

Nuclear medicine diagnostics of diseases affecting endocrine glands

Basic diagnostic methods:

Scintigraphy of the thyroid

Determination of iodine uptake by the thyroid

Scintigraphic imaging of adenomas of the parathyroid glands.

Scintigraphy of adrenal cortex.

Scintigraphy of adrenal medulla.

Scintigraphy of the thyroid gland

Radiopharmaceuticals:

^{131}I -sodium iodide

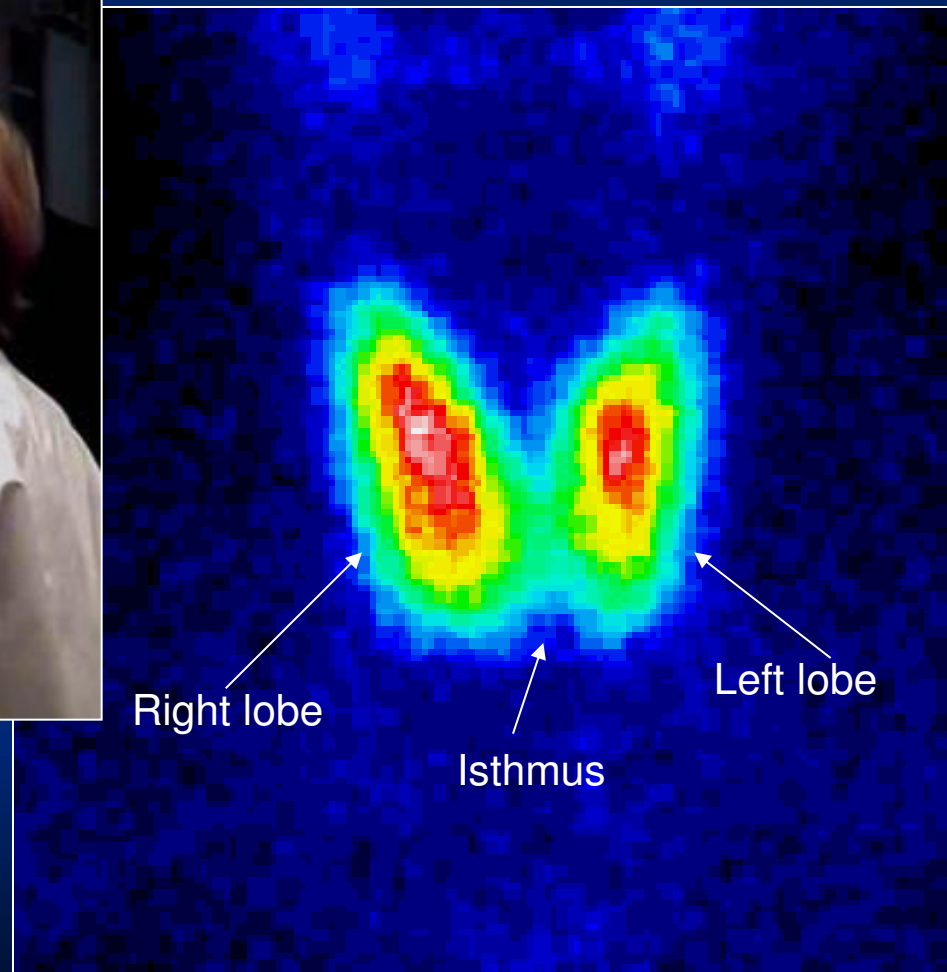
^{123}I -sodium iodide

$^{99\text{m}}\text{Tc}$ -pertechnetate.

