

Radiopharmaceutical: Tc^{99m}-Tetrofosmin (Myoview)

T1/2: 6 hours

Energy: 140 keV

Radiopharmaceutical dose:

- Resting Dose: 30 mCi Tc^{99m} -Tetrofosmin (Myoview).
- Stress Dose: 30 mCi Tc^{99m} -Tetrofosmin (Myoview).
- For patients under the age of 18, radiologist approval is needed.

CPT: 78452 (multiple SPECT); 78451 (rest OR stress SPECT – ONLY)

Indications:

Indications for myocardial perfusion imaging include, but are not limited to:

1. Detecting the presence, location, and extent of coronary artery disease.
2. Evaluating the physiologic significance or sequelae of coronary artery stenosis.
3. Monitoring the effects of treatment of coronary artery disease, including revascularization and medical therapy.
4. Detecting acute myocardial infarction.
5. Evaluating the viability of dysfunctional myocardium.
6. Stratifying risk of myocardial events.
7. Evaluating ventricular function (using gated images).
8. Determining prognosis after myocardial infarction.
9. Preoperative stratification of risk for adverse cardiovascular events during noncardiac surgery.

Contraindications:

Contraindications to the use of adenosine (Adenoscan) or regadenoson (Lexiscan) injection include:

1. Second- or third-degree AV block (except in patients with a functioning artificial pacemaker).
2. Sinus node disease, such as sick sinus syndrome or symptomatic bradycardia (except in patients with a functioning artificial pacemaker).
3. Known or suspected bronchoconstrictive or bronchospastic lung disease (e.g., asthma). (For adenosine only)
4. Known hypersensitivity to adenosine or regadenoson.
5. Methylxanthine use - Theophylline or caffeine preparations within 24 hours of the exam. These drugs are competitive inhibitors of adenosine receptors and may blunt the vasodilatory effect of adenosine.

Patient Instruction:

- No food or drink for 4 to 6 hours. Diabetics may need to skip their medications on the morning of the test. Follow cardiologist's instructions for cardiac medication intake.
- Nitroglycerin should be discontinued for 4 to 6 hours prior to test.
- No caffeine products for 24 hours prior to first appointment time. This includes decaffeinated products, since not all caffeine is removed. All medications and over the counter medicines should be checked, to be sure that no caffeine is in them. Common household products containing caffeine include:
 - Anacin
 - Excedrin
 - Fioricet
 - Cardiotea
 - Chocolate and all cocoa products

- Coffee, tea, and cola drinks
- Fiorinol
- Vivarin
- Energy drinks
- Repan
- Norgesic

DAY 1- Patient will be stressed using Adenosine or Lexiscan. During this procedure a 30 mCi dose of Tc^{99m}-tetrofosmin will be administered.

After completion of the stress portion the patient will be given a snack with a drink and will be instructed to return for final scan no less than 30 minutes after the tracer injection. Total time in department is 1 to 2 hours each day.

DAY 2- Patient will receive resting injection of 30 mCi of Tc^{99m}-tetrofosmin and then a scan will be performed at no less than 30 minutes after injection.

Technique for Adenosine (Adenoscan) Infusion:

1. A baseline blood pressure and 2 ECG tracings (baseline and valsalva) are recorded prior to the start of the procedure. Blood pressure and ECG tracings are to be checked once every 60 seconds, at minimum, or to record a specific event during pharmacologic stress.
2. The infusion rate for adenosine is typically 140µg/kg/min for 4 minutes. This may be reduced to 75-100 µg/kg/min if side effects are severe and the response is almost instantaneous. The formula for calculating the amount to be administered is:

$$\text{○ Patient's weight (in kilograms) } \times 0.19 \text{ (mL) } \times 3 \text{ (mg)}$$

3. Add enough 0.9% normal saline so that the total volume to be administered is 40 mL in a 60 mL syringe.
4. One 250 mL bag of 0.9% normal saline is delivered in conjunction with adenosine infusion.
5. 99mTc-tetrofosmin injection is given midway through the infusion (2 minutes), slowly, so as to avoid giving a bolus of adenosine when the tracer is administered.
6. Complete final 2 minutes of infusion, and turn off adenosine pump.
7. Aminophylline, or other antagonist, may be given in extreme cases where symptoms are severe, and are not resolving following cessation of Adenosine infusion.

