## Clinical guidelines

**MYOCARDIAL PERFUSION IMAGING (MPI) MUGA**

<table>
<thead>
<tr>
<th>CPT4 Codes:</th>
<th>Last Effective Date:</th>
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<tr>
<td>MPI – 78451, 78452, 78453, 78454, 78481, 78483</td>
<td>May 2016</td>
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<tr>
<td>MUGA – 78472, 78473, 78494, +78496</td>
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<tr>
<th>LCD ID Number:</th>
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<tr>
<td>J – M (was J-11) (NC, SC, VA, WV)</td>
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<tr>
<th>Responsible Department:</th>
<th>Implementation Date:</th>
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<td>Clinical Operations</td>
<td>June 2016</td>
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### “FOR CMS (MEDICARE) MEMBERS ONLY”

**Coverage Indications, Limitations, and/or Medical Necessity**

The two types of radionuclide studies commonly used for cardiac evaluation are myocardial perfusion imaging and cardiac blood pool imaging (multiple gated acquisition scanning (MUGA), ventriculography). Myocardial perfusion imaging is used primarily for the evaluation of coronary artery disease. Ventriculography is sometimes referred to as multiple gated acquisition scanning (MUGA) or cardiac blood pool imaging and is primarily used to evaluate valvular disease and cardiomyopathies. Either type of study may be obtained at rest or with stress. Stress may be provided by exercise or with pharmacologic agents.

Myocardial perfusion imaging is a diagnostic procedure that evaluates blood flow to cardiac muscle using radionuclides. A gamma camera is used to record images in planar or tomographic (single photon emission computed tomography {SPECT}) projections. Use of dual radiopharmaceuticals permits concurrent studies at rest and after stress, which are then compared and interpreted by a nuclear physician. Since the radiopharmaceutical accumulates in the myocardium in relation to blood flow, ischemic and infarcted myocardium can be detected.

With the use of technetium based radiopharmaceuticals, the perfusion imaging may be linked to acquisition of “first pass” data to visualize blood flow through the right heart, lungs and left heart giving diagnostically useful information about cardiac chamber shunts, wall motion, cardiac output, ejection fraction, left ventricular volume, shunt fraction and valvular regurgitation.

*Effective for services performed on or after March 14, 1995, PET scans performed at rest or with pharmacological stress used for noninvasive imaging of the perfusion of the heart for the diagnosis and management of patients with known or suspected coronary artery disease*
using the FDA approved radiopharmaceutical Rubidium 82 (Rb 82) are covered, provided the requirements below are met:

- The PET scan, whether at rest alone, or rest with stress, is performed in place of, but not in addition to, a single photon emission computed tomography (SPECT); or
- The PET scan whether at rest alone or rest with stress is used following a SPECT that was found to be inconclusive.

In these cases the PET scan must have been considered necessary in order to determine what medical or surgical intervention is required to treat the patient.

(For purposes of this requirement, an inconclusive test is a test(s) whose results are equivocal, technically uninterpretable, or discordant with a patient’s other clinical data and must be documented in the beneficiary’s file.)

The following studies are considered investigational and will not be covered:
- Ambulatory radionuclide cardiac monitoring
- Monoclonal anti-myosin imaging
- Radionuclide imaging of thrombi
- Radionuclide imaging of cardiac adrenergic nerves

Myocardial Perfusion Imaging (CPT codes 78451-78454, 78491, 78492)

Patients with a high pretest probability of disease are usually not candidates for this study unless determination of the size and reversibility of a defect are required for clinical decision making. Patients whose diagnosis is in question benefit most from this study. Patients with a low pretest probability of disease are usually not studied except when a prior exercise stress test by treadmill ECG or echo is a presumed false positive. Stress myocardial perfusion imaging, preceded by satisfactory stress echocardiography (CPT code 93350), is not medically necessary.