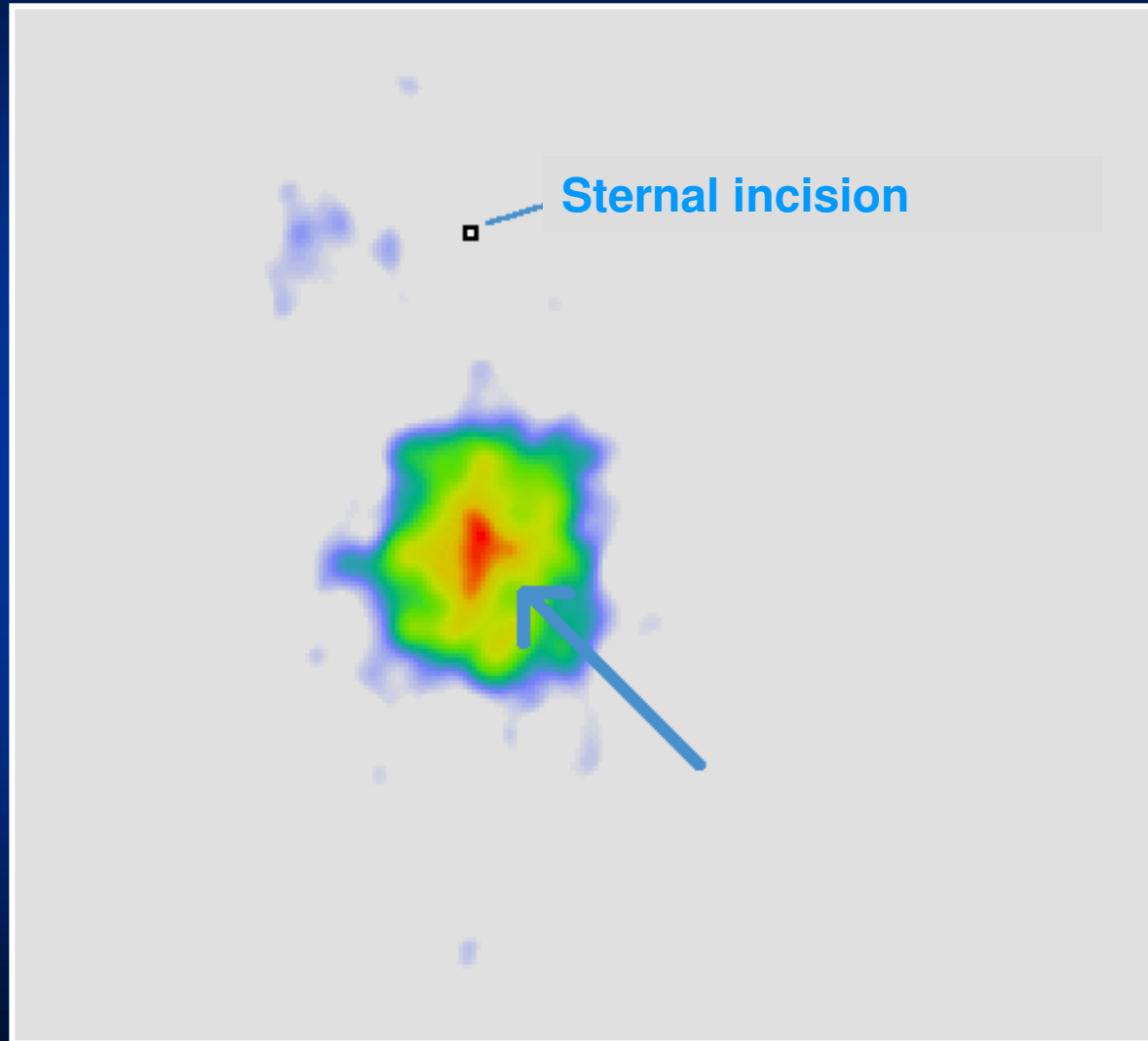
Clinical applications:

1. Localization of tissue with iodine affinity.
2. Specific differential diagnosis of thyroid nodules (adenomas vs. carcinomas).
3. Aid in interpretation of thyroid ultrasound examination.

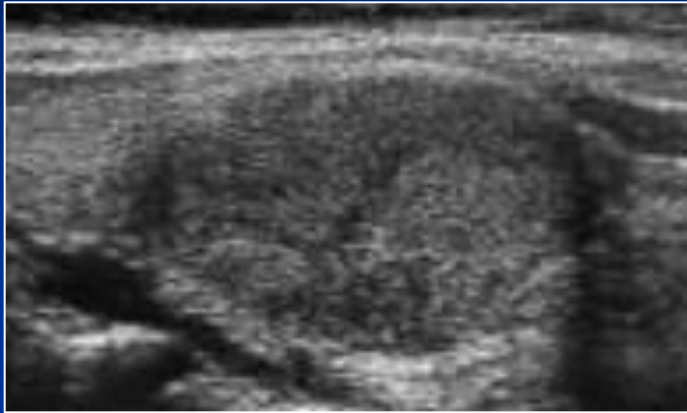
A normal thyroid gland scintigram



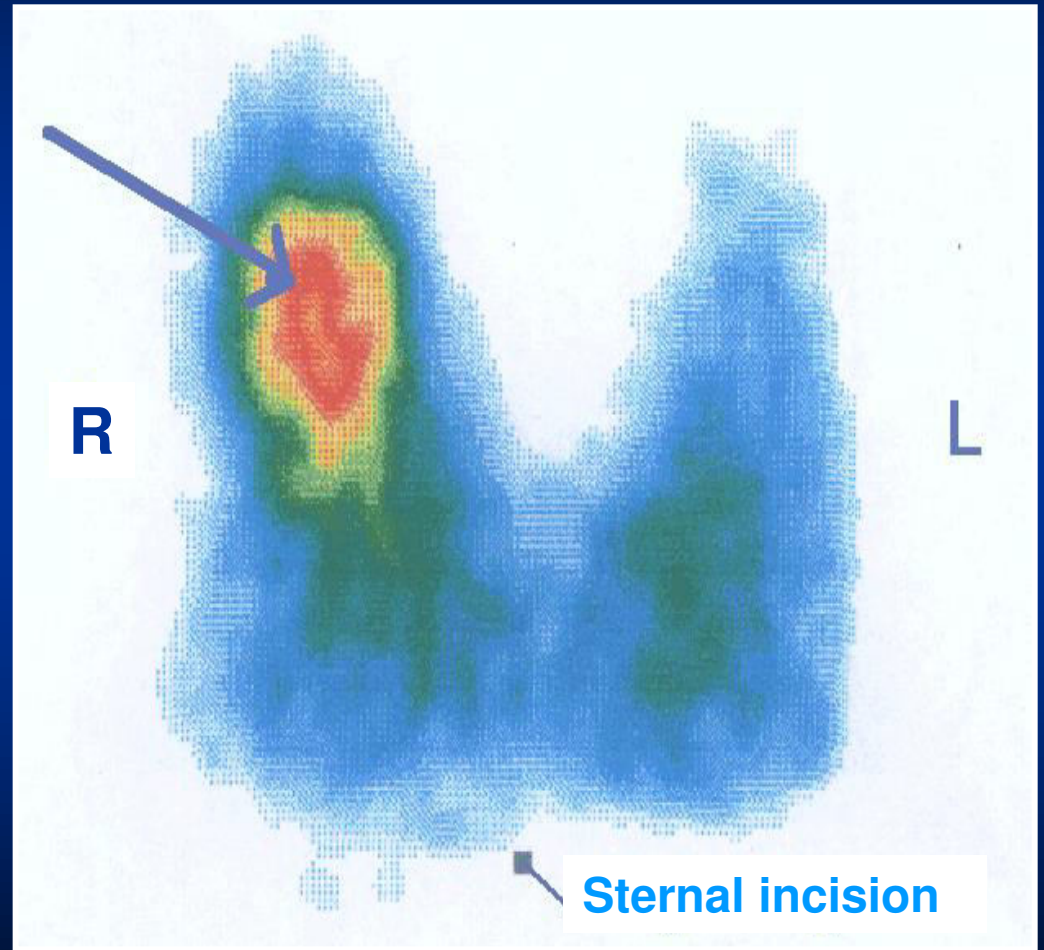
Ectopic localisation (retrosternal) of iodoaffinic tissue



