

## **A Model LCD**

### **LCD Information**

**LCD Title** **SINGLE PHOTON MYOCARDIAL PERFUSION IMAGING**

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**CMS National** Title XVIII of the Social Security Act, Section 1862(a)(1)(A). This section allows coverage and payment for only those services that are considered to be medically reasonable and necessary.

Title XVIII of the Social Security Act, Section 1833(e). This section prohibits Medicare payment for any claim, which lacks the necessary information to process the claim.

### **Indications and Limitations Of Coverage and/or Medical Necessity**

Myocardial perfusion imaging (MPI) is a technique in which radionuclide tracers (predominantly thallium-201 and technetium 99m-based agents) are used to evaluate myocardial blood flow, as well as myocardial scarring or infarction, in order to diagnose and assess the significance of coronary artery disease (CAD). When administered intravenously, the radionuclides distribute in proportion to regional myocardial blood flow present at the time of injection. MPI may be performed at rest, or more commonly, in conjunction with cardiac stress using exercise and/or pharmacologic stimulation (adenosine, dipyridamole or dobutamine). Technetium 99m-based tracers are usually administered twice, once at rest, and again following cardiac stress. Thallium-201 is usually administered following cardiac stress, with a booster dose sometimes being given prior to rest imaging. The tracer distribution in the heart is then imaged using a gamma camera, yielding scintigrams which depict the myocardial distribution of coronary blood flow. Typically, the scintigrams are compared qualitatively and/or quantitatively to recognized normal patterns. Perfusion abnormalities, or defects, are assessed and quantified as to location, extent and intensity, often allowing localization to specific coronary artery territories. Perfusion defects present with cardiac stress and absent at rest are termed “reversible”, and are suggestive of myocardial ischemia, and hemodynamically significant coronary stenoses. Defects present

on both rest and stress imaging are consistent with myocardial scarring or infarction.

MPI is most often performed using tomographic techniques and reconstruction algorithms utilizing either filtered back projection or repeating iterations and smoothing (SPECT imaging---single photon emission computerized tomography, CPT 78464, 78465). Planar (non-tomographic) technique CPT 78460, 78461) is occasionally utilized in certain clinical circumstances that interfere with optimal quality SPECT imaging, such as orthopedic shoulder problems. MPI is typically performed using ECG-synchronized gating of the post-stress and resting images. This allows qualitative evaluation of left and right ventricular size and function (CPT 78478), as well as calculation of LV ejection fraction (CPT 78480). Alternatively, first-pass imaging of the intravenous technetium 99m bolus through the heart may be performed to evaluate left and right ventricular function and ejection fractions. The use of wall motion analysis has been shown to improve the accuracy of MPI for diagnosing coronary disease by simplifying the identification of attenuation artifacts. In addition, either technique of wall motion study, with calculation of LV ejection fraction, provides definitive information on ventricular function, which is one of the strongest predictors of prognosis.

MPI may also be performed at rest, without accompanying cardiac stress. In patients with known or suspected myocardial infarction rest MPI is effective at determining the severity of myocardial scarring and quantifying ventricular function. Qualitative and quantitative analysis of resting MPI scintigrams allows assessment of myocardial viability and the likelihood that ventricular function can be restored by coronary revascularization. The presence of viable myocardium is a critical parameter in predicting whether a patient will benefit from angioplasty or bypass surgery.

Extensive clinical evidence has documented the utility of myocardial perfusion imaging in the evaluation of patients with known or suspected heart disease.

MPI provides important information pertaining to three critical aspects of cardiac diagnosis and management: **1)**

**DIAGNOSIS:** In patients suspected of having coronary disease because of chest discomfort, dyspnea, arrhythmias, cardiac risk factors or other clinical findings, stress MPI is a highly sensitive and specific test for identifying CAD. . In patients presenting to the emergency department with acute chest pain, rest MPI is effective in diagnosing an acute coronary syndrome. **2)**

**PROGNOSIS:** In patients with known CAD, the extent of

myocardial ischemia, infarction, and viability determined by MPI correlate well with prognosis. MPI allows separation of CAD patients into subgroups with low and high risk for cardiac events, thus helping to guide medical and interventional management.

