Division of Nuclear Medicine Procedure / Protocol

REST MUGA SCAN   **CPT CODE: 78472**
UPDATED: June 2020

Indications: Evaluation of ventricular function in the resting state.
Data is collected from several hundred cardiac cycles to generate an image set of the beating heart that is presented as a single, composite cardiac cycle. The method can be used to assess (a) regional and global wall motion; (b) cardiac chamber size and morphology, and (c) ventricular systolic and diastolic function, including left and right ventricular ejection fractions (LVEF and RVEF, respectively).

Parameters obtained from a MUGA include the following:
1. Global ventricular systolic function
2. Regional wall motion
3. Ventricular volumes (qualitative or quantitative)
4. Systolic and diastolic function indices
5. Stroke volume ratios

Common clinical settings in which a MUGA may be useful include:
1. Known or suspected coronary artery disease (CAD)
    a. CAD without myocardial infarction (MI)
    b. Remote MI
    c. Acute MI
2. To help distinguish systolic from diastolic causes of congestive heart failure (CHF) in patients with known or suspected CHF
3. Evaluation of cardiac function in patients undergoing chemotherapy
4. Assessment of ventricular function in patients with valvular heart disease

Patient Prep: No prep (no NPO). It is not necessary to withhold medications.

Scheduling: 75 minutes of imaging time and 15 minutes processing.

Radiopharmaceutical
& Dose: *Ultratag labeling of RBCs is to be used.* 20 mCi TcO$_4^-$ +/-20%. Dose will be adjusted for patient weight if ≤ 50 kg or ≥ 90 kg (refer to nomogram).

The patient's RBCs are labeled with Ultratag® RBC kit. Collect 1.0 to 3.0 ml of the patient's blood using heparin as an anticoagulant. Use 10-15 units of heparin currently stocked in 1000:1 dilution; to get 10-15 units only fill the needle hub as the required volume is 0.015 ml. *For patients who are allergic to heparin use 0.5 ml ACD (aka and stocked as Citrate Anticoagulation Solution Injection 4%) instead of heparin.*

Transfer the patient's blood to the reaction vial and gently mix to dissolve the lyophilized material. Allow to react for 5 minutes. Add contents of Syringe I, mix by inverting 4-5 times. Add the contents of Syringe II, mix by inverting 4-5 times. Place the vial in a lead shield and add the TcO$_4^-$. Mix the vial by gently inverting 4-5 times and allow to react for 20 minutes with occasional mixing. Re-inject the Tc-99m-labeled red blood cells.

Imaging Device: Use GE Infinia cameras with LEHR collimator in 180° configuration (H mode), the GE MPS with the LEHR collimator, or the Optima 640 with LEHR collimators in H mode. Use the GE R-wave trigger to gate the acquisition. Three electrodes are placed on the chest (upper left chest, upper right chest, lower left chest).

Imaging Procedure: Data is collected in the anterior, the best septal (45°) LAO, and left lateral (LAO 70-90°) positions.

Division of Nuclear Medicine Procedure / Protocol

Data Acquisition:

GE INFINIA/Optima 640Systems:		GE MPS Camera:	
Stop Conditions:	3500 Kcts	Stop Conditions:	4000 Kcts
Gating Parameters:	Frames/cycle: 24 Time selected	Num Bins:	24
Image Settings:	Zoom: 2.57 Matrix: 64x64	Image Settings:	Zoom: 1.60 Matrix: 64x64
Triggers:	High%: 15 Low%: 15	Triggers:	Center %: 100 Width %: 40
Peak:	140+/- 10%	Peak:	140, width = 20

Processing:

The cine loop should be reviewed for adequacy of counting statistics, appropriate ECG gating, adequacy of radiopharmaceutical labeling, and positioning of the heart. If any inadequacy is observed, a nuclear physician should be notified.

Do not process any images until **all three** datasets have been acquired. Processing each individual dataset as they are acquired will result in **multiple** result series being created and disabling automatic EF review for the physicians.

To Process:

1. Select the entire patient from the patient index.

2. Select the **EF Analysis** application.

3. Select **Filter only** from the EF Analysis page.
   This will filter and display each dataset. Select **cine** so all three datasets are in motion.

4. Select the **DynamicSCScreenBW** using the print icon. Save and name the screen as **DynamicSCfiltraw**.

5. Select **EF:Automatic** from the processing menu.
   The 45LAO will automatically be displayed and a ROI will appear. Adjust the ROI so all the activity from the left ventricle is loosely encompassed by the ROI. Use of the phase and amplitude images at the bottom of the screen to ensure the atrium is not included in the ROI.

6. Select **proceed**. Check all ROI's .
   The ROI used for background correction should be free of activity from the spleen or descending aorta. If the automatic application does not track the left ventricle, then the manual processing must be used.

7. Select **cine** so the 45LAO is in motion.

8. Select **DynamicSCScreenColor** using the print icon. Save and name the screen as **DynamicSCEF**.

9. Select **file** and **quit** to exit the EF analysis application.

10. Select the **Peak Filling Rate** application.

11. Processing is automatic.
    Save the screen by selecting **DynamicSCScreenColor** using the print icon. Save and name the screen as **DynamicSC(ClinicalSummary)PFR.**

12. Select **file** and **save and exit**.

UW Health
University of Wisconsin
Hospital and Clinics

PACS:

Send all three save screens. Also send all three filtered datasets located under the result series named *ef_results_1* and the raw data files themselves. (PACS will be the archive of the raw data.)

MD Workstation:

Send all three save screens. Also send all three filtered datasets located under the result series named *ef_results_1* and all raw data to the MD Cardiac Workstation/Xeleris (XELMD).

Interpretation:

The morphology, orientation, and sizes of the cardiac chambers and great vessels should be evaluated subjectively and reported. Global left ventricular function should be assessed qualitatively and compared with the calculated ejection fraction. Discrepancies should be resolved by reprocessing. Normal values for LVEF range between 50% and 80% at rest.

All left ventricular segments should be assessed for regional function using cinematic display of each view. Abnormalities of contraction should be described using the conventional terms of mild, moderate, or severe hypokinesia, akinesia and dyskinesia. The pattern of left ventricular diastolic function may be evaluated qualitatively from the volume curve. Results should be compared with previous studies.

_____

Reviewed By:

_____   _____   _____
Scott B. Perlman, MD, MS   Charles Stone, MD   Derek Fuerbringer, CNMT
Chief, Nuclear Medicine   Chief, Nuclear Cardiology   Manager, Nuclear Medicine

_____   _____   _____
Scott Knishka, RPh, BCNP   John Vetter, PhD, DABR
Radiopharmacist   Medical Physicist