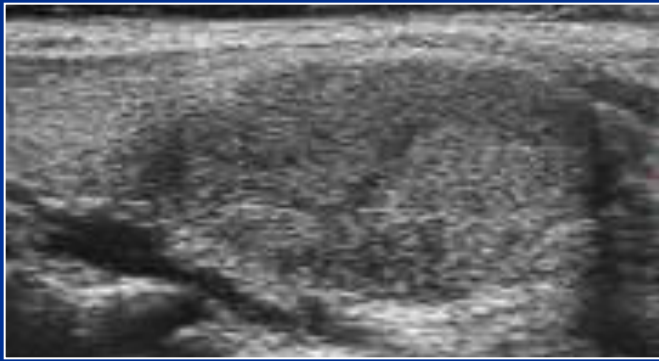
Hyperthyroidism – autonomous adenoma (hot nodule)



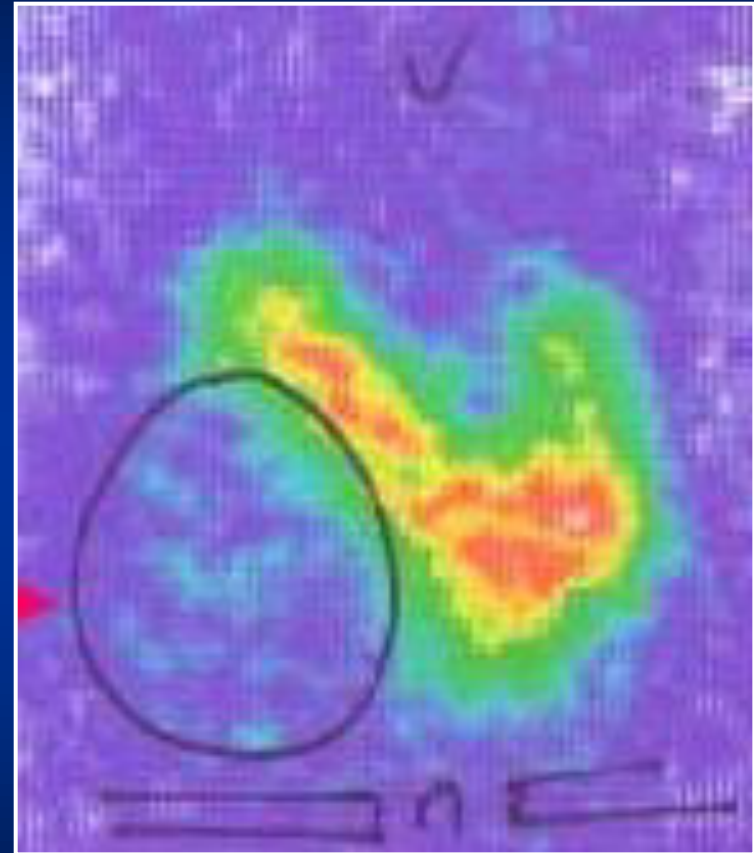
US study –
hypoechoic nodule



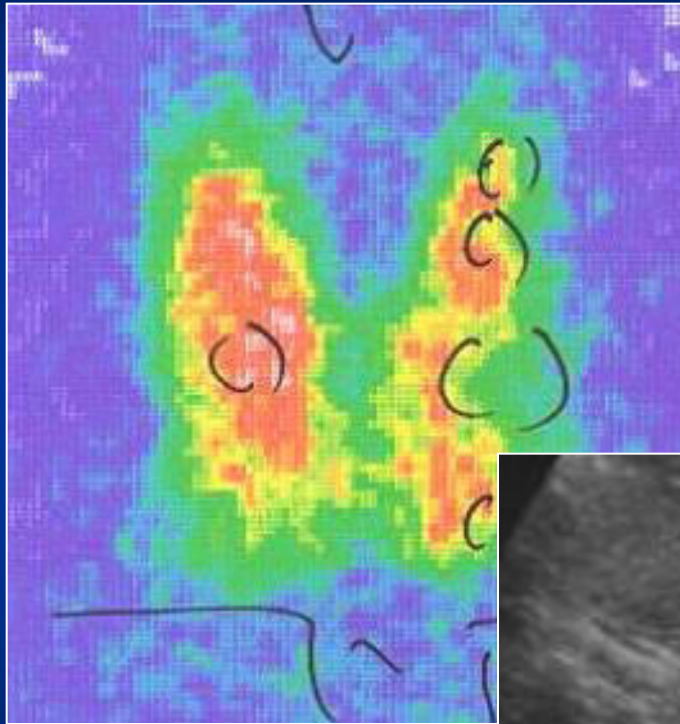
Hormonally inactive thyroid nodule (cold nodule)



