

## Division of Nuclear Medicine Procedure / Protocol

MYOCARDIAL PLANAR STRESS &/OR REST  
FOR USE WITH TECHNETIUM 99M AGENTS ONLY

CPT CODE: 78460-61, 78464-65, 78478, 78480  
UPDATED: JULY 2015

### Indications:

- Diagnosis of CAD, especially in patients with moderate probability of CAD
- Evaluation of patients with potential false positive stress EKG's
- Diagnosis of CAD in patients with abnormal resting EKG
- Management and prognosis of CAD
- Evaluation of CABG and PTCA patency
- Evaluation of LV disease

Acute infarct/chest pain is an indication for a rest only perfusion study. Resting myocardial perfusion images can be used to define the presence, location and extent of acute infarction or significant myocardial scar and for determination of changes in perfusion with resting chest pain.

### Patient Prep:

See the Myocardial Stress Test Prep Protocol

### Scheduling:

For a Rest only study, allow 60-90 minutes for imaging and processing.

For a Stress only study, allow 90 minutes for the stress test, imaging, and processing.

For a 1-Day Rest and Stress study, allow 180 minutes for the entire test.

\*\*\* For patients in excess of 150 kg, a stretcher will need to be ordered for imaging purposes \*\*\*

### Radiopharmaceutical

**& Dispensed Dose:** For a Rest only or a Stress only test (2 day study), the dose is 20mCi Tc99m Myoview or Sestamibi adjusted per the current weight-based Nomogram.

For a Rest and Stress test (1 day study) is as follows:

Resting dose is 12mCi weight adjusted per the current weight-based Nomogram.

Stress dose is 33mCi weight adjusted per the current weight-based Nomogram.

### Imaging Device:

GE Millennium MPS with LEHR collimator

### Data Acquisition:

For all protocols, select the **Gated Tc99m Planar Myo Perf** protocol.

Only use the **Non-Gated Tc99m Planar Myo Perf** protocol, if the EKG cannot properly track the patient's EKG rhythm.

### Acquisition Parameters:

Using the **Worklist** tab on the acquisition computer, either select the patient from the Worklist after pressing the **Query** button, or type in the Accession number and then press the **Query** button. Once the patient is selected, click on the **ADD TO DO** button on the bottom of the screen. Next, click on the **ACQUISITION** tab, highlight the patient, click on **ADD** tab, click on **SCAN**, click on **U of W CARDIAC**, and then select the appropriate protocol according to the **DATA ACQUISITION** section:

Then check the following tabs:

**Patient Tab:** Verify the patients' date of birth or enter the information.

**Study Tab:** Verify the accession number or enter the information.

**Energy Tab:** Select **Tc99m**

Peak of **140**

Width of **20**

Offset of **0**

**Start/Stop Tab:** Select **Time** for the Stop On option

Time **15** minutes

**Image Tab:** Matrix **128x128**

Zoom 1.6  
Number of Bins 8  
Orientation 90

\*\* Unless a cart is being used, then the orientation will need to be changed manually \*\*

