MUGA (Multiple Gated Acquisition Scan) - Single Service

Clinical Guidelines for Medical Necessity Review

Version: 1.0
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Important Notices

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Guideline Information:

Specialty Area: Cardiovascular Disease
Guideline Name: Multiple Gated Acquisition (MUGA) Scan (Single Service)

Literature review current through: 12/8/2023
Document last updated: 12/8/2023
Type: [**X**] Adult (18+ yo) | [_] Pediatric (0-17yo)

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Medical Necessity Criteria

Service: MUGA (Multiple Gated Acquisition Scan) -Single Service

General Guidelines

- **Units, Frequency, & Duration:** None
- **Criteria for Subsequent Requests:** MUGA scans may be used to assess cardiac damage before, during, or after cancer treatment.
- **Recommended Clinical Approach:** A multiple gated acquisition scan (MUGA scan) is a noninvasive, nuclear medicine test used to evaluate the heart's structural and dynamic properties. Other names include radionuclide angiography (RNA), radionuclide ventriculography (RVG), gated equilibrium radionuclide angiography (ERNA), and blood pool imaging. It uses a radioactive tracer to create a computerized image of the heart as it beats. The primary contemporary use of a MUGA scan is for evaluating the overall ability of the heart to pump blood by calculating a left and right ventricular ejection fraction and assessing regional wall motion abnormalities. However, there are multiple other possible uses for a MUGA scan, such as the assessment of the orientation of the heart and great vessels in the chest, determination of diastolic dysfunction, evaluation of valve motion, and assessment for intracardiac shunts.[1,5]

  There are a number of protocols that can be utilized. An equilibrium MUGA scan most commonly utilizes technetium-99m (Tc-99m) pertechnetate bound to red blood cells. Accordingly, the technetium remains within the blood pool, and serial imaging studies to assess function can be acquired over several hours. A “first-pass” study radionuclide angiography utilizes rapidly acquired image frames to observe a bolus of technetium-99m or another suitable radionuclide as it moves through the venous system into the right atrium, right ventricle, pulmonary artery, lungs, left atrium, left ventricle and aorta.[2] The procedure can give a separate evaluation of right ventricular function as well as assessing for an intracardiac shunt.[2]

Other Cardiac radionuclide imaging includes myocardial infarct avid scintigraphy, which is used in patients in whom it is not possible to make a definitive diagnosis of myocardial infarction by ECG or enzyme testing, if the duration from onset of the infarction is greater than 24 hours and less than 7 days.[2,5] Technetium-99m (stannous) pyrophosphate localizes in recently infarcted myocardium with the most intense visualization usually 48-72 hours after infarction.[2]

- **Exclusions:** The dose of radioactive materials used in nuclear medicine imaging can be different for every test, but in general, is small. All cardiac radionuclide studies should have the risks and benefits of the procedure reviewed with the patient.

Medical Necessity Criteria

Indications

➔ A **MUGA scan** is considered appropriate if **ANY** of the following is **TRUE**:

- ◆ **An equilibrium MUGA scan** is considered appropriate for evaluation of ventricular size, wall motion, stroke volume, and ejection fraction when this information is medically necessary to direct further evaluation and management for **ALL** of the following:[1-5]
  - **ANY** of the following clinical scenarios is **TRUE**:
    - Assessment of when ventricular function is required for management, and transthoracic echocardiography (TTE) or other imaging have proven inadequate; **OR**
    - When there are conflicting results between other testing in the measurement of ejection fraction (EF), and the results of the MUGA will help in the management of the patient; **AND**
  - **ANY** of the following:
    - Evaluation of ventricular function in a patient with myocardial disease; **OR**
    - Determination of accurate LVEF in patients with ongoing heart failure despite guideline-directed medical therapy; **OR**
    - Evaluation for ventricular dysfunction with post-transplant rejection; **OR**

        - Evaluation of patient in whom accurate measure of ejection fraction is needed to make determination of whether to implant defibrillator or biventricular pacemaker; **OR**
        - Evaluation prior to chemotherapy, and subsequently for monitoring and follow-up of patient receiving chemotherapeutic drug that is potentially cardiotoxic (eg, doxorubicin [Adriamycin]); **OR**
    - A **first pass study** is considered appropriate for **ANY** of the following:[2,3]
        - Need for assessment or identification of shunt (eg, suspected congenital abnormality); **OR**
        - Information has not been previously obtained or likely to be obtained from other planned tests such as echocardiography or equilibrium gated blood pool studies; **OR**
        - Assessment of right ventricular ejection fraction when transthoracic echocardiography (TTE) or other imaging have proven inadequate; **OR**
    - **Infarct avid scintigraphy** is considered appropriate for **ALL** of the following:[2,3]
        - Clinical scenario where is not possible to make definitive diagnosis of myocardial infarction by ECG or enzyme testing; **AND**
        - The duration from onset of the infarction is greater than 24 hours and less than 7 days.