Technique for Regadenoson (Lexiscan) Injection:

1. A baseline blood pressure and 2 ECG tracings (baseline and valsalva) are recorded prior to the start of the procedure.
2. Regadenoson is given as a standard dose of 0.4 mg/5 mL intravenously for any patient weight.
3. Administer Lexiscan as an IV injection over approximately 10 seconds into a peripheral vein using a 22-gauge or larger catheter or needle
4. Administer a 5-mL saline flush immediately after the injection of Lexiscan
5. Administer the radionuclide myocardial perfusion imaging agent 10-20 seconds after the saline flush. The radionuclide may be injected directly into the same catheter as Lexiscan.
6. Monitor blood pressure and ECG tracings every 60 seconds, at minimum, or to record a specific event, until symptoms resolve. This will typically occur by 3 minutes post Lexiscan injection.
7. Aminophylline, or other antagonist, may be given in extreme cases where symptoms are severe, and are not resolving after 3 to 5 minutes post Lexiscan injection.

Side Effects – Common benign effects:

- Side effects are very common and occur in about 80% of patients. Common side effects include, but are not limited to: decreased blood pressure, increased heart rate, chest pain, headache, flushing, and dyspnea (due to adenosine induced hyperventilation through stimulation of the carotid chemoreceptors). Chest pain is usually atypical and does not correlate with the presence of CAD. Ischemic ECG changes (ST depression) are seen in about 12% of patients and their presence is a strong indicator of coronary artery stenosis.

Equipment:

- Phillips Skylight – VXUR collimators
- Phillips Forte – VXUR collimators

Image Acquisition Parameters:

- Zoom: 1.46 x (40.9) cm
- Matrix size: 64 x 64
- Patient position: Supine
- Number of angles: 64
- Time per angle for Rest SPECT: **25** sec/stop
- Time per angle for Stress SPECT: **25** sec/stop
- Detector relative angle: 90 degrees
- Starting Angle: 0 degrees
- Rotation direction: Counterclockwise
- Orbit type: Non-Circular
- SPECT Mode (for Rest and Stress SPECT): Step
- Gated SPECT Parameters:
 - Images/Cycle: 8
 - % R-R Interval: 100
 - Arrhythmia Rejection: On
 - PVC Rejection: 1
 - Allowable Variance: 100%
 - Normalize: No

Processing Using AutoSPECT and AutoQUANT:

1. After acquisition of the Stress and Rest SPECT scans, LEFT Click on AutoSPECT.
2. Select the proper patient, and LEFT click on Proceed.
3. Choose the PROJECTION-S and PROJECTION-R data sets and LEFT click on PROCEED.
4. The MYOVIEW reconstruction will open by default, displaying the Gated Stress images on the left and the Rest images on the right.
5. Verify that there is no motion, and that the images are qualitatively accurate and free of artifact.
6. To motion correct, LEFT click on the Motion tab across the top of the screen, the word “Motion” will turn yellow when selected. If motion correction is not needed, proceed to step 9.
7. Adjust intensity if necessary. On the “Original” images for Stress and Rest, set the blue line to the center of the heart. Then set the yellow lines to 10 pixels above, and 10 pixels below the blue line number.
8. LEFT click on CORRECT for both sets of images. The corrections will take quite a few seconds each and you have to wait for one to finish before starting the other. (Motion should not be greater than one pixel. If motion is greater than one pixel, then the patient will have to be imaged again.) Return to the Recon tab.