Trigger Tab: Center 100%  
Width 20%

\*\* The Trigger Tab is only highlighted for the gated images \*\*

## Procedures:

### For a 1-Day Protocol, use the following:

1. For outpatients upon arrival to the nuclear medicine department, females will be asked to change from the waist up into 2 hospital gowns (alternating front and back openings), the brassiere needs to be removed for imaging. This is per the physicians. Male patients have no immediate prep. **For all patients, it is important to check for nitro patches, paste or nitro drip. If nitro is active in any form, it is necessary to ask the reading physician of the day as to the decision to inject with the nitro in place or not.**
2. A nuclear medicine technologist will interview the patient, verifying the patient with 2 forms of identification (i.e. DOB, spelling the name, MR #). A brief description of the test will be given and the patient allowed to ask any questions. If the patient is having active chest pain, the technician is to consult the reading physician of the day as to when to do the rest injection.
3. An IV will be placed. For in-patients, flush the existing IV first to ensure it is working. The radiopharmaceutical will be injected and flushed with a 0.9% Sodium Chloride 10cc syringe.
4. The patient will be asked to wait in the cardiac waiting room for approximately 30 minutes or until the imaging technologist is ready to image the patient.
5. The appropriate protocol is selected (see the **Data Acquisition** section).
6. Patients are asked to remove any metal objects from the chest/torso areas as to not interfere with the imaging of the heart.
7. The patient is asked to lie supine on the imaging table or stretcher. The imaging technologist will place the patient under the camera and adjust the camera so the camera face does not touch the patient. The patient is instructed to lay still, breath normally during the pictures. If Gating is being used, attach 3 leads to 3 EKG patches to acquire the necessary data. A total of 3 images are taken (Anterior, 45 LAO and LLAT).
8. Upon completion of the images, the patient is assisted up from the imaging table or stretcher and the images are reviewed. If it is determined that the images need to be repeated, follow steps 5-8 again.
9. Once it is determined that the images quality is good, the patient may proceed to the stress portion of the test. The rest images can now be processed as follows in the **IMAGING PROCESSING** portion of this protocol.
10. Follow the **Myocardial Stress Test Procedure Protocol** for the stress portion of the test.
11. Upon termination of the stress portion of the test, the request will be given to the appropriate imaging technologist.
12. The imaging technologist will select the appropriate imaging protocol (see the **Data Acquisition** section).
13. Patients may wait between 15-45 minutes before the stress images are started. When the imaging technologist is ready for the patient, the patient is asked to lie supine on the imaging table or stretcher. The imaging technologist will place the patient under the camera and adjust the camera so the camera face does not touch the patient. The patient is instructed to lay still, breath normally during the pictures. A total of 3 images are taken (Anterior, 45 LAO and LLAT). If gating is being used, 3 leads will be attached to the existing EKG patches from the stress test to acquire the necessary data.
14. Upon completion of the images, the patient is assisted up from the imaging table or stretcher and asked to wait in the cardiac waiting room until the images are processed and/or reviewed. The stress images can now be processed as follows in the **IMAGING PROCESSING** section of this protocol. The necessary screen captures are sent to PACS. It may be necessary to have the reading physician of the day review the images before the patient is released to leave. Once it is determined that the patient may leave, in-patients may be sent back to the floor. For out-patients, they may re-dress and the IV is to be removed before the patient leaves the department.



**For a 2-Day Rest only, where the Stress is not indicated, use the following:**

1. For outpatients upon arrival to the nuclear medicine department, females will be asked to change from the waist up into 2 hospital gowns (alternating front and back openings), the brassiere needs to be removed for imaging. This is per the physicians. Male patients have no immediate prep. **For all patients, it is important to check for nitro patches, paste or nitro drip. If nitro is active in any form, it is necessary to ask the reading physician of the day as to the decision to inject with the nitro in place or not.**
2. A nuclear medicine technologist will interview the patient, verifying the patient with 2 forms of identification (i.e. DOB, spelling the name, MR #). A brief description of the test will be given and the patient allowed to ask any questions. If the patient is having active chest pain, the technician is to consult the reading physician of the day as to when to do the rest injection.
3. The radiopharmaceutical can be directly injected into a vein, making sure to flush the syringe with blood at least once. For inpatients or outpatients with a working IV in place, the radiopharmaceutical shall be injected and flushed with a 0.9% Sodium Chloride 10cc syringe.
4. The patient will be asked to wait in the cardiac waiting room for approximately 30-45 minutes or until the imaging technologist is ready to image the patient.
5. The appropriate protocol is selected (see the **Data Acquisition** section).
6. Patients are asked to remove any metal objects from the chest/torso areas as to not interfere with the imaging of the heart.
7. The patient is asked to lie supine on the imaging table or stretcher. The imaging technologist will place the patient under and adjust the camera so the camera face does not touch the patient. The patient is instructed to lay still and breathe normally during the pictures. If Gating is being used, attach 3 leads to 3 EKG patches to acquire the necessary data. A total of 3 images are taken (Anterior, 45 LAO and LLAT).
8. Upon completion of the images, the patient is assisted up from the imaging table or stretcher and asked to wait in the cardiac waiting room until the images are processed and/or reviewed. The images are processed as follows in the **IMAGING PROCESSING** section of this protocol. The necessary screen captures are sent to PACS. It may be necessary to have the reading physician of the day review the images before the patient is released to leave. Once it is determined that the patient may leave, in-patients may be sent back to the floor. For out-patients, they may re-dress and the IV is to be removed, if one is in place, before the patient leaves the department.