**3).THERAPEUTIC:** In patients with known CAD and prior coronary revascularization, MPI provides important information regarding the adequacy of revascularization. In patients with known CAD on medical therapy, MPI can evaluate the ability of the patient's medical regimen at reducing myocardial ischemia.

## **SPECIFIC INDICATIONS**

The accepted specific indications for MPI are grouped according to the purpose of the study relative to the three general categories delineated above.

### **1. DIAGNOSTIC: Indications for MPI for Diagnostic Purposes.**

The evaluation of patients with suspected CAD has traditionally employed exercise ECG stress testing (ETT) as the primary modality, and reserved MPI for secondary diagnostic use. However, it is now increasingly recognized that ETT may yield frequent false positive results (particularly in women) or false negatives (in patients at significant risk for CAD). This may lead to uncertainty, patient anxiety, and delays in diagnosis. Since the published accuracy of MPI is superior to ETT, many physicians now use MPI as their primary test for CAD. No studies using modern MPI technology have evaluated the comparative cost-benefit of these two approaches. Consequently, either strategy should be considered appropriate.

- 1) As the initial test for patients at increased risk for CAD, defined as having >10% ten-year risk for coronary events.
- 2) As the initial test for female patients with suspected coronary artery disease, due to the reduced accuracy of exercise stress ECG in women.
- 3) As the initial test in patients with diabetes mellitus, with or without symptoms of suspected angina or coronary disease.
- 4) Patients with suspected coronary disease in whom an abnormal baseline ECG interferes with interpretation of exercise-induced ST segment deviations (some examples of which are LVH, digoxin, therapy, or nonspecific ST and T-wave abnormalities on resting ECG).

- 5) Patients with an abnormal exercise stress ECG without anginal symptoms, to further determine whether CAD is present.
- 6) Patients with an intermediate Duke treadmill score.
- 7) Patients with a 25%-75% coronary stenosis on angiography in whom MPI is performed to assess the functional significance of the coronary lesion.
- 8) Patients who have coronary calcification on CT scan which is quantified Agatston score is greater than or equal to 100.
- 9) Patients who are asymptomatic, but have an occupation that places other individuals at risk if they suffer a coronary event (e.g. airline pilots, bus drivers, train engineers).
- 10) Patients with intraventricular conduction delay (LBBB, ventricular pacing, accessory atrioventricular pathway) who undergo pharmacologic stress MPI with coronary vasodilators to determine the presence and extent of coronary disease.
- 11) Patients who have suspected CAD and who have a condition which would prevent them from achieving a diagnostically adequate level of cardiac stimulation (85% predicted maximum heart rate) on standard exercise ECG stress testing. Examples of these clinical conditions include claudication, old age or significant debilitation, neuropsychiatric disorders, or use of negative chronotropic medications. Such patients should undergo pharmacologic stress testing with MPI for the diagnosis of coronary disease.
- 12) Patients with a dilated cardiomyopathy in whom MPI is performed to differentiate between coronary disease and other nonischemic etiologies, or to serially follow the progression of fibrosis, as in Chagas' Disease.
- 13) Patients with a ventricular wall motion abnormality demonstrated by another imaging modality, in whom MPI is performed to determine whether coronary disease is the etiology.
- 14) Patients with hypertrophic cardiomyopathy or valvular heart disease in whom MPI is performed to differentiate coronary vs. noncoronary causes of chest discomfort.
- 15) Patients with cardiac transplantation in whom MPI is performed to evaluate the presence of obstructive CAD.