9. Set the blue line on each set of images to the center of the heart, and then set the corresponding yellow lines to 10 pixels above and 10 pixels below the blue center lines.
10. LEFT click on the AUTO REORIENT button at the top left of the screen.
11. Check that the images are aligned in the proper projections. Set the yellow lines around each projection as close as possible, without cutting any myocardium from any angle.
12. LEFT click on SAVE at the top right of the screen.
13. LEFT click on AutoQUANT.
14. Select the proper patient, and then LEFT click on PROCEED.
15. Select the appropriate files, substituting the motion corrected files, if necessary:
 - PROJECTION-S or PROJECTION-S_MC
 - PROJECTION-R or PROJECTION-R_MC
 - SHORT AXIS -STR
 - VERTICAL-STR
 - HORIZONTAL-STR
 - SHORT AXIS-RST
 1. VERTICAL-RST
 2. HORIZONTAL-RST
 3. PROC GS-STR
16. AutoQUANT defaults should automatically process the data, if not, select PROCESS.
17. Across the top, select Splash.
18. RIGHT click at the top right of the screen and choose Expand.
19. RIGHT click again and choose Dual.
20. RIGHT click again and choose 10 Band.
21. Set the intensity for each image set by MIDDLE clicking on the appropriate color bar and adjusting the color so that only the first white pixels are showing in the stress slices.
22. Now do the same for the resting images, but be sure that you match the same area of myocardium.
23. LEFT click on PRINT, enter 10BAND in the name of the image somewhere, and then LEFT click on OK.
24. Now change the color to GREY.
25. LEFT click on PRINT, enter GRAY in the name of the image somewhere, and then LEFT click on OK.
26. At the top right, deselect SCORE.
27. On the Views page, ensure that DUAL and ED are selected and the Surface is on INNER.
28. Now, drag the far left 3D image on the top row so that the APEX is at the top and the box has no imperfections. (Septal to the right)
29. Drag the middle image across the top row so that the apex is on the right, with no imperfections on the box surrounding the image. (Septal to the top)
30. Now, LEFT click on PRINT , start on frame #1 and then OK. Change the Interval to the next frame and PRINT again. Do this for all 8 frames.
31. On the Slice page, adjust the Interval back to 1, and PRINT each frame (1 thru 8) as you did on the Views page.(Dual off)
32. Now select the QPS page. Change color to Thermal. PRINT.
33. Now select the QGS page. Change color to Cool. PRINT.
34. Now LEFT click on SAVE, then SAVE ALL.
35. LEFT click on EXIT.

MYOCARDIAL PERFUSION SPECT- 2 DAY PROTOCOL FOR PATIENTS GREATER THAN 250 POUNDS

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36. Select IMAGE MANIPULATION, then IMAGE APPEND. Select eight snapshots of the Views and then PROCEED. Once loaded, choose EXIT at the top and change the name to VIEWS, then click SAVE SELECTED AND PROCEED.
37. Do the same for the Slices, and rename it SLICES, then SAVE SELECTED AND PROCEED.
38. DICOM send the VIEWS, SLICES, PROJECTION-R (or PROJECTION-R-MC), PROJECTION-S (or PROJECTION-S-MC), and the SPLASH GREY images in the DEFAULT GREY color to PACS.
39. DICOM send the SPLASH 10BAND image in RGB – 10 BAND color to PACS.
40. DICOM send the QPS image in RGB – THERMAL color to PACS.
41. DICOM send the QGS image in RGB – COOL color to PACS.
42. Under content manager on FUJI PACs (separate icon on the desktop)
 - a. ALL patients
 - b. Enter patient MR#
 - c. Grab and drag data set:
 - **STUDY SITE:** SYNAPSE DEFAULT
 - **PRO DESCRIPTION:** MYOVIEW

INTO DATA SET:

 - **STUDY SITE:** (YOUR LOCATION TLI, TCI, POI)
 - **PRO DESCRIPTION:** NM MYOCARDIAL PERFUSION GATED (LEXISCAN)
43. Place images in the correct order on PACS and release for radiologist interpretation.