



Crosswalk & Guideline of the NIA Heart (Cardiac) PET Scan

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HEART PET SCAN CROSSWALK:

HEART (Cardiac) PET Scan CPT Codes: 78459, 78491, 78492	Current Indications	New Indications
Indications for Cardiac PET Scan with Approved FDA Radioisotopes:		<i>Refer to Nuclear Cardiac Imaging/Myocardial Perfusion Study Guideline</i>
Evaluation in patient with suspected or known coronary artery disease	To qualify for PET perfusion scan done either at rest or with pharmacologic stress, the patient must meet National Imaging Associates criteria for indicated nuclear cardiac imaging/myocardial perfusion study and also:	To qualify for PET perfusion scan done either at rest or with pharmacologic stress, the patient must meet criteria◇ for indicated nuclear cardiac imaging/myocardial perfusion study AND
	Be likely to experience attenuation artifact with SPECT imaging due to factors such as morbid obesity, large breasts, breast implants, previous mastectomy, chest wall deformity, pleural pericardial effusion: OR	
	Have had a previous inadequate SPECT scan due to inadequate findings, technical difficulties with interpretation, or discordant results with previous clinical data	Patient had a previous inadequate SPECT/MPI imaging due to inadequate findings, technical difficulties with interpretation, or discordant results with previous clinical data.
Evaluation of myocardial viability prior to possible percutaneous or surgical revascularization if:	Previous SPECT test for viability is inadequate; AND	Previous SPECT/MPI imaging for viability is inadequate; AND
	Patient has severe left ventricular dysfunction (LVEF ≤ 35%)	Patient has severe left ventricular dysfunction (LVEF ≤ 35%)

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GUIDELINE INTRODUCTION:

Cardiac PET has two major clinical uses. First, it can characterize myocardial blood flow (perfusion scan). The FDA has approved both rubidium-82 (Rb-82) and nitrogen-13(N-13) radiotracers for this purpose. Second, PET can identify regions of myocardial viability that appear scarred (dead) on standard rest or stress SPECT/MPI imaging. The FDA has approved use of fluorine 18 (F-18) fluorodeoxyglucose for this purpose.

INDICATIONS FOR CARDIAC PET SCAN WITH APPROVED FDA RADIOISOTOPES:

- Evaluation of myocardial viability prior to possible percutaneous or surgical revascularization if:
 - Previous SPECT/MPI imaging for viability is inadequate; AND
 - Patient has severe left ventricular dysfunction (LVEF \leq 35%).
- Evaluation in patient with suspected or known Coronary Artery Disease.
 - To qualify for PET perfusion scan done either at rest or with pharmacologic stress, the patient must meet criteria \diamond for indicated nuclear cardiac imaging/myocardial perfusion study AND
 - Patient had a previous inadequate SPECT/MPI imaging due to inadequate findings, technical difficulties with interpretation, or discordant results with previous clinical data.

\diamond ACCF/ASNC/ACR/AHA/ASE/SCCT/SCMR/SNM 2009 APPROPRIATE USE CRITERIA for Nuclear Cardiac Imaging / Myocardial Perfusion Study:

ACCF et al. Criteria # MPI / Stress Echo	INDICATIONS (*Refer to Additional Information section) <input type="checkbox"/> <i>Not subject to Stress Echocardiogram contraindications as noted in section "Indications for a Nuclear Cardiac Imaging / Myocardial Perfusion Study". Please see explanation in Introduction, paragraph "6"</i>	APPROPRIATE USE SCORE (4-9); A= Appropriate; U=Uncertain (MPI / Stress Echo)
Detection of CAD/Risk Assessment: Symptomatic		
<i>Evaluation of Ischemic Equivalent (Non-Acute)</i>		
2 / 115	<ul style="list-style-type: none"> • Low pretest probability of CAD* • ECG uninterpretable OR unable to exercise 	A(7) / A(7)
3 / 116	<ul style="list-style-type: none"> • Intermediate pretest probability of CAD* • ECG interpretable AND able to exercise 	A(7) / A(7)
4 / 117	<ul style="list-style-type: none"> • Intermediate pretest probability of CAD* • ECG uninterpretable OR unable to exercise 	A(9) / A(9)
5 / 118	<ul style="list-style-type: none"> • High pretest probability of CAD* • Regardless of ECG interpretability and ability to exercise 	A(8) / A(7)
Detection of CAD: Asymptomatic (Without Ischemic Equivalent)		
<i>Asymptomatic</i>		
14 / 126	<ul style="list-style-type: none"> • Intermediate CHD risk (ATP III risk criteria)^{***} • ECG uninterpretable 	U(5) / U(5)
15 / 127	<ul style="list-style-type: none"> • High CHD risk (ATP III risk criteria)^{***} ✓ 	A(8) / U(5) ✓

