Cohere Medical Policy - MUGA (Multiple Gated Acquisition Scan)

Clinical Guidelines for Medical Necessity Review

Version: 2
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Important Notices

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Guideline Information:

Specialty Area: Diagnostic Imaging
Guideline Name: Cohere Medical Policy - Multiple Gated Acquisition (MUGA) Scan

Date of last literature review: 1/17/2025
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Type: [**X**] Adult (18+ yo) | [**X**] Pediatric (0-17yo)

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Service: MUGA (Multiple Gated Acquisition Scan)

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 to evaluate 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 many other possible uses for a MUGA scan, including assessing the orientation of the heart and great vessels in the chest, determining diastolic dysfunction, and evaluating valve motion. [1-5]

An equilibrium MUGA scan most commonly utilizes technetium-99m (Tc-99m) pertechnetate bound to red blood cells. The technetium remains within the blood pool, and serial imaging studies to assess function can be acquired over several hours. A “first-pass” study utilizes rapidly acquired image frames to observe a bolus of technetium-99m or other 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 assess for an intracardiac shunt.[2]

Other cardiac radionuclide imaging includes myocardial infarct avid scintigraphy, which is used when it is not possible to make a definitive diagnosis of myocardial infarction by electrocardiogram (ECG) or enzyme testing.[2,4] Technetium-99m (stannous) pyrophosphate localizes in recently infarcted myocardium with the most intense visualization, usually 48-72 hours after infarction.

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:[1-4]
  - **ANY** of the following clinical scenarios is **TRUE**:
    - Assessment of ventricular function when required for management, and transthoracic echocardiography (TTE) or other imaging have proven inadequate[5]; **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[2]; **OR**
    - Determination of accurate left ventricular ejection fraction (LVEF) in patients with ongoing heart failure despite guideline-directed medical therapy; **OR**
    - Evaluation for ventricular dysfunction with post-transplant rejection[2]; **OR**
    - Evaluation of patient in whom accurate measure of ejection fraction is needed to make a determination of whether to implant defibrillator or biventricular pacemaker; **OR**
    - Evaluation prior to chemotherapy and subsequently after chemotherapy for monitoring and follow-up of patient receiving any potentially cardiotoxic chemotherapy agent[3]; **OR**
- ◆ A **first pass MUGA study** is considered appropriate for **ANY** of the following:[2]
  - Need for assessment or identification of intracardiac shunt (e.g., suspected congenital abnormality)[2]; **OR**

- Information has not been previously obtained or is not likely to be obtained from other planned tests, such as echocardiography or equilibrium gated blood pool studies; **OR**
- Assessment of right ventricular ejection fraction (RVEF) when TTE or other imaging has proven inadequate[4]; **OR**

Non-Indications

➔ A **MUGA scan** is **NOT** considered appropriate for **ANY** of the following:

- ◆ Pregnant or breastfeeding patients; **OR**
- ◆ Known allergy or sensitivity to the materials used during the procedure.

Disclaimer on Radiation Exposure in Pediatric Populations

Due to the heightened sensitivity of pediatric patients to ionizing radiation, minimizing exposure is paramount. At Cohere, we are dedicated to ensuring that every patient, including the pediatric population, has access to appropriate imaging following accepted guidelines. Radiation risk depends mainly on the patient's age at exposure, the organs exposed, and the patient's sex, though there are other variables. The following technical guidelines are provided to ensure safe and effective imaging practices:

Radiation Dose Optimization: Adhere to the lowest effective dose principle for pediatric imaging. Ensure that imaging protocols are specifically tailored for pediatric patients to limit radiation exposure.[5,6]

Alternative Modalities: Prioritize non-ionizing imaging options such as ultrasound or MRI when clinically feasible, as they are less likely to expose the patient to ionizing radiation. For instance, MRI or ultrasound should be considered if they are more likely to provide an accurate diagnosis than CT, fluoroscopy, or radiography.[5,6]

Cumulative Dose Monitoring: Implement systems to track cumulative radiation exposure in pediatric patients, particularly for those requiring multiple imaging studies. Regularly reassess the necessity of repeat imaging based on clinical evaluation.[5,6]

CT Imaging Considerations: When CT is deemed the best method for

achieving a correct diagnosis, use the lowest possible radiation dose that still yields reliable diagnostic images.[5,6]

Cohere Imaging Gently Guideline: The purpose of this guideline is to act as a potential override when clinically indicated to adhere to Imaging Gently and Imaging Wisely guidelines and As Low As Reasonably Possible (ALARA) principles.

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]

For decades, Multi Gated Acquisition (MUGA) scans have been used to detect ventricular dysfunction.[7] However, due to concerns surrounding serial radiation exposure, echocardiography has largely superseded MUGA scans to become the primary method of medical imaging used to monitor and manage chemotherapy-induced cardiomyopathy.[8] Patients living with breast cancer and patients receiving trastuzumab were found to be particularly vulnerable to radiation exposure and secondary cancer risk associated with repeated MUGA scans.[9] However, the imaging test is still used to monitor left ventricular ejection fraction (LVEF) in clinical settings due to its high reproducibility and ease of administration.[5]

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. Fernández AE. Chemotherapy-induced dysfunction. E-Journal of Cardiology Practice. 2017 Mar;14(40).
4. Printezi MI, Yousif LI et al. LVEF by multigated acquisition scan compared to other imaging modalities in cardio-oncology: A systematic review. *Curr Heart Fail* Rep.2022;19(3): 136-145.
5. The Image Gently Alliance. Procedures - image gentle and CT scans. Updated 2014. Accessed December 9, 2024. https://www.imagegently.org/Procedures/Computed-Tomography
6. National Cancer Institute. Radiation risks and pediatric computed tomography (CT): A guide for health care. Updated September 4, 2018. Accessed December 9, 2024. https://www.cancer.gov/about-cancer/causes-prevention/risk/radiation/pediatric-ct-scans
7. Huang H, Nijjar PS et al. Accuracy of left ventricular ejection fraction by contemporary multiple gated acquisition scanning in patients with cancer: comparison with cardiovascular magnetic resonance. *J Mag Reson.* 2017;19:1-9.
8. Verquer EM. Imaging used to detect and monitor cardiotoxicity from chemotherapy. *Radiol Technol*. 2022;94(1): 51-52.
9. Kolla BC, Sunny Roy SS et al. Cardiac imaging methods for chemotherapy-related cardiotoxicity screening and related radiation exposure: Current practice and trends. *Anticancer Res*. 2017; 37(5): 2445-2449.

Clinical Guideline Revision History/Information

Original Date: December 8, 2023		
Review History		
Version 2	1/23/2025	• Annual Review • In indications: Deleted Infarct avid scintigraphy indication. • In non-indications: The word “lactating” has been replaced by “breastfeeding” to include a patient who has had a stillbirth and is physiologically lactating but not feeding a baby with breast milk or a patient who is formula feeding baby and is physiologically lactating but not feeding a baby with breast milk. • Removed CMS references. • Added reference on chemotherapy-induced dysfunction (reference #4)