16) Patients with suspected or known coronary disease being evaluated for cardiovascular risk prior to noncardiac surgery, who meet the recommendations for MPI set forth in the clinical guidelines of American College of Cardiology and American Heart Associations (“Perioperative Cardiovascular Evaluation for Noncardiac Surgery: ACC/AHA 2002 Guideline Update. J. Am Coll Card 2002; 39: 542-553).

17) Patients with atrial or ventricular cardiac arrhythmias, to determine the presence and functional severity of potential coronary disease.

18) Patients with syncope or pre-syncope, to determine the presence and functional severity of potential coronary disease.

19) Patients presenting to the emergency department with acute chest pain, to evaluate the possibility of an acute coronary syndrome.

## **2. PROGNOSTIC: Indications for MPI for Prognostic Purposes**

1) Patients with high probability of CAD based on clinical findings and risk factors who are having MPI to define the extent and severity of CAD for prognostic purposes.

2) Patients with an abnormal standard stress test who are having MPI to determine the extent of ischemia to guide future therapy.

3) Patients with known CAD who have new onset of angina, or significant change in symptoms.

4) Patients with a history of CAD and recent myocardial infarction in whom MPI is performed to define the presence of post-MI ischemia, myocardium at risk, assess myocardial viability, and assess LV function (using gated MPI techniques).

5) Patients with acute coronary syndromes who have become stable on medical therapy and are undergoing MPI to ascertain whether myocardial ischemia is suppressed on medical therapy, and whether or not angiography is warranted.

6) Repeat MPI one to three years after an initial study in patients with known or high likelihood of CAD, stable symptoms, and a predicted annual mortality of greater than 1%, to redefine the risk of cardiac events.

7) Patients with known coronary disease and left ventricular dysfunction who are having MPI to identify the presence of myocardial viability, and determine suitability for revascularization procedures.

### **3. Indications for MPI to Evaluate the Effectiveness of Medical Therapy or Revascularization.**

- 1) MPI to assess the efficacy of medical therapy.
- 2) MPI following coronary revascularization in patients with recurrent angina-like symptoms.
- 3) MPI following coronary revascularization in asymptomatic patients deemed at high risk for restenosis, or who have had suboptimal revascularization, or who have high risk coronary anatomy.

#### **CPT/HCPCS Section & Benefit Category**

Radiology  
Drugs other than oral  
Medical and surgical supplies  
Medicine

#### **Type of Bill Codes Revenue Codes**

Not Applicable  
Not Applicable

#### **CPT/HCPCS Codes**

**78460** Myocardial perfusion imaging; (planar) single study, at rest or stress (exercise and/or pharmacologic), with or without quantification

**78461** multiple studies, (planar) at rest and/or stress (exercise and/or pharmacologic) and redistribution and/or rest injection, with or without quantification

**78464** tomographic (SPECT), single study at rest or stress (exercise and/or pharmacologic), with or without quantification

**78465** tomographic (SPECT), multiple studies, at rest and/or stress (exercise and/or pharmacologic) and redistribution and/or rest injection, with or without quantification

**78466** Myocardial imaging, infarct avid, planar, qualitative or quantitative

**78468** with ejection fraction by first pass technique

**78469** tomographic SPECT with or without quantification

**78472** Cardiac blood pool imaging, gated equilibrium; planar, single study at rest or stress (exercise and/or pharmacologic), wall motion study plus ejection fraction, with or without additional quantitative processing

+ **78478** Myocardial perfusion study with wall motion, qualitative or quantitative study (list separately in addition to code for primary procedure) (Use 78478 only in conjunction with codes 78460, 78461, 78464 and 78465)

+ **78480** Myocardial perfusion study with ejection fraction (list separately in addition to code for primary procedure) (Use 78480 only in conjunction with codes 78460, 78461, 78464 and 78465)

+ **78496** Cardiac blood pool imaging, gated equilibrium; single study, at rest, with right ventricular ejection fraction by first pass technique. (list separately in addition to code for primary procedure)

