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.

Nuclear medicine diagnostics of diseases affecting endocrine glands
Scintigraphy of the thyroid gland

Radiopharmaceuticals:

$^{131}$I-sodium iodide

$^{123}$I-sodium iodide

$^{99m}$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

- Right lobe
- Left lobe
- Isthmus

131Ina
Ectopic localisation (retrosternal) of iodoaffinic tissue

Sternal incision
Hyperthyroidism – autonomous adenoma (hot nodule)

US study – hypoechogenic nodule

Sternal incision

Sternal incision
Hormonally inactive thyroid nodule (cold nodule)

US study – hypoechogenic 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

PA

AP

tarczyca

przerzut ?

przerzut ?

guz

131INa
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

$^{99m}$Tc-MIBI
Parathyroid adenoma – ectopic localization in the thorax

Transversal sections

Frontal sections

Sagittal sections

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)

\[1^{31}\text{I}-\text{Cholesterol (Norcho1)}\]
Conn’s syndrome (adrenal adenoma)

CT – normal view of adrenal glands

MRI – normal view of adrenal glands

Active accumulation of RPh in the right adrenal – small adenoma

$^{131}$I-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