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 hyperthyroidism.
• Evaluation of enlarged glands or glands with nodules.
• Evaluation of patients who had irradiation of the head and neck in childhood with or without palpable nodules.
• Evaluation for ectopic thyroid tissue, e.g. struma ovarii (image over pelvis) and lingual thyroid (image upper neck and jaw).
• Evaluation of congenital hypothyroidism.

Examination Time

• Initially: 15 minutes for radiopharmaceutical administration.
• Imaging at 24 hours: 60 minutes.

Patient Preparation

• The patient must be off thyroid hormones:
  1. Thyroxine (T-4) for 4 - 6 weeks.
  2. Triiodothyronine (T-3) for at 2 weeks.

• The patient must not be taking antithyroid medications:
  1. Propylthiouracil (PTU) and Tapazole for at least 7 days.

• The patient must not have had intravenous or intrathecal iodinated contrast material (IVP, CT with contrast, myelogram, and angiogram) for at least 4 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.

• TSH and T4 panel results.

**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.

• Dose: 190 – 270 uCi (7 - 10 MBq). Pedi by NACG chart.

• Technique of administration: Oral.

**Patient Position & Imaging Field**

• Patient position: Supine with the chin tilted up.

• Imaging field: Neck.

**Acquisition Protocol**

• Begin imaging 24 hours after ingestion of the radiopharmaceutical.

• Acquire 10 minute Anterior, RAO, and LAO images of the thyroid with the collimator 3 inches from the patient’s neck.

• Have Radiologist review images for any history of nodules or mass

**Protocol Summary Diagram**

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I-123 sodium iodide

Action

Time 0 24 hr.

Delayed pinhole images
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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.

Method for timely correction of Data Analysis and reporting errors and notification of referring parties

- Data Analysis and reporting errors are reported to the interpreting physician and appropriate clinic manager for timely correction and notification of the referring physician via report addendum or STAT call if error is significant.

Principle Radiation Emission Data - I-123

- 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

<table>
<thead>
<tr>
<th>Organ</th>
<th>rads/500 µCi</th>
<th>mGy/18.5 MBq</th>
</tr>
</thead>
<tbody>
<tr>
<td>Thyroid</td>
<td>3.75</td>
<td>37.5</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>
NUCLEAR MEDICINE THYROID DATA SHEET

Patient MRN_______________________ Date____________________________

Patient ____________________________________________________________

Referring Physician ______________________________

Test Ordered _______________________________________________________

_____ Thyroid Medication _________________________________

_____ Other Medications

_____ RAI DX/RX (When & Where) ______________________________

_____ Thyroidectomy

_____ Imaging in the last 30 days? Type of Exam(s) __________________________

_____ Myelogram, CT with IV contrast, IVP, Arteriogram, Cardiac Cath?

_____ Family history of Goiter or other thyroid problems?

_____ Pregnant? ______ Nursing? _____________LMP? ________

_____ Recent female hormones?

_____ Lump or Goiter? (how long have you noticed?) _______________________

_____ Recent change?

_____ Weight change? (how much, what time period?) _______________________

_____ Exophthalmus or pressure? (how much, how long?) __________________

_____ Pain in lower neck, sore throat, dysphagia? _________________________

_____ Other remarks: ________________________________________________

Date: ____________

Radioisotope: I-123

Patient Dose: _________________________uCi @ ___________________________(Time)

2 minute counts – aperture out:

Pill ____________________ - Background _________ = ____________________ @ __________(Time)

Decayed to administration ______________________ cts @ ______________________(Time)

Decayed to 24 hours ______________________ cts (x .284)

Decayed to 4 hours ______________________ cts (x .811)

Uptake formula: \[
\frac{\text{Neck counts} - \text{Leg counts}}{\text{Decayed Pill counts}} \times 100 = \text{Uptake \%}
\]

4 or 24 Hr. \[
\frac{\text{Uptake counts}}{\text{Decayed Pill counts}} \times 100 = \text{Uptake \%}
\]

24 Hr. normal: 15 - 35% 

4 Hr. normal: 5 - 20%