

## Dual Isotope Myocardial Perfusion Imaging Protocol

### Indications:

1. Detection of obstructive coronary artery disease (CAD) in the following:
  - a. Patients with an intermediate pretest probability of CAD based on age, gender, and symptoms.
  - b. Patients with high-risk factors for CAD (e.g., diabetes mellitus, peripheral, or cerebral vascular disease).
2. Risk stratification of post-myocardial infarction patients before discharge (submaximal test at 4-6 days), and early (symptom-limited at 14-21 days) or late (symptom-limited at 3-6 weeks) after discharge.
3. Risk stratification of patients with chronic stable CAD into a low-risk category that can be managed medically or into a high-risk category that should be considered for coronary revascularization.
4. Risk stratification of low-risk acute coronary syndrome patients (without active ischemia and/or heart failure 6-12 hours after presentation) and of intermediate-risk acute coronary syndrome patients 1-3 days after presentation (without active ischemia and/or heart failure symptoms).
5. Risk stratification before non-cardiac surgery in patients with known CAD or those with high-risk factors for CAD.
6. To evaluate the efficacy of therapeutic interventions (anti-ischemic drug therapy or coronary revascularization) and in tracking subsequent risk based on serial changes in myocardial perfusion in patients

### Contraindications and Precautions:

1. High-risk unstable angina. However, patients with chest pain syndromes at presentation, who are otherwise stable and pain-free, can undergo exercise stress testing.
2. Decompensated or inadequately controlled congestive heart failure.
3. Uncontrolled hypertension (blood pressure  $>200/110$  mm Hg).
4. Uncontrolled cardiac arrhythmias (causing symptoms or hemodynamic compromise).
5. Severe symptomatic aortic stenosis.
6. Acute pulmonary embolism.
7. Acute myocarditis or pericarditis.
8. Acute aortic dissection.
9. Severe pulmonary hypertension.
10. Acute myocardial infarction ( $<4$  days).
11. Acutely ill for any reason.

### Relative Contraindications:

Relative contraindications for exercise stress testing include:

1. Known left main coronary artery stenosis.
2. Moderate aortic stenosis.
3. Hypertrophic obstructive cardiomyopathy or other forms of outflow tract obstruction.
4. Significant tachyarrhythmias or bradyarrhythmias.
5. High-degree atrioventricular (AV) block.
6. Electrolyte abnormalities.
7. Mental or physical impairment leading to inability to exercise adequately.
8. Patients with complete left bundle branch block (LBBB), permanent pacemakers, and ventricular pre-excitation (Wolff-Parkinson-White syndrome) should preferentially undergo pharmacologic vasodilator stress test (not dobutamine stress test).

### Patient Preparation:

1. NPO for 4 hours.
2. No caffeine containing food or liquids for 12 – 18 hours prior to the test.

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3. Medications that interfere with the test results should be discontinued for an appropriate time as determined by cardiologist. These medications include: beta blockers, calcium channel blocks, long acting nitrates, theophylline products
4. Comfortable clothes.
5. Removal of metal and objects that might attenuate in the field of view.
6. Using universal precautions, an IV is placed in an antecubital vein for injection of both the rest and stress doses. Each injection is followed by a flush of 10 ml of normal saline.

### Radiopharmaceuticals/Pharmaceuticals:

#### Rest:

Identity: Thallium-201 (Tl-201)  
Dose: 2.5 – 4.0 mCi  
Route adm: Intravenous

#### Stress:

Identity: Tc<sup>99m</sup> Sestamibi or Tetrofosmin  
Dose: 24 - 36 mCi

Route adm: Intravenous

### Procedure:

1. Tl-201 dose is injected at rest and SPECT imaging may begin in 10-15 minutes.
2. The patient is positioned in the supine position with the left arm raised above the head.
3. Images are obtained using the following parameters:
  - Energy Window: 25-30% symmetric 70 keV; 20% symmetric 167 keV
  - Collimator: Low Energy High Resolution (LEHR)
  - Orbit: 180 degree (45 degree RAO to 45 degree LPO)
  - Orbit type: Circular or noncircular depending on camera vendor
  - Pixel size: 6.4 mm
  - Acquisition type: Either step and shoot or continuous
  - Number of projections: 32 preferred; 64 optional
  - Matrix: 64 x 64
  - Time/projection: 40 seconds for 32 projections; 25 seconds for 64 projections
  - ECG Gating: Can be attempted but time/stop may need to be increased
    - a. Frames/cycle: 8
    - b. R – R window 100%
4. Following the rest imaging, the patient is exercised and the Tc<sup>99m</sup> tracer is injected at peak exercise. The patient continues to walk 1-2 minutes. (1 -2 minutes for Tc tracers right?)
5. Stress imaging may begin 15 – 60 minutes post injection.
6. Stress imaging is performed using the following parameters:
  - Energy Window: 15-20% symmetric 140 keV
  - Collimator: Low Energy High Resolution (LEHR)
  - Orbit: 180 degree (45 degree RAO to 45 degree LPO)
  - Orbit type: Circular or noncircular depending on camera vendor
  - Pixel size: 6.4 mm
  - Acquisition type: Either step and shoot or continuous
  - Number of projections: 60 - 64
  - Matrix: 64 x 64
  - Time/projection: 20 seconds
  - ECG Gating -

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- a. Frames/cycle: 8 or 16
  - b. R – R window 100%
7. The images are processed using the labs usual myocardial perfusion quantitation software such as Cedars AutoQuant, Emory Cardiac Toolbox, 4DM SPECT or Wackers-Lui. Filters will vary per camera manufacturer and the lab should verify filters with the manufacturer. Thallium - Filtered backprojection with a Butterworth filter, order 5 and cut-off 0 – 0.5 (Gated 0.2, Non-gated 0 .25)

Note for ICANL Accredited Laboratories:

All protocols must contain detailed, site-specific, camera specific instructions for: acquisition, processing, display and labeling

**SAMPLE**