Cardiac MRI Guidance

Understanding the Exam

Cardiac MRI exams evaluate the heart's structure and function and assess the blood flow through it. A cardiac viability scan evaluates scar tissue in the heart muscle after an injury such as a heart attack. Tissue that is considered viable can recover from the injury, but nonviable tissue will not recover. This helps evaluate a patient's need for heart surgery or other procedures. Late Gadolinium Enhancement (LGE) imaging is used to check for injuries or scars for these studies. Perfusion studies measure how blood flows in the heart muscle. These studies can show a reduction in blood flow caused by a narrowing in coronary arteries from coronary artery disease. A stress test is performed as part of a perfusion study to compare how blood flows at rest and how blood flows during periods of exertion.

These studies typically take about 90 minutes to complete.

Performing and approving users

Action	User	Required Credentials
Performed By	MRI Technologist	Registered Technologist in Magnetic Resonance Imaging - R.T.(R)(MRI)(ARRT)
Read By	Radiologist or Cardiologist	Typically, board-certified in radiology or cardiology and have completed an accredited cardiovascular magnetic resonance (CMR) program, may be certified by the Society for Cardiovascular Magnetic Resonance (SCMR)

Facility Types

This type of study is performed in these facility types:

- Community hospitals
- Outpatient imaging centers
- Public health facilities
- University-affiliated teaching hospitals and medical institutions
- Government and private research institutes
- Medical imaging facilities

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Worksheet

Measurements and Observations

This section has 3 standard tabs and 15 study type-specific tabs.

Standard Tabs	Study-Specific Tabs
• Report Images • Report Attachments • Report Recipients	• *Stress Test* • *Resting EKG/ECG* • *Stress Protocol* • *LV* • *LA* • *RA* • *RV* • *AV* • *MV* • *TV* • *PV* • *Pericardium* • *Aorta* • *PA* • *IVC*

Protocol

The worksheet has six protocols:

- Function
- Viability
- Perfusion
- Perfusion and Viability
- Valve Assessment
- Structural Assessment

Select a protocol to adjust the worksheet to accommodate the imaging technique.

- The Function, Valve Assessment, and Structural Assessment protocols omit the Viability and Perfusion diagrams and observations from the LV tab.
- The Viability protocol omits the Perfusion diagram and observations from the LV tab.
- The Perfusion protocol omits the Viability diagram and observations from the LV Tab.

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Calculated values

Find calculated values in the Studycast Help.

My Choices Form Options

Find My Choices options on the Cardiac MRI My Choices Form.

Report

Use the Display IDiagram images on report option to include or exclude the function, viability, or perfusion diagrams on the final report. Users can toggle diagrams on a per-study basis.

Accreditation

Studycast reports meet requirements from:

- American College of Radiology (ACR)

Demo Path

Use this demo path when training after covering the basic worksheet orientation.

If Training a Technologist

Study Quality defaults to Excellent (default can be something else)

- Protocol defaults to Perfusion and Viability
- Procedure defaults to Cardiac
- Test Type defaults to Exercise
- Informed Consent can be checked or unchecked by default

Contrast, sedation, and magnet information can also be documented in the tables section.
Open the report to show how these fields affect the procedure statement on the report.

Stress Test Tab

[be sure to have a preset favorite to add this information ahead of time and then simply note that a user should enter the relevant values on the first pass through.
Enter stress test information on the Stress Test tab. This information can be:

- The resting, peak, and recovery EKG/ECG.
- The duration of the exercise.
- Test symptoms.
- The reason for stopping.

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To show the Stress Test tab:

1. Document a rhythm for Resting EKG/ECG, Peak EKG/ECG, and an arrhythmia.
2. Enter “Chest Pain” as a reason for stopping in the Exercise section.
3. Show the following fields and explain their calculations:
    a. Max APHR.
    b. 90% of Max APHR (Target).
    c. % of Max APHR.
4. The Max Achieved field populates with the highest heart rate from the stress stages on the Nuclear Imaging Protocol tab by default.
    a. There is a worksheet option to populate this field from the highest HR from all stages or only the last stage.
5. Generate the findings to show how the EKG/ECG information affects the statements.
6. Preview the report. Show which information displays on the report.

Stress Protocol Tab

The technologist enters blood pressures (BP) and heart rates (HR) here.

1. Enter BP and HR information at rest and each stress stage.
2. Generate the findings statements. Show the statements.
3. Preview the report. Show how the information entered on this tab displays on the report.

Heart Chambers

The four heart chamber tabs (LV, LA, RA, RV) as well as the Aorta tab contain measurements and observations. Abnormal measurements highlight in red. The findings and conclusions are on the right of the screen.

- On the LV tab, there are three interactive diagrams: wall motion, hyperenhancement, and perfusion. Clicking on any one segment makes a selection. Clicking again rotates through the observations for each segment. You can also click the legend and then click multiple segments to apply that observation to the segments clicked. Ctrl-click sets all values to the current legend selection. The Wall Motion diagram drives the Global Wall Motion observation.
- The Hyperenhancement diagram drives Viability and HE Wall Thickness observations.
- The Perfusion diagram drives the Perfusion observations.

Set the apical segment hyperenhancement to 51-75%. Show how this affects the viability and HE wall thickness observations for the LAD territory. Select Mid-wall HE as the pattern and Sarcoidosis as the etiology. Show how this affects the and statements.

Set perfusion to Transmural defect. Show how this affects the observations and statements.

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Note whether the client has the diagrams set to appear on the report by default and demonstrate that you can toggle them on/off for this particular study (Display on report check box).

Show example of documenting abnormality on another tab.

Mitral valve: choose mild stenosis and mild regurgitation, then click Generate to update the findings.

Note: This combination can generate two statements or a single combined statement, depending on what the client chose in the MyChoices form.

Generate conclusions and note that it pulls down everything from the LV as it did before, along with other abnormal statements, including the one we just generated for the mitral valve.

Conclusions either:

- ALWAYS pull down everything from the left ventricle (and RV, if MyChoices option set) and statements from any tab where an abnormal observation was noted. Or (based on MyChoices option)
- Pull down everything from LV (and RV if MyChoices option set) and ONLY statements generated from abnormal observation selections.

Demonstrate how to enter additional findings by adding something like “more abnormal info.” Then regenerate conclusions and note whether that free-typed statement is pulled down (MyChoices option: default = yes). Click **X** to delete this statement from the Conclusions if it is not needed.

Key Studycast Benefit

Instead of choosing each finding statement to pull down to conclusions individually, the worksheet automatically pulls down LV and all statements from any tab with abnormal observation. This saves time and you won’t accidentally miss something. (MyChoices option on everything from tab with abnormal observation vs. only abnormal statements should be based on user preference/ likelihood of free text in findings.)

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SWOT Analysis

Strengths: • Ability to document stress or rest studies • Ability to document function, viability, and perfusion from diagram	**Weaknesses**:
Opportunities:	**Threats**: • We do not offer advanced MRI image processing like some other PACS

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