US study – hypoechoogenic nodule of uniform structure



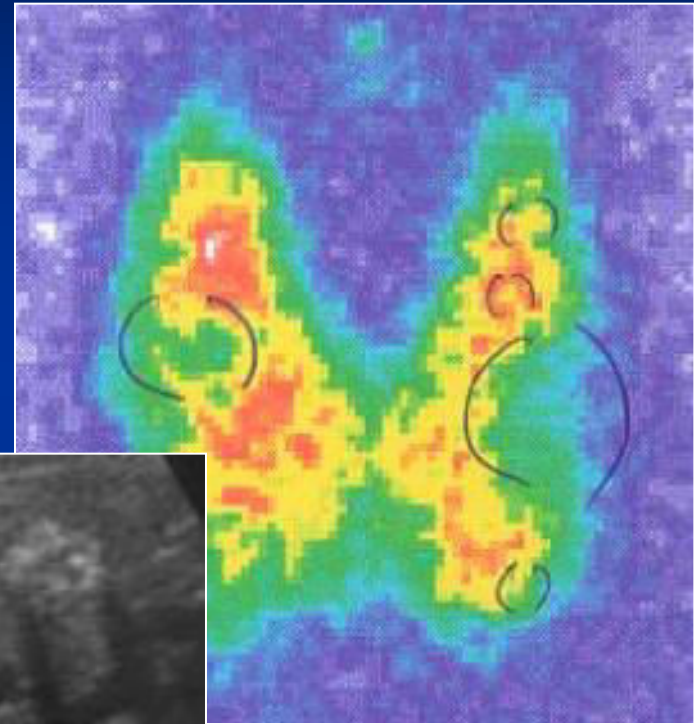
Multinodular, hormonally inactive goiter – cold nodules