Indications for Myocardial Perfusion Imaging

1. Acute myocardial infarction - Myocardial perfusion imaging is not typically performed during the acute period of myocardial infarction, if the diagnosis is established by other means. In selected patients, imaging is appropriate in the assessment of:
   - Disease severity
   - Risk assessment and/or prognosis
   - Efficacy of acute reperfusion therapy
   - Evidence of myocardial salvage
   - Suspected infarction when the combination of history and other tests is not diagnostic.
2. **Unstable angina** - Myocardial perfusion imaging may be useful as an adjunct to other tests in the diagnosis or treatment of unstable angina only when the combination of history and other tests is not diagnostic. In selected patients, imaging is appropriate for:
   - Identification of ischemia in the distribution of a known lesion or in remote areas
   - Identification of the severity/extent of disease in patients with medically unstable angina or ongoing ischemia
   - Measurement of left ventricular function.

3. **Chronic ischemic heart disease** - The use of myocardial perfusion imaging is well established in the diagnosis and management of coronary artery disease (CAD) and is covered in these situations:
   - Diagnosis of CAD, especially in patients with atypical chest pain
   - Evaluation of abnormal or suspected false positive stress ECG
   - Evaluation of other symptoms suspicious for the diagnosis of CAD such as syncope and ventricular arrhythmia
   - Assessment of myocardial viability after revascularization or medical management
   - Planning PTCA to identify lesions causing ischemia, if unknown
   - Evaluation of suspected or known CAD prior to high risk surgical procedures
   - Identification of the presence, location, extent, and severity of myocardial ischemia
   - Assessment of drug therapy
   - Assessment of symptoms suggesting restenosis following PTCA
   - Assessment of symptoms suggesting ischemia following CABG
   - Follow up of symptomatic ischemic heart disease.

4. **Congenital heart disease** - Echocardiography is the method of choice for evaluating patients with known or suspected congenital heart disease. Selected patients may benefit from myocardial perfusion imaging when assessing for:
   - Diagnosis of anomalies of the coronary circulation
   - Kawasaki’s disease

5. **Post-transplant cardiac disease**
   - Assessment of coronary arteriopathy
   - Evaluation for ventricular dysfunction with post-transplant rejection

**Cardiac Blood Pool Imaging (MUGA, Ventriculography) (CPT codes 78472, 78473, 78481, 78483, 78494, 78496)**

These services are allowed for the evaluation of ventricular size, wall motion, stroke volume, and ejection fraction when this information is medically necessary to direct further evaluation and management of the cardiac condition.

**Indications for Cardiac Blood Pool Imaging (MUGA, Ventriculography):**

1. **Cardiomyopathy** - Cardiac blood pool imaging (MUGA, ventriculography) is covered for:
• Diagnosis of hypertrophic cardiomyopathy and/or myocardial ischemia
• Differentiation of ischemic from non-ischemic cardiomyopathy

2. Post-transplant cardiac disease
• Assessment of coronary arteriopathy
• Evaluation for ventricular dysfunction with post-transplant rejection

3. Assessment of cardiac function for cardiotoxic chemotherapy
   A. One baseline study is considered medically necessary prior to the initiation of cardiotoxic chemotherapy when one of the following conditions is met:
      1. No echocardiogram is planned or performed
      2. Prior echocardiogram is uninterpretable due to poor visualization window
   B. Cardiac function monitoring during or at the completion of cardiotoxic chemotherapy. Cardiotoxic chemotherapy includes any of the following medications:
      · 5-FU (5 fluorouracil)
      · Adriamycin® (doxorubicin)
      · Avastin® (bevacizumab)
      · Cerubidine® (daunorubicin)
      · Clofarabine
      · Cytoxan® (cyclophosphamide)
      · Epirubicin (Pharmorubicin®)
      · Gleevec® (imatinib)
      · Herceptin® (trastuzumab)
      · Ifex® (ifosfamide)
      · Mutamycin® (mitomycin)
      · Nexavar® (sorafenib)
      · Novantrone® (mitoxantrone)
      · Sutent® (sunitinib)
      · Taxol® (paclitaxel)
      · Taxotere® (docetaxel)
      · Tykerb® (lapatinib)
      · Valstar® (valrubicin)
      · Xeloda® (capecitabine)
      · Zavedos® (idarubicin)

Pharmacologic Stress Agents (HCPCS codes J0153, J0280, J0461, J1245, J1250)

