluter and Tetraluter.

Parallelism of dilution curves of extracts to the standard curve were not observed in either ethanol extraction or butanol-chloroform-ammonia (3x) extraction. Good parallelism was obtained in the method of butanol-chloroform-ammonia (1x) extraction, but recovery of both T4 and T3 were low. In the method to extract and determine T3 and T4 by Sephadex G-25 column, both parallelism and recovery were satisfactory and hence, this method could be considered to be the most useful method to determine tissue T3 and T4 concentrations.

Serum Thyroid Hormone Levels in Patients with Liver Diseases and Schistosomiasis Japonica

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The levels of thyroxine (T4), triiodothyronine (T3) and thyroxine stimulating hormone (TSH) were measured for sera obtained from patients with Schistomiasis japonica and various liver diseases by using radioimmunoassay kit (RIA) (Riagnost). Thyroxine bidding capacity (TBC) was also measured by competitive protein binding assay method (CPBA).

The average values (TBC%, T3 ng/ml, T4 µg/dl, TSH µU/ml) were 101.3±9.68, 0.93±0.64, 9.79±4.44, 7.21±3.12 in patient with hepatitis (n=59), 100.2±17.2, 0.78 ±0.37, 8.29±2.72, 6.85±3.90 in liver fibrosis (n=29), and 101.13±

11.5, 0.56±13.6, 6.95±2.86, 9.60±4.46 in liver cirrhosis (n=59). T3 values in patients with hepatitis was inversely correlated with age (r=−0.41, p<0.01). T4 values measured by RIA method were always lower than those by CPBA method, the relation being Y (RI)=0.423 × (CPBA)+1.371 r=0.539, p<0.01, n=40).

A significant decrease in T3 value and almost normal T4 level and slightly increased TSH level are compatible with the view that the liver may play a significant role in peripheral T4→T3 conversion in man.

Diagnosis of Thyroid Tumors by Thyroid Scanning with 201TI and 131I

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We used the thyroid scanning with 131Cs or 201TI for determining whether a thyroid tumor is malignant or not. Cesium is a monovalent cation and belongs to IA group in the periodic table. Though thallium belongs to IIIA group, it is a monovalent cation. Therefore thallium may be biologically similar to cesium. 1) Thyroid scans were performed on 44 cases of thyroid tumors with 131Cs and 19 cases of thyroid tumors with 201TI, histologically verified by surgery. The percent positive scan of 28 cases of malignant tumors and 16 cases of benign tumors using 131Cs were 71.4% (20/28) and only 12.5% (2/16) respectively. Twenty of 22 cases of positive scan with 131Cs...
were malignant (90.9%). The percent positive scan of 13 cases of malignant tumors and 6 cases of benign tumors using $^{201}$Tl were 92.3% (12/13) and 84.3% (5/6) respectively. These results show that $^{131}$Cs scan exceeds $^{201}$Tl scan for determining malignancy of the thyroid tumors. 2) There was more accumulation of either $^{131}$Cs or $^{201}$Tl in follicular tumors than in papillary tumors in the cases of both benign and malignant tumors. There was more accumulation of $^{131}$Cs in solid tumors than in cystic tumors in the cases of both benign and malignant tumors.

However, there was accumulation of $^{201}$Tl in both solid and cystic tumors. 3) In all of six cases with chronic thyroiditis verified by open biopsy or surgery, there was almost the same degree of accumulation of $^{201}$Tl as the normal functioning area on $^{131}$I scans in the localized hypofunctioning area.

The combination of $^{131}$I and $^{201}$Tl on thyroid scan will be useful in the diagnosis of chronic thyroiditis.

**Evaluation of Thyroid Diseases Using Multi-nuclei Scintigraphy**

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Differential diagnoses of various thyroid diseases were performed with the combined use of Na$^{131}$I, $^{99m}$TcO$_4^-$ and $^{201}$TlCl. A total of 45 patients were examined: 12 patients with Graves' disease, 11 with Hashimoto's thyroiditis, 6 with cancer, 4 with thyroid cyst and 12 hospitalized controls without thyroid disease.

First, 100 μCi of Na$^{131}$I was administered orally and the uptake was measured at intervals of 1, 3, and 24 hrs. A scan dose of 1 mCi of $^{201}$TlCl was then administered IV and the thyroid uptake of the $^{201}$TlCl was continuously recorded for the first 30 minutes. Scintigraphy was subsequently carried out. The $^{201}$TlCl clearance rate was derived from the following ratio: 20 min. uptake/5 min. uptake value (%).

After $^{201}$TlCl scanning a dose of 1mCi of $^{99m}$TcO$_{4^-}$ was given IV, subsequent to which the uptake rate was measured and scintigraphy was performed. Finally, following the Na$^{131}$I uptake measurement made at 24 hrs, a thyroid scan was carried out.

Nodules represented as cold features when Na$^{131}$I scanning is used in cases of chronic thyroiditis, adenomatous goiter, follicular adenoma and carcinoma are visualized as hot features in $^{201}$TlCl scanning. A high rate of positive scan using $^{201}$TlCl is seen in both primary and metastatic lesions of thyroid cancer, especially in cases of well-differentiated follicular carcinoma. Therefore, $^{201}$TlCl scanning is useful for recognizing metastasis in the neck area. $^{201}$TlCl, however, does not concentrate in cystic lesions.

Additional scanning utilizing Na$^{131}$I and $^{99m}$TcO$_{4^-}$ is necessary, due to difference in their metabolism. $^{99m}$TcO$_4^-$ usually concentrates in carcinomatous lesions of both well differentiated and undifferentiated types, so $^{99m}$TcO$_4^-$ scanning is useful for detecting malignant lesions. Also, $^{99m}$TcO$_4^-$ scanning usually shows a larger cold nodule than Na$^{131}$I scanning. The difference is probably due to the time elapsed after administration of the radionuclides. Such a phenomenon is seen in cases of follicular carcinoma with or without papillary foci.

In thyroid scintigraphy, therefore, it is necessary to use an adequate combination of various radionuclides such as Na$^{131}$I, $^{99m}$TcO$_4^-$ and $^{201}$TlCl for differential diagnosis.