**For a 2-Day Stress only, where the stress is being performed prior to the rest, use the following:**

1. For outpatients upon arrival to the nuclear medicine department, females will be asked to change from the waist up into 2 hospital gowns (alternating front and back openings), the brassiere needs to be removed for imaging. This is per the physicians. Male patients have no immediate prep. **For all patients, it is important to check for nitro patches, paste or IV drip. If nitro is active in any form, it is necessary to ask the reading physician of the day as to the decision to inject with the nitro in place or not.**
2. A nuclear medicine technologist will interview the patient, verifying the patient with 2 forms of identification (i.e. DOB, spelling the name, MR #). A brief description of the test will be given and the patient allowed to ask any questions. If the patient is having active chest pain, the technician is to consult the reading physician of the day as to when to do the rest injection.
3. An IV will be placed. For in-patients, flush the existing IV first to ensure it is working.
4. Follow the Myocardial Stress Test procedure protocol for the stress portion of the test.
5. The patient will be asked to wait in the cardiac waiting room for approximately 30-45 minutes or until the imaging technologist is ready to image the patient.
6. Once the stress test is complete, the request will be given to the appropriate imaging technologist.
7. The imaging technologist will select the appropriate imaging protocol (see the **Data Acquisition** section).



8. When the imaging technologist is ready to image the patient, the patient will be asked to lie supine on the imaging table or stretcher. The imaging technologist will place the patient under the camera and adjust the camera so the camera face does not touch the patient. The patient is instructed to lay still and breathe normally during the pictures. If Gating is being used, attach 3 leads to 3 EKG patches to acquire the necessary data. A total of 3 images are taken (Anterior, 45 LAO and LLAT).
9. Upon completion of the images, the patient is assisted up from the imaging table or stretcher and asked to wait in the cardiac waiting room until the images are processed and/or reviewed. The images are processed as follows in the **IMAGING PROCESSING** section of this protocol. The necessary screen captures are sent to PACS. It may be necessary to have the reading physician of the day review the images before the patient is released to leave. Once it is determined that the patient may leave, in-patients may be sent back to the floor. For out-patients, they may re-dress and the IV is to be removed before the patient leaves the department.

**For a 2-Day Rest only, where the Stress has already been performed, use the following:**

1. For outpatients upon arrival to the nuclear medicine department, females will be asked to change from the waist up into 2 hospital gowns (alternating front and back openings), the brassiere needs to be removed for imaging. This is per the physicians. Male patients have no immediate prep. **For all patients, it is important to check for nitro patches, paste or nitro drip. If nitro is active in any form, it is necessary to ask the reading physician of the day as to the decision to inject with the nitro in place or not.**
2. A nuclear medicine technologist will interview the patient, verifying the patient with 2 forms of identification (i.e. DOB, spelling the name, MR #). A brief description of the test will be given and the patient allowed to ask any questions. If the patient is having active chest pain, the technician is to consult the reading physician of the day as to when to do the rest injection.
3. The radiopharmaceutical can be directly injected into a vein, making sure to flush the syringe with blood at least once. For inpatients or outpatients with a working IV in place, the radiopharmaceutical shall be injected and flushed with a 0.9% Sodium Chloride 10cc syringe.
4. The patient will be asked to wait in the cardiac waiting room for approximately 30-45 minutes or until the imaging technologist is ready to image the patient.
5. The appropriate protocol is selected (see the **Data Acquisition** section).
6. Patients are asked to remove any metal objects from the chest/torso areas as to not interfere with the imaging of the heart.
7. The patient is asked to lie supine on the imaging table or stretcher. The imaging technologist will place the patient under the camera and adjust camera so the camera face does not touch the patient. The patient is instructed to lay still and breathe normally during the pictures. If Gating is being used, attach 3 leads to 3 EKG patches to acquire the necessary data. A total of 3 images are taken (Anterior, 45 LAO and LLAT).
8. Upon completion of the images, the patient is assisted up from the imaging table or stretcher and asked to wait in the cardiac waiting room until the images are processed and/or reviewed. The images are processed as follows in the **IMAGING PROCESSING** section of this protocol. The necessary screen captures are sent to PACS. It may be necessary to have the reading physician of the day review the images before the patient is released to leave. Once it is determined that the patient may leave, in-patients may be sent back to the floor. For out-patients, they may re-dress and the IV is to be removed, if one is in place, before the patient leaves the department.