For those patients who are unable to reach 75-100% of their age predicted maximum heart rate by physiologic exercise, vasodilation can be achieved with the use of either dipyridamole or adenosine. Use of pharmacologic agents in myocardial perfusion imaging (CPT codes 78451-78454, 78491, 78492) is not a standard of care and is not medically necessary unless exercise is not possible. In some cases dobutamine may be used to effect stress through its inotropic effect.
1. Dipyridamole is typically administered intravenously at 0.57 mg/kg over a 4-minute period. The maximum dose should not exceed 60 mg. Since the dilation effect persists, after injection of the radiopharmaceutical, its effect is typically reversed with intravenous aminophylline, which must be available to reverse ischemia when it occurs. Dipyridamole is relatively contraindicated in patients with:

- Known bronchospastic lung disease (asthma)
- Systemic hypotension (systolic BP below 100 mm Hg.)
- Acute myocardial infarction less than 48 hours old
- Unstable angina

2. Adenosine is administered intravenously at 0.14 mg/kg/min over 6 minutes (0.84mg/kg). The vasodilation effect is short lived. Adenosine is contraindicated in patients with:

- Second or third degree AV block
- Sinus node disease, except those with a functioning pacemaker
- Known or suspected bronchoconstrictive or bronchospastic lung disease
- Known hypersensitivity to adenosine

3. Dobutamine is administered intravenously, starting at 0.5-1.0 mcg/kg/min and titrated to reach the maximum heart rate for 2-5 minutes. The maximum dose is 40 mcg/kg. Atropine may be added in appropriate doses IV. Dobutamine is contraindicated in patients with:

- Idiopathic subaortic stenosis
- Acute myocardial infarction

**Physician Supervision Requirements**

Myocardial perfusion and blood pool imaging require general supervision by a qualified physician licensed to administer radioactive materials. Cardiology stress procedures (CPT codes 93015-93018) performed in conjunction with nuclear myocardial perfusion imaging studies are covered by Medicare only when performed under the direct supervision of a qualified physician, who provides:

- Medical expertise required for performance of the test
- Medical treatment for complications and side effects of the test
- Medical services required as part of the test such as injections of medications
- Medical expertise in the interpretation of the cardiovascular stress test component, some of which has to be provided during the test and before the patient is discharged from the testing suite.
CPT/HCPCS Codes

**Group 1 Paragraph:** NOTE: For Part A services only, the provider should bill the appropriate procedure code on the UB-04 for 11X bill type.

Use CPT code 78496 in conjunction with CPT code 78472.

**Group 1 Codes:**

- 78451  Ht muscle image spect sing
- 78452  Ht muscle image spect mult
- 78453  Ht muscle image planar sing
- 78454  Ht musc image planar mult
- 78472  Gated heart planar single
- 78473  Gated heart multiple
- 78481  Heart first pass single
- 78483  Heart first pass multiple
- 78491  Heart image (pet) single
- 78492  Heart image (pet) multiple
- 78494  Heart image spect
- 78496  Heart first pass add-on

**Group 2 Paragraph:** HCPCS Codes

**Group 2 Codes:**

- A4641  Radiopharm dx agent noc
- A9500  Tc99m sestamibi
- A9501  Technetium TC-99m teboroxime
- A9502  Tc99m tetrofossmin
- A9505  TL201 thallium
- A9526  Nitrogen N-13 ammonia
- A9555  Rb82 rubidium

*Please refer to the CMS website for the ICD-10 Codes that Support Medical Necessity.*
**Documentation Requirements**

The patient's medical record must document the medical necessity of services performed for each date of service submitted on a claim, and documentation must be available to A/B MAC on request.

The medical record must document when significant resting ECG abnormalities are present, or a medication is being used and cannot be withdrawn, that would interfere with interpretation of a stress ECG, resulting in the selection of myocardial perfusion study.

The rationale for selecting pharmacologic stress rather than exercise stress must be indicated in the medical record.

Claims submitted for stress tests performed as preoperative evaluation of patients without symptoms of CAD who are deemed to be at moderate risk must document one of the following at-risk conditions in the medical record: Diabetes mellitus with complications, peripheral vascular disease, aortic aneurysm or cerebrovascular disease.

**Utilization Guidelines**

Services performed for excessive frequency are not medically necessary. Frequency is considered excessive when services are performed more frequently than generally accepted by peers and the reason for additional services is not justified by documentation.