Starting examination

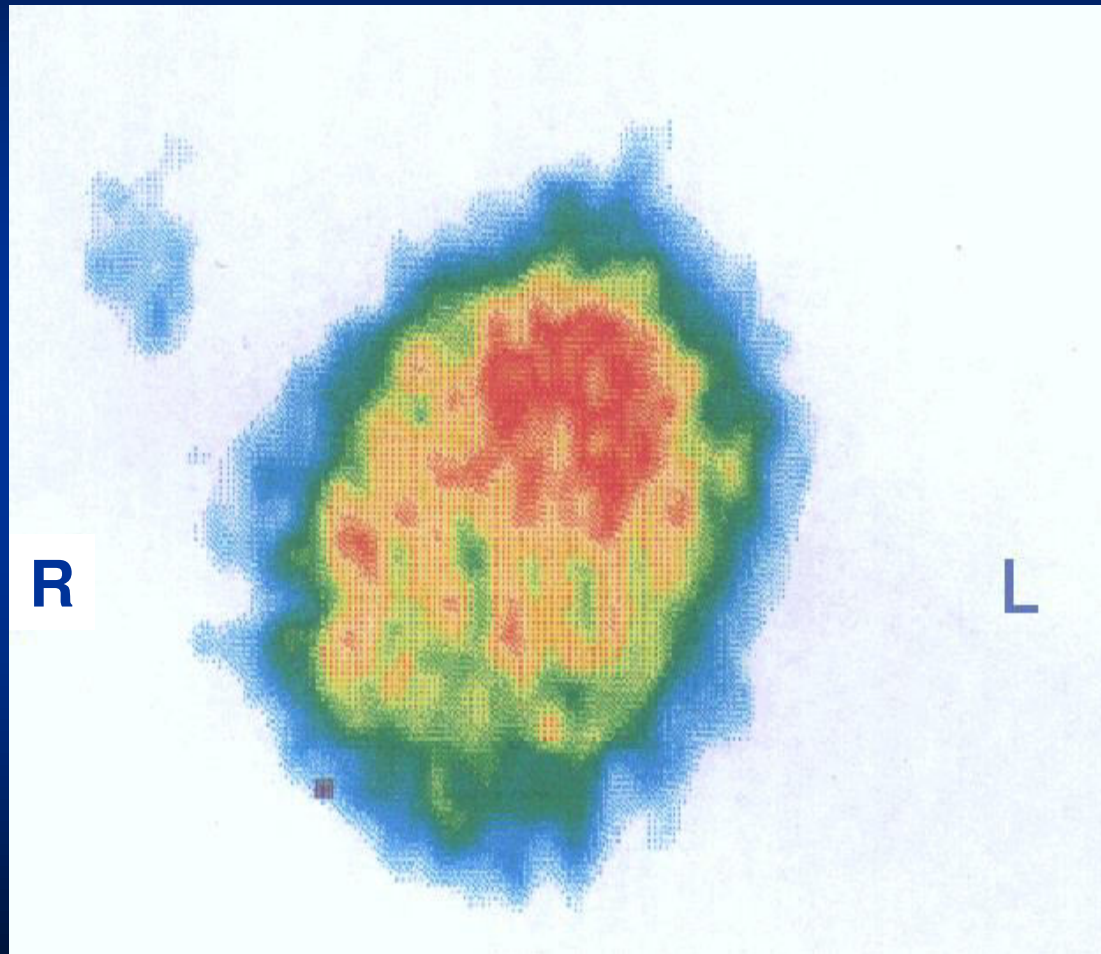


US study –
hyperechogenic nodules



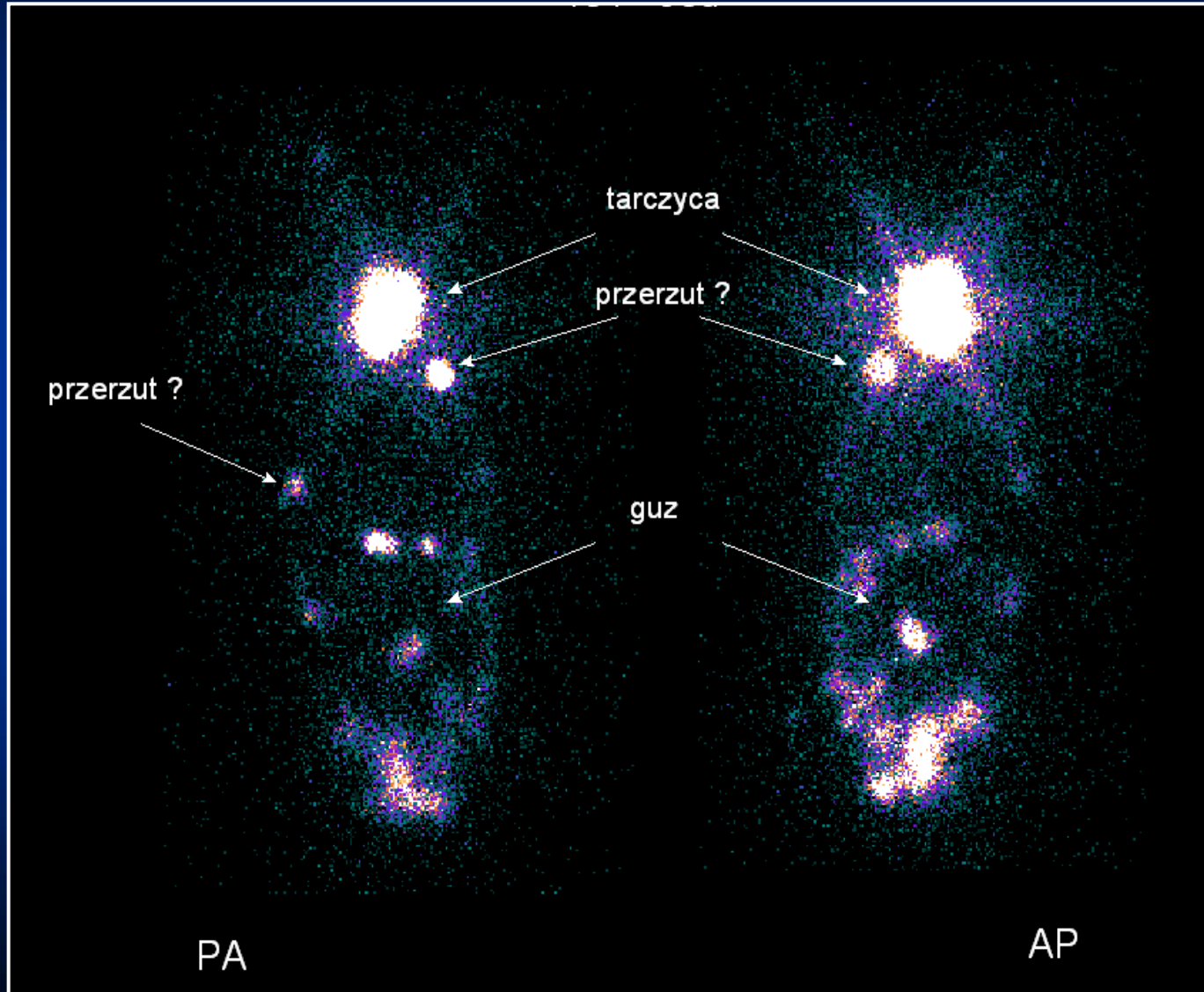
Two years later
(no progress)

Autonomous adenoma (hot nodule)



Thyroid carcinoma – staging of the disease (wide spread metastases)

Whole body scintigraphy



Determination of iodine uptake by the thyroid.

Radiopharmaceuticals:

Sodium iodide labeled with ^{131}I or ^{123}I

Indications: determination of iodine retention in the thyroid, used for calculation of therapeutic activity of ^{131}I .

Scintigraphic imaging of parathyroid adenomas.