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	<i>New-Onset or Newly Diagnosed Heart Failure With LV Systolic Dysfunction Without Ischemic Equivalent</i>	
16 / 128	<ul style="list-style-type: none"> • No prior CAD evaluation AND no planned coronary angiography 	A(8) / A(7)
	<i>New-Onset Atrial Fibrillation</i>	
17 / 132	<ul style="list-style-type: none"> • Part of evaluation when etiology unclear 	U(6) / U(6)
	<i>Ventricular Tachycardia</i>	
18 / NA	<ul style="list-style-type: none"> • Low CHD risk (ATP III risk criteria)^{***} 	A(7) / NA
19 / NA	<ul style="list-style-type: none"> • Intermediate or high CHD risk (ATP III risk criteria)^{***} 	A(8) / NA
	<i>Syncope</i>	
21 / 134	<ul style="list-style-type: none"> • Intermediate or high CHD risk (ATP III risk criteria)^{***} 	A(7) / A(7)
	<i>Elevated Troponin</i>	
22 / 135	<ul style="list-style-type: none"> • Troponin elevation without additional evidence of acute coronary syndrome (with ischemia is not subject to Stress Echocardiogram contraindications) ✓ 	A(7) / A(7) ✓
	Risk Assessment With Prior Test Results and/or Known Chronic Stable CAD	
	<i>Asymptomatic OR Stable Symptoms Normal Prior Stress Imaging Study</i>	
26 / 145	<ul style="list-style-type: none"> • Intermediate to high CHD risk (ATP III risk criteria)^{***} ✓ • Last stress imaging study done more than or equal to 2 years ago • If known CAD, not subject to Stress Echo contraindications 	U(6) / U(4) ✓
	<i>Asymptomatic OR Stable Symptoms Abnormal Coronary Angiography OR Abnormal Prior Stress Imaging Study, No Prior Revascularization</i>	
28 / 147	<ul style="list-style-type: none"> • Known CAD on coronary angiography OR prior abnormal stress imaging study • Last stress imaging study done more than or equal to 2 years ago 	U(5) / U(5)
	<i>Prior Noninvasive Evaluation</i>	
29 / 153	<ul style="list-style-type: none"> • Equivocal, borderline, or discordant stress testing where obstructive CAD remains a concern 	A(8) / A(8)
	<i>New or Worsening Symptoms</i>	
30 / 151	<ul style="list-style-type: none"> • Abnormal coronary angiography OR abnormal prior stress imaging study 	A(9) / A(7)