**A4641** Supply of radiopharmaceutical diagnostic imaging agent, not otherwise classified

**A9500** Supply of radiopharmaceutical diagnostic imaging agent, technetium tc-99M sestamibi, per dose

**A9502** Supply of radiopharmaceutical diagnostic imaging agent. Tc 99m, tetrofosomine, per unit dose

**A9505** Supply of radiopharmaceutical diagnostic imaging agent, thallous chloride Tl 201, per MCI

**J0151** Injection, adenosine, 90 mg

**J0395** Injection, arbutamine HCl, 1 mg

**J1245** Injection, dipyridamole, per 10 mg

**J1250** Injection, dobutamine hydrochloride, per 250 mg

**ICD-9 Codes that Support Medical Necessity**

The correct use of an ICD-9-CM code listed in the “ICD-9 Codes that Support Medical Necessity” section does not guarantee coverage of a service. The service must be reasonable and necessary in the specific case and must meet the criteria specified in this LCD.

250.60 - 250.63 Diabetes with neurological manifestations

250.90 - 250.93 Diabetes with unspecified complication

394.0-394.9 Diseases of mitral valve

395.0-395.2 Diseases of aortic valve

396.0-396.3 Disease of mitral and aortic valve

396.8 Multiple involvement of mitral and aortic valves

401.1 Benign hypertension

401.9	Unspecified essential hypertension
402 -402.9	Hypertensive heart disease
410.02-410.82	Myocardial Infarction
411	Postmyocardial Infarction syndrome
411.1	Intermediate coronary syndrome
411.81	Coronary occlusion without MI
411.89	Coronary insufficiency
413.0-413.9	Angina
414.00-414.05	Atherosclerosis
414.06-414.07	Atherosclerosis transplanted heart and of bypass graft of transplanted heart
414.8	Specified chronic ischemic disease
414.9	Chronic ischemic heart disease, unspecified
416	Pulmonary hypertension
424.0-424.3	Valve disorders
425.0-425.9	Cardiomyopathy
426.10-426.9	Conduction disorders
427.0-427.89	Cardiac dysrhythmias
428.0-428.9	Heart failure
429	Myocarditis, unspecified
433.1	Occlusion/stenosis carotid artery
433.11	Occlusion/stenosis carotid artery
440.20-440.9	Atherosclerosis of extremities
441.00-441.9	Aortic aneurysm
745.2-745.5	Tetralogy of Fallot, Common ventricle, Ventricular septal defect ASD
746.00-746.7	Congenital anomalies of heart
746.81	Subaortic stenosis
746.85	Coronary artery anomaly
*780.2	Syncope
*785.1	
786.02	Orthopnea
786.05	Shortness of breath
786.09	Dyspnea
786.5	Chest pain, unspecified
786.51	Precordial pain
786.59	Other chest pain
794.3	Abnormal cardiovascular function study
794.31	Abnormal EKG
V72.81	Preoperative cardiovascular exam

### **Documentation Requirements**

- Documentation supporting the medical necessity, such as ICD-9-CM diagnosis codes, must be submitted with each claim. Claims submitted without such evidence will be denied as not medically necessary.
- Claims may be submitted electronically or on paper.

- Medical records must substantiate the medical necessity of the services, including a clinical diagnosis and the specific reason for the study.
- All segments of the service must have a formal interpretation and report.
- Requested records must be accompanied by a copy of the formal report and the reason for the referral for the test.
- The referral order must be kept on file in the patient's medical record.
- When billing for the purchase of radiopharmaceutical(s), a copy of the bill indicating the dosage administered, unit price per dose, name and total charge of the radioactive drug must be on file in the patient's medical record.

**Sources of Information**

This document was prepared as a collaborative effort of the American College of Cardiology (ACC) Carrier Advisory Committee (CAC) and the American Society of Nuclear Cardiology (ASNC).