K. Thyroid

Improvement of the Thyroid Images with a Pin-Hole Collimator of a Small Diameter

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The magnification of images by means of a pin-hole collimator can resulted in improved resolution through the relative enhancement of the intrinsic resolution of a scintillation camera. The study purposed the improvement of thyroid images by using the pin-hole of a variety of diameters with a Toshiba scintillation camera having a 15-1/4 in.-diameter Nal crystal. The pin-holes were made of lead with diameters ranging from 5.0mm to 1.5mm.

The phantom experiments using parallel-lein sources with Tc-99m demonstrated the evident separation of images of 2mm-separated line sources at 2.5cm to 5cm distant. However, the sensitivity was measured, approximately in proportion to the area of pin-hole. Seventy cases of thyroid scintigrams have been taken by using a variety of pin-hole collimators. It was concluded that improved resolution of thyroid images was observed by using a smaller pih-hole, valuable in interpretation of small cold nodules.

A Method of Thyroid Test: Simultaneous Administration of Two Nuclides and Its Data Processing by a Minicomputer System

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A minicomputer system was used for the improvement of the thyroid function test and in this report, the simultaneous measurement of two nuclides (I-131 and Tc-99m) were studied.

Method :

After the intravenos injection of I-131 and Tc-99m, gamma camera (Nuclear Chicago, PHO/GAMMA HP) and a minicomputer system (Nova 1200 16K words, moving head disk 4047A Diablo 31, graphic computer terminal 4002A Tektronix Inc., hard copy unit 4601 Tektronix Inc., magnetic tape recorder TMZ.) were used to record the distribution of radioactivities in every one minute, and to store the results in disk-memory,

After the end of 40 minutes recording, the data were transfered on the magnetic tape.

After the intravenous injection of the nuclides, the images from gamma camera were displayed on the CRT as the maps of each nuclide and also the dynamic studies of each

nuclide were performed as the R.O.I. curves (Region of Interest).

Result:

The uptake curves and the R.O.I. curves in the simultaneous measurement of two nuclides, showed difference according to the function and the region of thyroid.

Clinical Application of Thyroid Tumor Scanning with $^{197}HgCl_2$

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Various tumor scanning agents have been studied as a diagnostic method of malignant tumors. Recently, we applied scintillation scanning with $^{197}HgCl_2$ to the disease of the thyroid and found that $^{197}HgCl_2$ concentrated in thyroid cancer. The diagnostic usefulness of ^{197}Hg scanning for various thyroid disease was studied.

Nine patients with thyroid cancer shown cold nodule with ^{131}I scanning were scanned after injection of $^{197}HgCl_2$. The positive scanning of tumor could be obtained in 8 out of 9 patients with thyroid cancer. Only one case having cystic degeneration showed negative scanning. Since two of 13 patients with thyroid adenoma revealed positive scanning, it may be possible to differentiate benign and malignant tumor of the thyroid.

In chronic thyroiditis, positive delineation was obtained in 6 out of 7 patients. It is impossible to differentiate from thyroid cancer by ^{197}Hg scanning alone, but it may be gener ally possible to differnatiate both disease by ^{131}I scintigram. In all patients with hyperthyroidism radiomercury did not concentrate in the thyroid gland.

These findings suggest that ^{197}Hg scanning may be a valuable diagnostic method for the detection of thyroid cancer.

Radioimmunoassay of Serum Triiodothyronine in Thyroid Diseases

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Serum levels of triiodothyronine (T_3) were determined in normal snbjects and patients with various thyroid diseases by radioimmunoassay using Dainabot's assay kit. The sensibility of the assay was at the level of 0.125 ng/ml. The presisions of intra-assay and inter-assay were 6.7% and 11.0% respectively.

The concentration of T_3 was 1.33 ± 0.27