PARATHYROID STUDY – SPECT/CT

Radiology Associates of Clearwater

Overview

The Parathyroid Study depicts hypertrophied parathyroid tissue, probably because of uptake of Tc-99m-sestamibi in the mitochondria of hyperactive cells.

Indications

Detect and localize parathyroid adenomas (1-3).

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

Examination Time

Initially: 60 minutes.

Delayed imaging at 2 hours: 30 minutes.

*Patients who are getting a pre-op injection will only require a single image at 15 minutes.

Patient Instructions

None

Lab / Image Correlation

Any imaging studies if the neck should be included for comparison.

Patient Preparation

Remove all jewelry from the head and neck.

Equipment & Energy Windows

Gamma camera: Small or large field of view with 1.5 zoom (1) for planar.

Symbia SPECT/CT camera for SPECT.

Collimator: Low energy high resolution

Energy windows: 20% window centered at 140 keV.
Matrix 128x128 for planar and 256 x 256 for SPECT/CT

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

Radiopharmaceutical: Tc-99m-sestamibi (1,4).

Dose: 25 mCi (925 MBq).

Technique of administration: Standard intravenous injection.

**Patient Position & Imaging Field**

Patient position: Supine with head and neck extended (1).

Imaging field: Neck and upper two thirds of the mediastinum.

**Acquisition Protocol (1)**

Acquire images of the neck and mediastinum for 300 seconds each as follows:

1. Immediate ant. w/mkr on SSN and 4 cm distance mkrs on right side of neck.
2. Ant. at 5 min.
3. RAO at 10 min. at 34°
4. LAO at 15 min. at 34°
5. Chest at 20 min. – salivary glands to diaphragm.
6. 2 hr after injection, do planar images using 1,2,3,4 above.

*If this is a pre-op study only an anterior image is required. Do not Inject the radiotracer until called by Surgery to confirm the time of injection. After injection, document the time and date and send copies of the previous and current image with the patient to surgery.*

SPECT/CT at 90 minutes (5,6):

1. Degrees of rotation: 360
2. Number of images: 32 per head
3. Time per image: 30 seconds
4. CT at 2.5mA, 140kV, 256 x 256

Show images to the physician prior to the patient leaving.

**Data Processing**

SPECT PRocessing
- In category drop down select parathyroid
- Double click SPECT PROC icon
- Next click Tomo Reconstruction tab
- Verify Iterative Reconstruction OSEM 2D is being used
- Verify 4 subsets are being used
- Verify 10 iterations are being used
- Verify Gaussian filter at 8.0 is being used
- Changes Attenuation Coefficient 0.15
- Auto contours ON
- Projection Angles 2
- Edge Strength 0.5
- Background Threshold 5
- In 3D Orientation tab verify image is centered and adjust if necessary
- In Flexible Display tab adjust slices in transverse tab, coronal tab, and sagittal tabs across the top of screen
- Send to Dr. reading station and PACS

SPECT/CT Processing
- Select Patient
- In categories drop down select SPECT/CT
- In the first Tomo Reconstruction tab verify Filtered Back Projection is being used
- Butterworth filter order 5 cutoff 0.5
- Changes Attenuation Coefficient 0.15
- Auto Contours
- Projection angle 2
- Edge Strength 0.5
- Background Threshold 5
- Gaussian Slice Averaging # of slices 1
- In the second Tomo Reconstruction tab verify
- Flash 3D is being used
- 8 subsets
- 10 iterations
- Gaussian Filter at 8.4
- In Image Registration tab verify SPECT and CT images are aligned properly. Adjust if necessary.
- In Flexible Display tab verify image quality on cine
- In Hard Copy tab send to Dr. reading station and PACS
- Click complete
**Principle Radiation Emission Data - Tc-99m (11)**

Physical half-life = 6.01 hours.

<table>
<thead>
<tr>
<th>Radiation</th>
<th>Mean % per disintegration</th>
<th>Mean energy (keV)</th>
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<tbody>
<tr>
<td>Gamma-2</td>
<td>89.07</td>
<td>140.5</td>
</tr>
</tbody>
</table>

**Dosimetry - Tc-99m-Sestamibi (12)**

<table>
<thead>
<tr>
<th>Organ</th>
<th>rads/25 mCi</th>
<th>mGy/925 MBq</th>
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<tbody>
<tr>
<td>Upper large intestine</td>
<td>3.88</td>
<td>38.8</td>
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<tr>
<td>Lower large intestine</td>
<td>2.68</td>
<td>26.8</td>
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<tr>
<td>Gallbladder wall</td>
<td>2.41</td>
<td>24.1</td>
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<tr>
<td>Small intestine</td>
<td>2.32</td>
<td>23.2</td>
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<tr>
<td>Kidneys</td>
<td>1.39</td>
<td>13.9</td>
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<tr>
<td>Urinary bladder wall</td>
<td>1.29</td>
<td>12.9</td>
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<tr>
<td>Ovaries</td>
<td>1.02</td>
<td>10.2</td>
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<tr>
<td>Thyroid</td>
<td>0.68</td>
<td>6.8</td>
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<tr>
<td>Red marrow</td>
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<td>6.0</td>
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<tr>
<td>Whole body</td>
<td>0.38</td>
<td>3.8</td>
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<tr>
<td>Liver</td>
<td>0.36</td>
<td>3.6</td>
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<tr>
<td>Testes</td>
<td>0.24</td>
<td>2.4</td>
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**References**


Normal Findings


Note: This protocol is in agreement with the Society of Nuclear Medicine Procedure Guidelines Manual, 1999.