## Image Processing & PACS:

For **NON-GATED** images, use the following:

Select all three images (Anterior, 45 LAO and LLAT)  
Select the **LOAD TO NEW** tab under the Xeleris applications column  
Label the images as the either rest or stress images  
Take a screen capture and exit

To smooth the images, follow the steps below:

Select the Anterior image  
Select the **LOAD TO NEW** tab under the Xeleris applications column  
Highlight the image box  
Select the **IMAGE** tab  
Select **FILTER**  
Select the **9 POINT SMOOTH**  
Press the **APPLY & QUIT** tab  
Select **FILE**, and then **SAVE AS**, then quit the application  
This may be repeated for both the 45 LAO and LLAT images  
Select all three smoothed images from the patient file, select **LOAD TO NEW** tab under the Xeleris applications column, label these images as rest or stress, take a screen capture and exit

**Transfer all screen captures to PACS. Transfer all data to the XELMD.**

For **GATED** images, follow the steps below:

Select the Anterior image  
Select the **LOAD TO NEW** tab under the Xeleris applications column  
Select **IMAGE**  
Select **REFRAME**  
With the cursor blinking in the INPUT box, click on the quadrant to be used, fill in the output number of frames  
Select **APPLY & QUIT**  
Select **FILE** then **SAVE AS** (now labeled as combined) then quit the protocol  
Repeat for the 45 LAO and LLAT  
Select all three combined images from the patient file, select **LOAD TO NEW** tab under the Xeleris applications column, label these images as rest or stress, take a screen capture and exit

To smooth the images, follow the steps below:

Select the Anterior raw data  
Select the **LOAD TO NEW** tab under the Xeleris applications column  
Highlight the image box  
Select the **IMAGE** tab  
Select **FILTER**  
Select the **9 POINT SMOOTH**  
Press the **APPLY & QUIT** tab  
Select **FILE**, and then **SAVE AS** (now labeled as smooth), then quit the application  
This may be repeated for both the 45 LAO and LLAT raw data images  
Select all three smoothed images from the patient file, select **LOAD TO NEW** tab under the Xeleris applications column, label these images as rest or stress, take a screen capture  
Set all three images into motion; take a dynamic screen capture and then exit

**Transfer all screen captures to PACS. Transfer all data to the XELMD.**



**Interpretation:**

The stress test is interpreted according to physiological stress level attained and the EKG changes. This is the responsibility of the exercise physiologists and the cardiology staff and fellows.

The images are examined for perfusion defects and to determine whether they are present only at stress (ischemia) or both at rest and stress (infarct). With large ischemic defects, the referring physician should be contacted to determine patient disposition.

The change in ventricular cavity size from stress to rest and the appearance of lung activity in the stress images both indicate extensive coronary disease, and the referring physician should be contacted immediately.

Acute Chest Pain: The same criteria apply as for stress studies, but as increased coronary flow is not induced then ischemia cannot be precipitated. Only if there is active ischemia at the time of injection will it be recognized. The study is very sensitive for acute infarctions.

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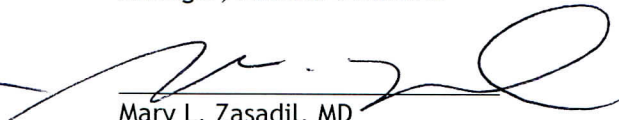
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