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University of Wisconsin Hospital and Clinics

Division of Nuclear Medicine Procedure / Protocol

MYOCARDIAL PLANAR STRESS &/OR REST **CPT CODE: 78460-61, 78464-65, 78478, 78480**
FOR USE WITH THALLIUM 201 AGENTS ONLY **UPDATED: MARCH 2012**

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 minutes for imaging and processing.
For a Stress only study, allow 60 minutes for the stress test, imaging, and processing.
For a 1-Day Rest and Stress study, two separate appointments are made. The first for stress portion for 60 minutes, the second for the rest portion for 60 minutes, 4 hours after the start of the stress portion.
*** 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 3mCi adjusted per the current weight nomogram.
For a 1-Day stress and rest, a 3mCi stress dose adjusted per the current weight nomogram is used and an optional 1mCi rest dose may be drawn. This is dependent on the reading physician of the day.

Imaging Device: GE Millennium MPS

Data Acquisition:

For all protocols, select the **Gated TL201 Planar Myo Perf** protocol.
Only use the **Non-Gated TL201 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. Highlight the patient, 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**, under system click on **U of W CARDIAC**, and then select the appropriate protocol:

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 **TL201**	2 Peak
	Peak of **72**	Peak of **167**
	Width of **30**	Width of **20**

Isotope Tab: Select **TL201**
Collimator **LEHR**
Uniformity **LEHR**
Energy **ECOR**
Spatial **TL201**
PMT **PMT**

Start/Stop Tab: Select **Time** for the Stop On option
Time is **10** minutes.

Image Tab: Matrix **64x64**
Zoom **1.6**
Orientation **90**
****** Unless a cart is being used then the orientation will need to be changed manually ******

Trigger Tab (Gated protocol only):
Center **100%**
Width **20%**

Procedures:

Rest Only Study (only if stress is not indicated:

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 15 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 imagine 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 in place, before the patient leaves the department.

Stress Only Study (2-Day):

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.
3. An IV will be placed. For in-patients and/or out-patients with a working IV in place, 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. Once the stress test is complete, the request will be given to the appropriate imaging technologist and the patient is taken directly to the imaging table as soon as possible. The imaging technologist will select the appropriate imaging protocol (see the **Data Acquisition** section).
6. The patient is asked to lie supine on the imagine 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.
7. 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.

Stress and Rest Study (1-Day):

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.
3. An IV will be placed. For in-patients and/or out-patients with an IV in place, flush the IV first to ensure it is working. Patient is now ready for the stress portion of the test.
4. Follow the **Myocardial Stress Test Procedure Protocol** for the stress portion of the test.
5. Upon termination of the stress portion of the test, the request will be given to the appropriate imaging technologist and the patient is escorted directly to the imaging table as soon as possible.
6. The imaging technologist will select the appropriate imaging protocol (see the **Data Acquisition** section).
7. Patients are asked to remove any metal objects from the chest/torso areas as to not interfere with the imaging of the heart.
8. The patient is asked to lie supine on the imagine 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).
9. Upon completion of the images, the patient will be asked to wait in the cardiac waiting room until the images are processed and reviewed. The images are processed as follows in the **IMAGE PROCESSING** section of this protocol. It may be necessary to have the reading physician of the day review the images before the patient is released to leave.

It is the physicians option that the resting image may be performed as soon as 2 hours post stress without a re-injection, this is to rule out an attenuation artifact. Consult the reading physician of the day. If it is determined that a resting injection is needed, the patient should return 3-4 hours post stress for the second injection and resting images.

10. Once it is determined that the patient may leave, in-patients may be sent back to the floor. If a re-injection is not needed, the IV may be discontinued in out-patients at this time. For out-patients that need a re-injection, they may re-dress but leave the IV in for the second appointment. A copy of the **Myocardial Dietary Restrictions for Thallium Cardiac Stress Tests** is explained and sent with the patient.
11. At the time of the second appointment (resting part of the study), the nuclear medicine technologist will interview the patient, verifying the patient with 2 forms of identification (i.e. DOB, spelling the name, MR #). Female patients 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. Male patients have no immediate prep.
12. If needed, the radiopharmaceutical (Thallium) will be injected into the IV and flushed with a 0.9% Sodium Chloride 10cc syringe. For out-patients, the IV may now be discontinued.
13. The patient will be asked to wait in the cardiac waiting room for 15 minutes or until the imaging technologist is ready to image the patient.
14. The appropriate protocol is selected (see the **Data Acquisition** section).
15. Patients are asked to remove any metal objects from the chest/torso areas as to not interfere with the imaging of the heart.
16. The patient is asked to lie supine on the imagine 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).
17. Upon completion of the images, the patient is assisted up from the imaging table and asked to wait in the cardiac waiting room while the images are reviewed. The images are processed as follows in 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.

Image Processing & PACS:

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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