The Diagnostic Value of ^{131}I Scanning in Patients with Thyroid Nodule

R. Furihata
Professor Maruta's Surgical Clinic, Shinshu University, Matsumoto

Scintiscanning with radioactive iodine (^{131}I) was carried out in 251 patients with the single thyroid nodule (165 adenomas and 86 carcinomas) during the past 3 years. Nodules were loosely classified as being cold, warm or hot on the scan, and the results obtained are summarized as follows:

1) The scintigram of adenoma showed cold nodule in 68.5%, warm nodule in 29.7% and hot nodule in 1.8%, and that of carcinoma showed cold nodule in 88.4% and warm nodule in 11.6%.

The cold nodule predominates in the both of adenoma and carcinoma, but it is more frequently seen in carcinoma than in adenoma. Scince no hot nodule is seen in carcinoma, it has no chance of malignancy.

2) The cold nodule which is smaller than 2cm. in diameter was seen in 33.2% of adenoma and in 64.2% of carcinoma. Therefore, if the smaller nodule than 2 cm. in diameter is cold on the scan, the chances of it being malignant are much greater. However, the larger warm nodule has little chance of malignancy.

3) Since the cold nodule at the upper part of the lobe is seen in 42.9% of adenoma and in 93.9% of carcinoma, and carcinoma is much frequently located at the upper part of the lobe as compared with adenoma, the cold nodule located there is hgihly suspected as being malignant.

4) In order to clarify the relationship between the findings on the scan and content of iodinated compounds in the nodular tissue, the following studies were performed.

In the studies on in vivo organification of iodide investigated by means of ^{131}I paper chromatography, organification of iodide was observed to be slightly inhibited in colloid adenoma and to be remarkably inhibited in tubular adenoma as well as papillary carcinoma. No iodinated compounds were observed in trabecular adenoma and anaplastic carcinoma.

Furthermore, thyroglobulin in the nodular tissue was isolated in the analytical ultracentrifuge, and it was revealed that thyroglobulin was decreased according to the grade of undifferentiation of thyroid tumor.

Thus, it appears that the variation of content of iodinated compounds in the nodular tissue displays the findings on the scintigram.

The Clinical Significance of RI Scanning and its Limitation (2) Thyroid Gland

K. Ito
Ito Hospital, Tokyo

The differential diagnosis for goiter and thyroid cancer can be easily made by palpation in most cases. Some of them, however, are hard to be diagnosed. Those examples may be found in cases of early-stage cancer, and the cases with advanced adhesion of goiter. Therefore, the effectiveness of thyroid scintigram in diagnosis may be found in its application to the cases which cannot be differentiated by palpation.

I classify the scitigram of thyroid phyma into the following three types, cold nodule, hypertrophy, and hot nodule. Cold nodule is subvided furthermore into five types according to its shape of defects or of margins, or whether or not light shadows can be seen on

its defect. Hypertrophy is also classified into three types according to the shape of defect.

I examined our scintigram of past one and a half year, which includes 403 cases of cancer. In adenoma, cold nodule and hypertrophy with light shadows were most frequently found, while, in cancer, phagedenic defect and total defect of hemithyroid were observed many in number.

Regarding the defect from phyma size, it appears clearly when a phyma grows as big as a pigeon or a chicken egg. But, in the case with small adenoma, a defect can hardly be characterized.

Observing in relation to the site of a phyma; a defect can be seen most clearly when a phyma is located at the pole, whereas in the cases in which it is in the center of the thyroid, the recognition of a defect by scintigram is most difficult.

As for its relation to adhesion and infiltration, some difference could be found between the defects of cancer and inflammation origin although both of them are phagedenic. Erroneous diagnosis in both cases mostly occures when palpation cannot be helpful. But this may be very useful method of differential diagnosis for the clinicians without much experience. The diagnosis by palpation may also be corrected by the employment of scintigram.

Studies on Thyroid Scintigram by ^{99m}Tc Pertechnetate

K. Torizuka

Central Clinical Radioisotope Division, Kyoto University Medical School, Kyoto

The present report deals with the applicability of ^{99m}Tc pertechnetate as an agent for thyroid scanning and its metabolic behaviour. ^{99m}Tc pertechnetate obtained by elution with hydrochloric acid from ^{99m}Mo absorbed on an alumina column. Within 30 minutes after the intravenous injection of 1 mCi of ^{99m}Tc pertechnetate, the thyroid uptake reaches its maximum, while after oral administration it requires 3 hours. A clear distinction was observed between hyperthyroidism and euthyroidism or hypothroidism 30 minutes after intravenous injection and ^{131}I uptake 30 minutes and 24 hours after intravenous injection. The thyroid 30 minute-uptake of ^{99m}Tc also correlated well with the ^{131}I-T_3 resin uptake. These uptake tests, therefore, are considered to be useful in the quick diagnosis of hyper- and hypo-or euthyrodism. Suppression tests with triiodothyronine or potassium thiocyanate gave comparable results with those obtained with ^{131}I. Thyroid 24 hour-uptake of ^{131}I varied with the amount of iodine intake, that is; it was decreased when the daily iodine intake over 500 μg. On the other hand, the 30 minute- or 3 hour-uptake of ^{99m}Tc showed almost no variation with changes of iodine intake. ^{99m}Tc pertechnetate produced significantly better thyroid scans with excellent resolution than ^{131}I. The advantages of ^{99m}Tc pertechnetate appear to be due to its physical characteristics; that is, its short half life of six hours and pure gamma emission of 140 KeV.