THYROID IMAGING STUDY  
(Iodine-123)  
(No RAIU)
Radiology Associates of Clearwater

Overview

The Thyroid Imaging Study with radioiodine demonstrates the distribution of functioning thyroid tissue, including ectopic tissue, since thyroid tissue is the only tissue that concentrates large amounts of iodine.

Indications

Evaluation of palpable nodules (1-2).

Evaluation of an abnormal gland to palpation, but without definite nodules (1,3).

Evaluation of patients who had irradiation of the head and neck in childhood with or without palpable nodules (4,5).

Evaluation for ectopic thyroid tissue, e.g. struma ovarii (image over pelvis) and lingual thyroid (image upper neck and jaw).

*Exams ordered for indications which are not listed above need to be discussed with the Nuclear Medicine Physician.

Examination Time

Initially: 20 minutes for radiopharmaceutical administration.

Imaging at 6 (scan only) or 24hours (with uptake): 1 hour.

Patient Preparation (6)

The patient must be off thyroid hormones:
1. Thyroxine (T-4) for at least 10 days.
2. Triiodothyronine (T-3) for at least 3 days.

The patient must not be taking antithyroid medications:
1. Propylthiouracil (PTU) and tapazole for at least 3 days.

The patient must not have had intravenous or intrathecal iodinated contrast material (IVP, CT with contrast, myelogram, angiogram) for at least 3 weeks.
The technologist records a pertinent, standard history on the Thyroid Information Sheet (see below). The nuclear medicine physician records his/her palpation findings on the same form.

**Equipment & Energy Windows**

- Gamma camera: Small or large field of view.
- Collimator: Pinhole with 5 mm insert.
- Energy windows: 20% window centered at 159 keV.

**Radiopharmaceutical, Dose, & Technique of Administration**

- Radiopharmaceutical: I-123 as sodium iodide (7-9). (* A written directive is required prior to administering)
- Dose: 100-200µCi.
- Technique of administration: Oral.

**Patient Position & Imaging Field**

- Patient position: Supine.
- Imaging field: Neck.

**Acquisition Protocol**

- Begin imaging 6 hours after ingestion of the radiopharmaceutical (scan only) or 24 hours (In conjunction with uptake).
- Acquire a 5 minute ANT image with the distance between the collimator and patient's neck adjusted so that the thyroid gland fills three quarters of the field of view. Use the persistence scope to determine this distance.
- Acquire 5 minute RAO and LAO oblique images at 35°; again with the thyroid gland filling approximately three quarters of the field of view (11).
- If there is a palpable nodule, an additional 5 minute ANT image should be acquired:
  1. The nuclear medicine physician places a mark on the patient's skin directly over the center of the palpable nodule.
  2. The technologist then places a radioactive marker on top of the skin mark.
3. An image may now be exposed or, if the camera is equipped with an
electronic marker, the electronic marker can be aligned with the
radioactive marker, the radioactive marker removed, and then an
image exposed.
4. In either case, the camera must be positioned so that its central ray
(a line perpendicular to the crystal and passing through the pinhole)
passes through the palpable nodule (12).

**Data Processing**

None.

**Optional Maneuvers**

Evaluation of midline activity: If the images show midline radioactivity which
may be due to radioactive saliva, have the patient swallow water and repeat
the image.

Imaging of suppressed thyroid tissue with Tl-201 (13):
1. Perform at least 1 day after I-123 study.
2. Inject 2 mCi thallous Tl-201 chloride intravenously.
3. At 15 minutes acquire a 10 minute ANT image of thyroid using a
pinhole collimator.

Thyroid suppression test (14):
1. Performed to determine if a functioning nodule is autonomous.
2. Place the patient on 25 µg of triiodothyronine four times a day for
three days and repeat the thyroid imaging study.

**Principle Radiation Emission Data - I-123** (15)

Physical half-life = 13.2 hours.

<table>
<thead>
<tr>
<th>Radiation</th>
<th>Mean % per disintegration</th>
<th>Mean energy (keV)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Gamma-2</td>
<td>83.3</td>
<td>159.0</td>
</tr>
<tr>
<td>ce-K, gamma-2</td>
<td>13.6</td>
<td>127.2</td>
</tr>
</tbody>
</table>

**Dosimetry - I-123 as Sodium Iodine** (16,17)

<table>
<thead>
<tr>
<th>Organ</th>
<th>rads/500 µCi</th>
<th>mGy/18.5</th>
</tr>
</thead>
<tbody>
<tr>
<td>Thyroid</td>
<td>3.75</td>
<td>37.5</td>
</tr>
<tr>
<td>Tissue</td>
<td>53-I-123</td>
<td>123-I-123</td>
</tr>
<tr>
<td>----------------------</td>
<td>----------</td>
<td>-----------</td>
</tr>
<tr>
<td>Stomach wall</td>
<td>0.12</td>
<td>1.2</td>
</tr>
<tr>
<td>Ovaries</td>
<td>0.02</td>
<td>0.2</td>
</tr>
<tr>
<td>Red marrow</td>
<td>0.02</td>
<td>0.2</td>
</tr>
<tr>
<td>Liver</td>
<td>0.01</td>
<td>0.1</td>
</tr>
<tr>
<td>Whole body</td>
<td>0.01</td>
<td>0.1</td>
</tr>
<tr>
<td>Testes</td>
<td>0.01</td>
<td>0.1</td>
</tr>
</tbody>
</table>

References


Normal Findings


JSM PROTOCOL\04-1
Rev. 10/14/14

Note: This protocol is in agreement with the Society of Nuclear Medicine Procedure Guidelines Manual, Feb 1999.
Has the patient taken thyroid hormones or antithyroid medicines? Yes___ No___
Has the patient had any x-ray contrast studies in the last month? Yes___ No___
If the patient is having an uptake study, have he/she eaten since last night? Yes___ No___

Additional pertinent thyroid history:
__________________________________________________________________
__________________________________________________________________
__________________________________________________________________

Technologist_________________________________
__________________________________________________________________

PHYSICIAN TO COMPLETE

Neck Palpation Diagram  Check as Appropriate

Normal ___
Size X1___, X1.5___, X2___, X3___
Contour: smooth___, irregular___
multinodular___
Firmness: normal___, firm___, hard

Single Nodule____
Moves With Swallowing___
Firm___
Gland Tender___

_______________________  Physician