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**THALLIUM-201 CHLORIDE SCINTIGRAPHY OF THYROID NODULES AND THEIR ACTIVITIES OF Na-K ATPase.**

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Thallium-201 is useful radionuclide for thyroid imaging. However, the mechanism of its accumulation into thyroid nodule has not been precisely elucidated. We determined Na-K ATPase activities of thyroid nodules and normal thyroid glands. Thallium-201 accumulations of these thyroid tissues were analyzed from biochemical and pathohistological aspects, and a new knowledge was revealed.

Malignant thyroid nodules, showing high accumulation of thallium-201, have high activity of Na-K ATPase, while macroadenoma showed similar level of accumulations as normal thyroid gland and Na-K ATPase activities were also at similar level. On the other hand, tumours accumulating thallium adenoma has a strong activity of Na-K ATPase. It was called "fetal" type follicular adenoma in pathology.

Na-K ATPase is implicated in active transport of Na out of and K into the cells. Thallium, replaceable to potassium, had a greater affinity in activation of Na-K ATPase than potassium.

A mechanism of thallium-201 accumulation in thyroid scintigraphy based upon the Na-K ATPase is proposed.

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**DIFFERENTIAL DIAGNOSIS OF THYROID TUMORS BY Thallium-201 CHLORIDE DYNAMIC STUDY**


Tl-201-cl scintigraphy requires long time to get delayed images. So we try to distinguish whther malignancy or benignancy of thyroid tumors by using Tl-201-cl dynamic study in a short time. The method is that after Tl-201-cl is injected, dynamic study is performed for an hour, acquired data is inputed to computer, ROI is created at four points, tumor, normal lesion of tumor side, normal lesion of not tumor side, background and time-activity curve, background subtraction curve is made. By using two curves, we make four parameters and investigate them. They are Tm, T 1/2, Cp/Cn (peak count at tumor side divided that at not-tumor side), curve ratio curve (time-activity curve of count at tumor divided that at not-tumor side).

There are no difference in Tm and T1/2 between group a and group b but prolongation in group I, Cp/Cn of group a is high ratio, that of group b is low ratio. Count ratio curve of group b is all rightupcurve but there are rightupcurve in group a. In group b two is parallel curve and one is rightupcurve.

So we think, Cp/Cn and count ratio curve is useful to distinguish thyroid tumors.

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**TI-201 CI FUNCTIONAL IMAGE(WASHOUT RATE) IN THYROID NODULAR DISEASE.**


The purpose of this study is to differentiate malignant thyroid nodule from benign nodule using a washout curve of TI-201 CI functional image (washout rate). After i.v. injection of TI-201 CI, 10 min. and 120 min. images were obtained. With using data storing system of matrix size 128 x 128, 5 minutes of each images were stored.

Washout rate on each matrix was calculated by following formula, counts of 10 min - counts of 120 min/counts of 10 min (10).

Functional image of washout rate was demonstrated on color scale. 14 cases of thyroid cancer, 11 cases of benign thyroid nodule, 4 cases of chronic thyroiditis and 10 cases of control were examined.

The mean value of washout rate was 46.4 ± 18.3% in cancer nodule, 69.4 ± 13.5% in benign nodule, 56.4 ± 6.4% in chronic thyroiditis and 68.3 ± 6.9% in controls.

Regional washout rate study on thyroid nodule was very useful in differentiating malignant and benign nodule.

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**EVALUATION OF TI-201 SHORT DELAYED SCANNING IN THYROID TUMOR.**

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The remaining of thallium-201 chloride (TI-201) in the cells of almost nodular goiters is characteristic.

The subjects were 17 cases of malignant tumor and 29 cases of benign tumor consisted of 4 cases of thyroid cyst.

Using TI-201, the early (5 min.) short delayed (25 min.) scintigraphy and the subtraction were performed to differentiate the malignancy from the cold nodules on the T-139 or T-2-99m scintigraphy.

Compared were the retention of the TI-201 accumulation on the subtraction images of the pathological malignant and benign nodules of 27 cases accumulated of TI-201, consisted 15 cases of malignant tumor and 12 cases of benign tumor.

The TI-201 retention on the short delayed scintigraphy was seen in 12 cases (80%) of malignancy and in only 2 cases (17%) of benign.

The more retention in the part of nodules on the short delayed scintigraphy suspect the malignant nodules.