Radiopharmaceuticals:

^{99m}Tc -MIBI,

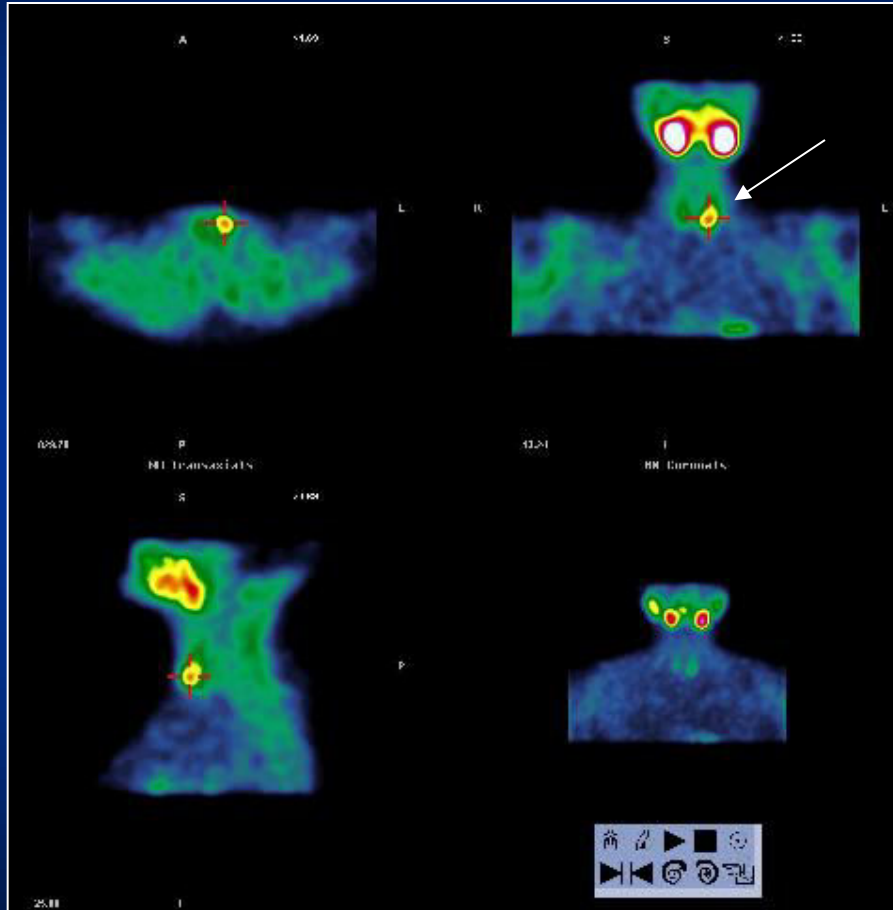
^{201}Tl -Thallium chloride

Clinical applications:

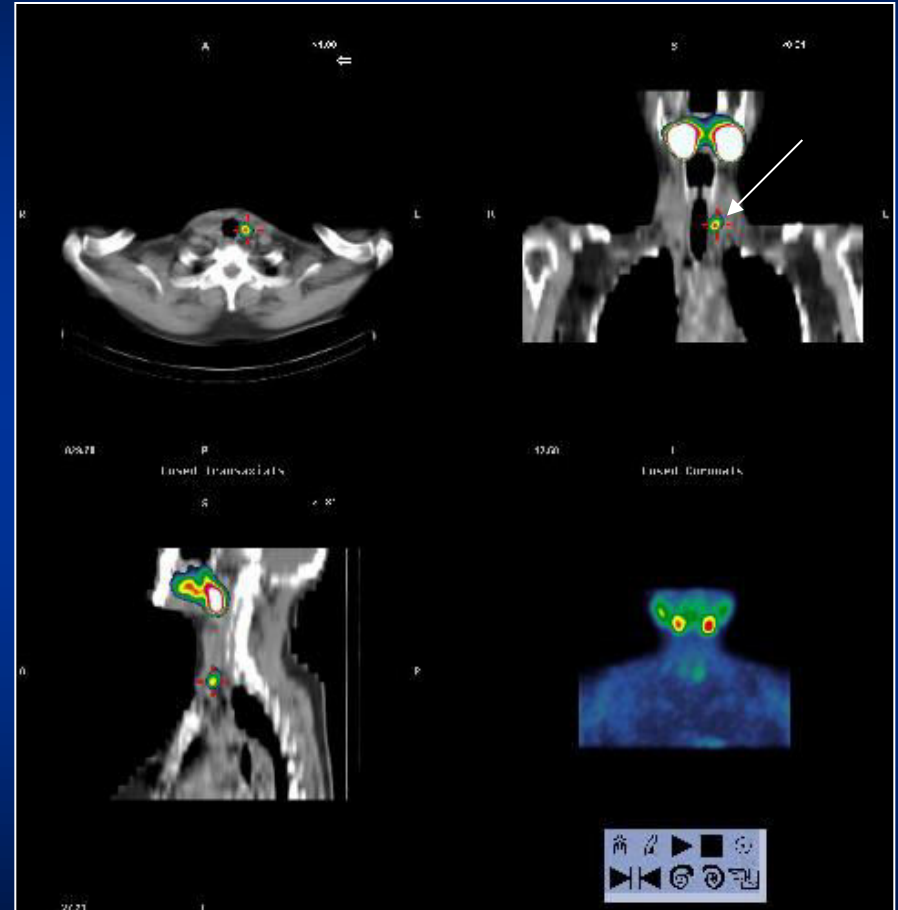
Detection and localization of hormonally hyperactive parathyroid glands or adenomas.