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ACCF et al. Criteria # MPI / Stress Echo	INDICATIONS (*Refer to Additional Information section) <input type="checkbox"/> <i>Not subject to Stress Echocardiogram contraindications as noted in section "Indications for a Nuclear Cardiac Imaging / Myocardial Perfusion Study". Please see explanation in Introduction, paragraph "6"</i>	APPROPRIATE USE SCORE (4-9); A= Appropriate; U=Uncertain (MPI / Stress Echo)
31 / 152	<ul style="list-style-type: none"> Normal coronary angiography OR normal prior stress imaging study 	U(6) / U(5)
<i>Coronary Angiography (Invasive or Noninvasive)</i>		
32 / 141	<ul style="list-style-type: none"> Coronary stenosis or anatomic abnormality of uncertain significance 	A(9) / A(8)
<i>Asymptomatic Prior Coronary Calcium Agatston Score</i>		
34 / 137	<ul style="list-style-type: none"> Low to intermediate CHD risk^{***} Agatston score between 100 and 400 	U(5) / U(5)
35 / 138	<ul style="list-style-type: none"> High CHD risk^{***} ✓ Agatston score between 100 and 400 	A(7) / U(6) ✓
36 / 139	<ul style="list-style-type: none"> Agatston score greater than 400 	A(7) / A(7)
<i>Duke Treadmill Score</i>		
38 / 149	<ul style="list-style-type: none"> Intermediate-risk Duke treadmill score^{****} 	A(7) / A(7)
39 / 150	<ul style="list-style-type: none"> High-risk Duke treadmill score^{****} 	A(8) / A(7)
Risk Assessment: Preoperative Evaluation for Noncardiac Surgery Without Active Cardiac Conditions		
<i>Intermediate-Risk Surgery</i>		
43 / 157	<ul style="list-style-type: none"> Greater than or equal to 1 clinical risk factor ✓ Poor or unknown functional capacity (less than 4 METs) 	A(7) / U(6) ✓
<i>Vascular Surgery</i>		
47 / 161	<ul style="list-style-type: none"> Greater than or equal to 1 clinical risk factor Poor or unknown functional capacity (less than 4 METS) 	A(8) / A(7)
Risk Assessment: Within 3 Months of an Acute Coronary Syndrome		
<i>STEMI</i>		
50 / 164	<ul style="list-style-type: none"> Hemodynamically stable, no recurrent chest pain symptoms or no signs of HF To evaluate for inducible ischemia No prior coronary angiography 	A(8) / A(7)
<i>UA/NSTEMI</i>		
52 / 166	<ul style="list-style-type: none"> Minor perioperative risk predictor Normal exercise tolerance (greater than or equal to 4 METS) Hemodynamically stable, no recurrent chest pain symptoms or no signs of HF To evaluate for inducible ischemia 	A(9) / A(8)

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ACCF et al. Criteria # MPI / Stress Echo	INDICATIONS (*Refer to Additional Information section) <input type="checkbox"/> <i>Not subject to Stress Echocardiogram contraindications as noted in section "Indications for a Nuclear Cardiac Imaging / Myocardial Perfusion Study". Please see explanation in Introduction, paragraph "6"</i>	APPROPRIATE USE SCORE (4-9); A= Appropriate; U=Uncertain (MPI / Stress Echo)
	<ul style="list-style-type: none"> No prior coronary angiography 	
	Risk Assessment: Post revascularization (Percutaneous Coronary Intervention or Coronary Artery Bypass Graft)	
	<i>Symptomatic</i>	
55 / 169	<ul style="list-style-type: none"> Evaluation of ischemic equivalent 	A(8) / A(8)
	<i>Asymptomatic</i>	
56 / 170	<ul style="list-style-type: none"> Incomplete revascularization Additional revascularization feasible 	A(7) / A(7)
57	<ul style="list-style-type: none"> Less than 5 years after CABG ✓ 	U(5) ✓
58 / 172	<ul style="list-style-type: none"> Greater than or equal to 5 years after CABG 	A(7) / U(6)
60 / 174	<ul style="list-style-type: none"> Greater than or equal to 2 years after PCI 	U(6) / U(5)
	Assessment of Viability/Ischemia	
	<i>Ischemic Cardiomyopathy/Assessment of Viability</i>	
62 / 176	<ul style="list-style-type: none"> Known severe LV dysfunction Patient eligible for revascularization 	A(9) / A(8)

◇ INDICATIONS FOR A NUCLEAR CARDIAC IMAGING/MYOCARDIAL PERFUSION STUDY:

To qualify for SPECT/MPI, the patient must meet ACCF/ASNC Appropriateness criteria for appropriate indications above and meets any one of the following conditions:

- Stress echocardiography is not indicated; OR
- Stress echocardiography has been performed however findings were inadequate, there were technical difficulties with interpretation, or results were discordant with previous clinical data; OR
- MPI is preferential to stress echocardiography including but not limited to following conditions:
 - Ventricular paced rhythm
 - Evidence of ventricular tachycardia
 - Severe aortic valve dysfunction
 - Severe Chronic Obstructive Pulmonary Disease, (COPD) as defined as FEV1 < 30% predicted or FEV1 < 50% predicted plus respiratory failure or clinical signs of right heart failure. (GOLD classification of COPD access http://www.pulmonaryreviews.com/jul01/pr_jul01_copd.html)
 - Congestive Heart Failure (CHF) with current Ejection Fraction (EF) , 40%
 - Inability to get an echo window for imaging
 - Prior thoracotomy, (CABG, other surgery)

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- Obesity BMI>40
- Poorly controlled hypertension [generally above 180 mm Hg systolic (both physical stress and dobutamine stress may exacerbate hypertension during stress echo)]
- Poorly controlled atrial fibrillation (Resting heart rate > 100 bpm on medication to control rate)
- Inability to exercise requiring pharmacological stress test
- Segmental wall motion abnormalities at rest (e.g. due to cardiomyopathy, recent MI, or pulmonary hypertension)

INDICATIONS FOR CARDIAC PET SCAN THAT REQUIRE FURTHER CLINICAL REVIEW

- Any request for more than one PET scan after treatment in the absence of new symptoms or signs.
- Repeat imaging for viability after approved imaging for perfusion completed OR repeat imaging for perfusion after approved imaging for viability completed.
- A PET scan to assess for coronary artery disease in the absence of likely attenuation artifact or previous inadequate SPECT/MPI imaging for patients in whom diagnostic coronary angiography is felt to be a high risk procedure (e.g. chronic kidney disease with high risk of contrast nephropathy, previous anaphylactic reaction to contrast medium, difficult arterial access).
- A PET scan to assess for viability in the absence of a previous inadequate SPECT/MPI imaging for viability and severe left ventricular dysfunction (LVEF ≤ 35%).

ADDITIONAL INFORMATION:

The applications for Cardiac Viability Imaging with FDG PET are:

- The identification of patients with partial loss of heart muscle movement or hibernating myocardium is important in selecting candidates with compromised ventricular function to determine appropriateness for revascularization.
- Distinguish between dysfunctional but viable myocardial tissue and scar tissue in order to affect management decisions in patients with ischemic cardiomyopathy and left ventricular dysfunction.

*Pretest Probability of CAD for Symptomatic (Ischemic Equivalent) Patients:

- **Typical Angina (Definite):** Defined as 1) substernal chest pain or discomfort that is 2) provoked by exertion or emotional stress and 3) relieved by rest and/or nitroglycerin.
- **Atypical Angina (Probable):** Chest pain or discomfort that **lacks 1** of the characteristics of definite or typical angina.
- **Nonanginal Chest Pain:** Chest pain or discomfort that **meets 1 or none** of the typical angina characteristics.

Once the presence of symptoms (Typical Angina/Atypical Angina/Non angina chest pain/Asymptomatic) is determined, the probabilities of CAD can be calculated from the risk algorithms as follows:

Age (Years)	Gender	Typical/Definite Angina Pectoris	Atypical/Probable Angina Pectoris	Nonanginal Chest Pain	Asymptomatic
<39	Men	Intermediate	Intermediate	Low	Very low
	Women	Intermediate	Very low	Very low	Very low
40–49	Men	High	Intermediate	Intermediate	Low
	Women	Intermediate	Low	Very low	Very low
50–59	Men	High	Intermediate	Intermediate	Low

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	Women	Intermediate	Intermediate	Low	Very low
>60	Men	High	Intermediate	Intermediate	Low
	Women	High	Intermediate	Intermediate	Low

- **Very low:** Less than 5% pretest probability of CAD
- **Low:** Less than 10% pretest probability of CAD
- **Intermediate:** Between 10% and 90% pretest probability of CAD
- **High:** Greater than 90% pretest probability of CAD

APPLICABLE CPT/HCPCS CODE(S):

78459	Myocardial imaging, positron emission tomography (PET), metabolic evaluation
78491	Myocardial imaging, positron emission tomography (PET), perfusion; single study at rest or stress
78492	Myocardial imaging, positron emission tomography (PET), perfusion; multiple studies at rest and/or stress

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REFERENCES

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