Non-Indications

- ➔ **MUGA scans/cardiac radionuclide imaging** are **NOT** considered appropriate for **ANY** of the following:
    - Pregnant or lactating patients; **OR**
    - Known allergy or sensitivity to the radioactive or other materials used during the procedure.

Level of Care Criteria

Inpatient or Outpatient

Procedure Codes (HCPCS/CPT)

HCPCS/CPT Code	Code Description
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
78473	Cardiac blood pool imaging, gated equilibrium; multiple studies, wall motion study plus ejection fraction, at rest and stress (exercise and/or pharmacologic), with or without additional quantification
78481	Cardiac blood pool imaging (planar), first pass technique; single study, at rest or with stress (exercise and/or pharmacologic), wall motion study plus ejection fraction, with or without quantification
78483	Cardiac blood pool imaging (planar), first pass technique; multiple studies, at rest and with stress (exercise and/or pharmacologic), wall motion study plus ejection fraction, with or without quantification
78494	Cardiac blood pool imaging, gated equilibrium, spect, at rest, wall motion study plus ejection fraction, with or without quantitative processing
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)

78466	Myocardial imaging, infarct avid, planar; qualitative or quantitative
78468	Myocardial imaging, infarct avid, planar; with ejection fraction by first pass technique
78469	Myocardial imaging, infarct avid, planar; tomographic spect with or without quantification

Medical Evidence

Mitra et al. (2012) describe two important uses of MUGA scans in day-to-day clinical practice: serial assessment of left ventricular ejection fraction (LVEF) in patients who are receiving cardiotoxic chemotherapy as well as with intractable heart failure (HF) patients to determine an accurate LVEF. Additionally, in heart failure patients, identifying diastolic dysfunction in HF with preserved LVEF and evaluation of dyssynchrony with MUGA single photon emission tomography prior to cardiac resynchronization therapy.[1]

A 1995 American College of Cardiology guideline from the Committee on Radionuclide Imaging. Gated equilibrium blood pool radionuclide angiography under rest and stress is recommended in chronic ischemic heart disease to determine accurate left and right ventricular ejection fraction values and ability to assess regional wall motion. Rest and exercise or pharmacological stress may be appropriate.[2]

There are two related Local Coverage Determinations (LCDs) from Centers for Medicare and Medicaid Services (CMS):[3,4]

- Local Coverage Determination (LCD) L33960: Cardiovascular Nuclear Medicine (Revised 2023)
- Local Coverage Determination (LCD) L33457: Cardiac Radionuclide Imaging (Revised 2023)

References

1. Mitra D, Basu S. Equilibrium radionuclide angiocardiography: Its usefulness in current practice and potential future applications. World J Radiol. 2012 Oct 28;4(10):421-30.
2. Ritchie J, Bateman T et al. Guidelines for Clinical Use of Cardiac Radionuclide Imaging Report of the American College of Cardiology/American 'Heart Association Task Force on Assessment of Diagnostic and Therapeutic Cardiovascular Procedures (Committee on Radionuclide Imaging), Developed in Collaboration With the American Society of Nuclear Cardiology. J Am Coll Cardiol. 1995 Feb, 25 (2) 521–547.
3. Centers for Medicare and Medicaid Services. Cardiovascular Nuclear Medicine. Effective January 26, 2023. https://www.cms.gov/ medicare-coverage-database/ view/lcd.aspx?lcdId=33960&ver=24.
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5. Odak M & Kayani W. (2023, July 25). MUGA Scan. In *StatPearls.* StatPearls Publishing. Retrieved November 20, 2023 from https://www.ncbi.nlm.nih.gov/ books/NBK564365/.

Clinical Guideline Revision History/Information

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Review History	