Radiopharmaceutical 1: Tc99m-Sestamibi
Radiopharmaceutical 2: Tc99m-Pertechnetate
Dose 1: 20 mCi
Dose 2: 10 mCi
T1/2: 6 hours
Energy: 140 keV
CPT: 78071
HCPCS: A9500 (Tc99m-Sestamibi); A9512 (Tc99m-Pertechnetate)

Indications:
1. To localize parathyroid adenomas or parathyroid hyperplasia in patients with hyperparathyroidism that is determined on the basis of elevated parathyroid hormone levels in the setting of an elevated serum calcium level.
2. Localization of hyperfunctioning parathyroid tissue in patients with persistent or recurrent disease.
3. Localization of ectopic tissue in patients previously diagnosed with hyperparathyroidism.

Patient instruction:
• Documentation of an elevated parathyroid hormone (PTH) or serum calcium level is necessary prior to performance of this test. Documented elevation of urinary calcium levels is preferred if other lab abnormalities are mild.
• Upon scheduling, if patient has any pertinent prior studies, please instruct either the patient or the physician's office to make those available for comparison.

Equipment:
1. Philips Skylight (VXUR collimator)
2. Philips Forte (VXUR collimator)
3. Philips Vertex Plus (VXUR collimator)

Procedure:
1. Set intravenous line for injection of radiotracer.
2. Inject 20 mCi Tc99m-Sestamibi, followed by at least 5 mL normal saline flush.
3. At 10 to 20 minutes post injection, acquire 600k counts in Anterior, **31°** RAO, and **31°** LAO projections of the neck and chest.
4. Immediately following static views, acquire SPECT scan of the neck and chest.
5. At 3 hours post injection, repeat the Anterior, **31°** RAO, and **31°** LAO views of neck and chest for 600k counts.
6. After the 3 views, and with patient still lying in the same position, inject 10 mCi Tc99m-pertechnetate.
7. At 10 to 15 minutes post injection, acquire 600k counts in the anterior projection of neck and chest.

Acquisition Parameters:
• Static Views:
VXUR (or VXUR) collimator.
Matrix: 256 x 256.
Zoom: 1.85 x (32.2) cm
Total counts: 600,000

• SPECT parameters:
VXUR (or LEUHR) collimator.
Matrix: 128 x 128

Zoom: 1 x (Full Field)
Number of angles: 128
Time/Angle: 20 sec (adjust, if necessary, for larger patients)
Detector relative angle: 180º
Starting angle: 0º
Rotation Direction: Clockwise (Counterclockwise by default for SKYLight)
Imaging Arc: 360º
SPECT Mode: Step
Orbit Type: Non-Circular

Processing:

1. LEFT click on AutoSPECT.
2. Select the PROJECTION EARLY dataset and LEFT click on PROCEED.
3. Load the proper reconstruction protocol (Parathyroid SPECT).
4. Ensure that there is no patient motion, if motion is greater than 0.5 pixels, then motion correct or repeat the SPECT scan.
5. On the Reconstruction tab, adjust the yellow lines to the top and bottom of the FOV and select RECONSTRUCT button at the top left of the screen.
6. Select the Reorient tab, and center the patient in the FOV, if necessary, by manipulating the blue arrows on the different projections (Azimuth, Elevation, and Twist) to the far right of the screen.
7. Adjust the yellow lines around the axial, coronal, and sagittal views, so as to eliminate any excess space around the patient.
8. On the Save tab, ensure the proper labeling, and slice thickness, for each image. If motion corrected, select the MoCo Raw option.
9. LEFT click on the SAVE button at the top right of the screen.
10. LEFT click on QUIT.
11. LEFT click on SPECT FRAME REVERSE.
12. Choose the AXIAL slices that you just created and left click on PROCEED.
13. After a few seconds, the reversed images will appear next to the original AXIAL images.
14. LEFT click on EXIT and then SAVE SELECTED AND PROCEED.
15. Do the same for the SAGITTAL slices.
16. LEFT click on REFRAME ULTRA DYNAMIC DISPLAY.
17. Choose the AXIAL_R images and LEFT click on PROCEED.
18. RIGHT click on SELECTION MENU and choose 3, the RIGHT click again and choose 3 STANDARD.
19. LEFT click on the 24-view display on the right of the screen. Place the images at a proper start and end point. Turn off the frames around the images by LEFT clicking on the ON/OFF button at the bottom right.
20. Window and level to the proper intensity. LEFT click on the annotation tool and choose the PARATHYROID_AX label.
21. LEFT click on the camera tool to take a snapshot of the image. LEFT click on QUIT.
22. Do the same for the CORONAL and SAGITTAL_R image sets.
23. LEFT click on the MD/MCD PHYSICIAN'S REVIEW button across the top of the screen.
24. Select the AXIAL image set (unreversed) and LEFT click on PROCEED.
25. LEFT click on 3D across the top and then on VOLUME on the right side of the screen.
26. Extend the green line from the middle of the AXIAL image from the center of the image to the edge. To do this, MIDDLE click in the center of the image and drag to the edge of the image.
27. Change the DEPTH to 128.
28. Change the VIEWS to 32.

29. LEFT click on CREATE.
30. Once created, LEFT click on SAVE. Leave the name as “VOLUME” and then LEFT click on PROCEED.
31. LEFT click on CANCEL, and then CANCEL again (at top right), and then QUIT.
32. LEFT click on ALL IMAGE DISPLAY and choose the RAO EARLY, LAO EARLY, RAO LATE, and LAO LATE images and the PROCEED.
33. Choose the 4-view layout.
34. Change the ZOOM to 1.0. LEFT click on ZOOM MATRIX button at bottom left and then RIGHT click on the SELECTION MENU and then RIGHT click on 1.25.
35. Adjust window and level to proper intensity.
36. Turn off the frames.
37. Annotate using the PARA_OBL label. Snapshot and QUIT.
38. Do the same for the ANT EARLY, ANT LATE, and ANT TcO4 images using the PARA_ANT image label. Snapshot and QUIT.
39. Double snapshot all static and SPECT snapshots.
40. DICOM send all double snapshots, the AXIAL_R, SAGITTAL_R, CORONAL, and PROJECTION image sets to PACS and put online in proper order for radiologist interpretation.