Parathyroid glands

Adenoma of a gland

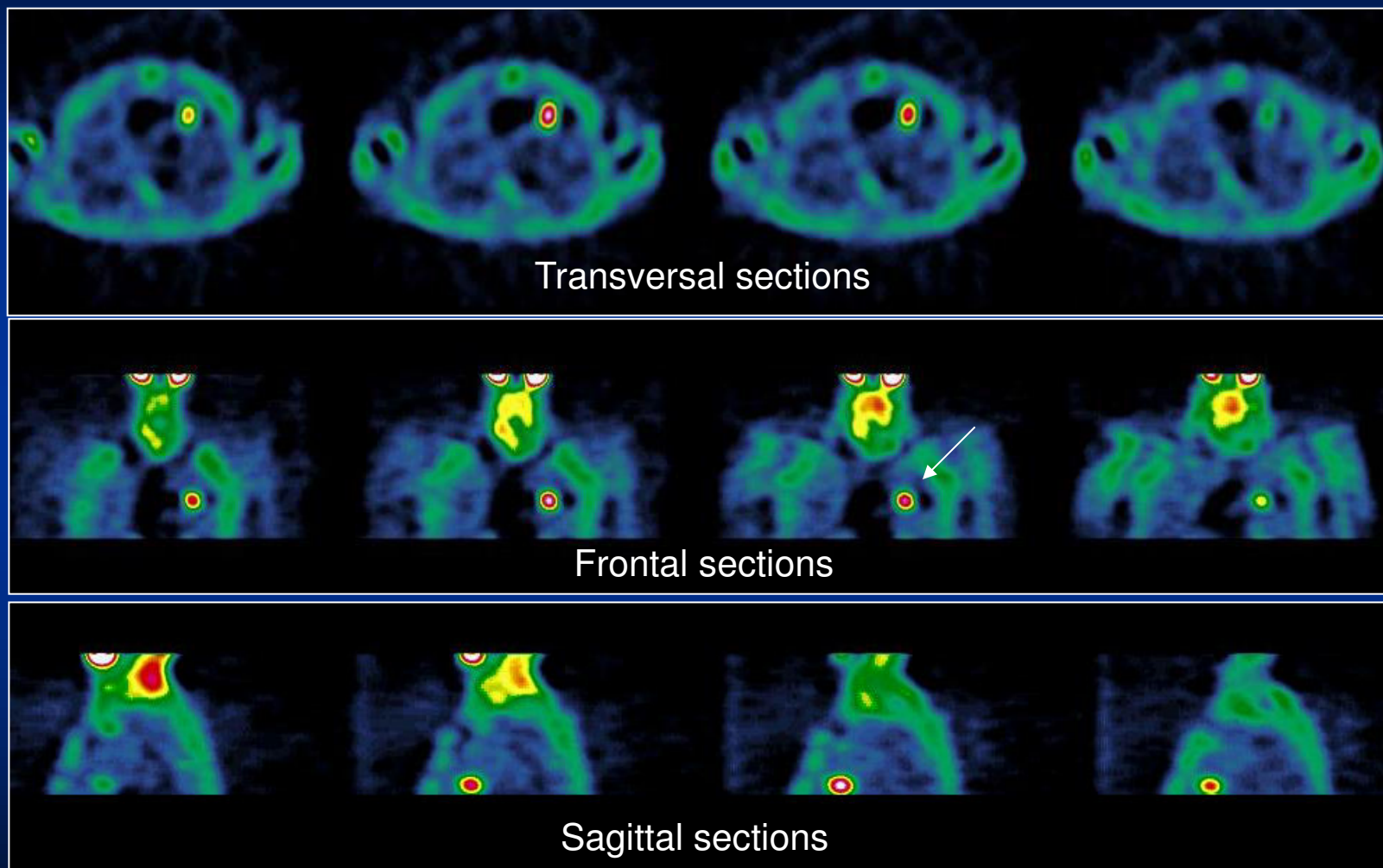


SPECT



SPECT/CT

Parathyroid adenoma – ectopic localization in the thorax



SPECT

^{99m}Tc -MIBI

Scintigraphy of adrenal cortex.

Radiopharmaceuticals:

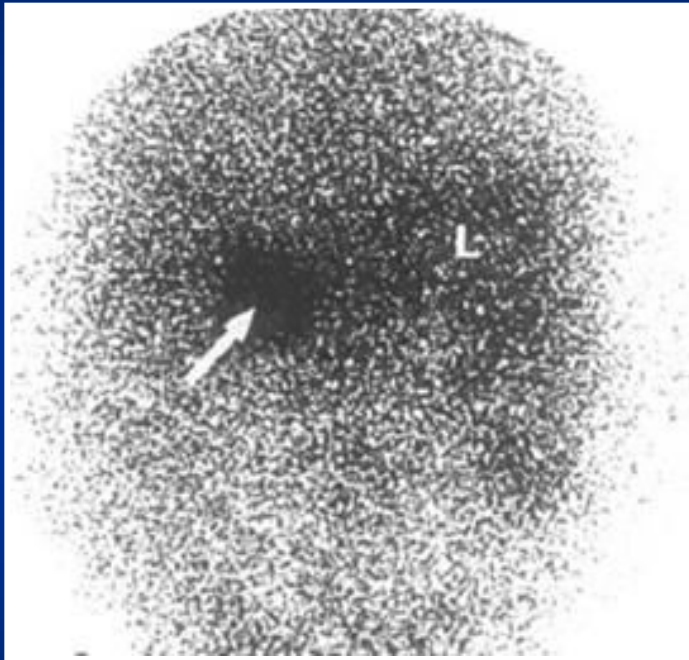
^{131}I -cholesterol,

^{75}Se -cholesterol

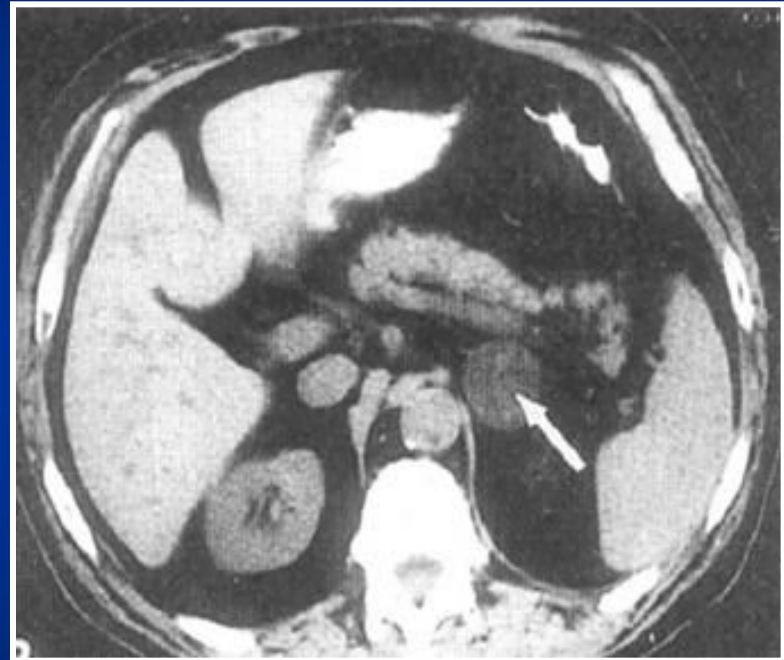
Clinical applications:

1. Differential diagnosis of the Cushing syndrome.
2. Differential diagnosis of the Conn syndrome.

Cushing's syndrome (adrenal adenoma)



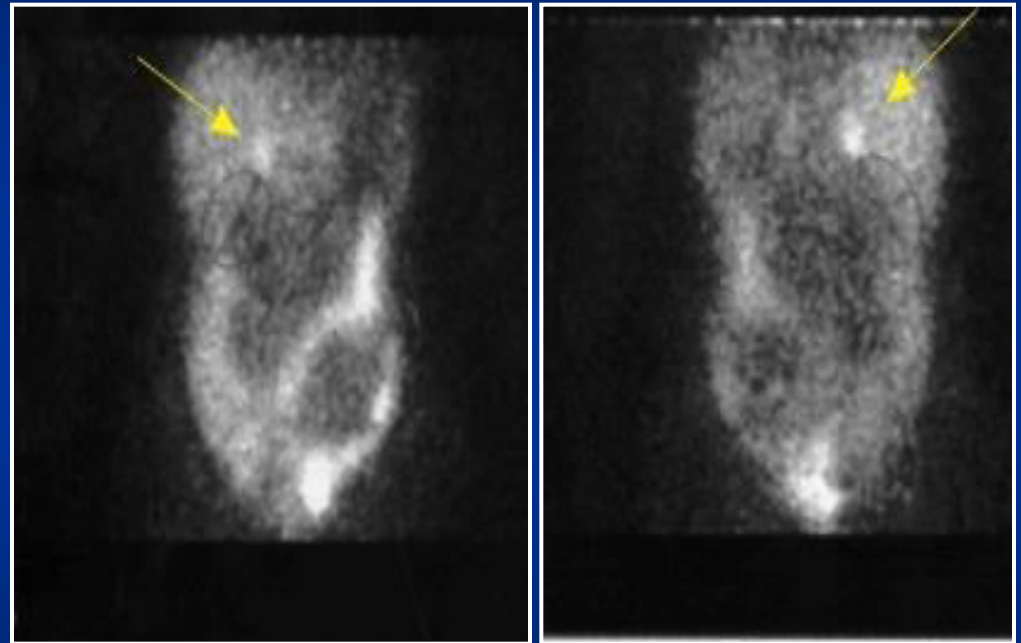
AP



Conn's syndrome (adrenal adenoma)



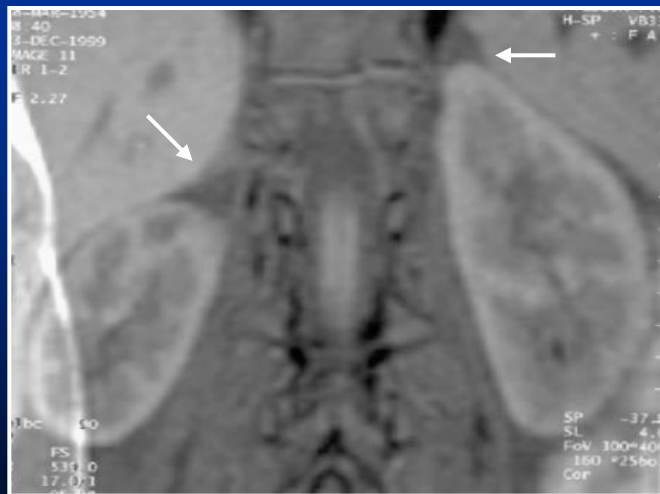
CT – normal view of adrenal glands



AP

PA

Active accumulation of RPh in the right adrenal – small adenoma



MRI – normal view of adrenal glands

¹³¹I-Cholesterol

Scintigraphy of adrenal medulla

Radiopharmaceuticals:

^{131}I or ^{123}I labeled MIBG (metaiodobenzylguanidine)

Clinical applications:

Suspected tumors of chromaffine tissue, detection and localization of tumors originating from the adrenal medulla.

Carcinoma of adrenal medulla

