Dilated Cardiomyopathy: An AHP Guide

Authors: Ashwin Venkateshvaran and Aideen Fallon

Dilated Cardiomyopathy (DCM) is a primary myocardial disease characterized by dilation and impaired systolic function of one or both ventricles, in the absence of abnormal loading conditions or coronary artery disease sufficient to cause global systolic dysfunction. This condition results in reduced ejection fraction and can progress to symptomatic heart failure, arrhythmias, or thromboembolic events.

For the CMR Technologist or Allied Health Professional (AHP), understanding the structural and functional alterations in DCM is essential when performing and interpreting cardiac MRI. CMR provides comprehensive evaluation of ventricular volumes, function, myocardial tissue characterization, and the presence of fibrosis through late gadolinium enhancement. Accurate and consistent imaging is crucial not only for diagnosis, but also for guiding therapeutic decisions and monitoring disease progression. A well-informed approach enables AHPs to tailor protocols, improve scan quality, and support high-level clinical care.

1. Patient Preparation & Setup

• Field strength: 1.5 T preferred; 3 T optional with optimized shimming.

• ECG gating: Ensure reliable R-wave detection. Use real-time cine or pulse gating in arrhythmia.

• Coils: ≥8-element coil for high SNR and parallel imaging.

• Contrast: Confirm no contraindications; collect hematocrit for ECV mapping.

• Breath-holds: Use SENSE or acceleration techniques to limit to ≤10–12 s.

2. Imaging Workflow

Step	Objective	Sequence/Notes
1	Anatomy	Localizers (axial/coronal SSFP or BB)

2	LV, RV volumes and LV ejection fraction assessment	Cine SSFP – 2, 3, 4-ch & full short-axis stack. Include apex to base for full volume calculation
3	T1 mapping	Native T1 (MOLLI/ShMOLLI), 4+ slices (optional)
4	Oedema detection	T2-weighted short-axis (rare in chronic DCM)
5	Fibrosis imaging	LGE PSIR ~10 min post Gd with TI scout
6	ECV quantification	Post-contrast T1 + hematocrit for fibrosis burden

3. Reporting Essentials

• LV & RV dimensions: EDV, ESV, SV, EF; end-diastolic diameter (indexed).

• Valvular regurgitation: Identify and quantify (mitral/tricuspid).

• Fibrosis: Mid-wall pattern typical of DCM; describe extent and location.

• ECV/mapping: Provide T1 values and ECV estimate (>0.30 suggests diffuse fibrosis).

• Risk indicators: EF <35%, mid-wall fibrosis, frequent NSVT episodes, Raised ECV.

4. Tips & Tricks for Technologists

• Use SENSE/acceleration to reduce breath-hold times.

• Adapt to arrhythmias with real-time cine.

• Subendocardial or transmural LGE suggests ischemia – evaluate for CAD.

• At 3 T, optimize shimming to reduce SSFP/mapping artifact.

• Use tagging for suspected wall motion abnormality.

• Be cautious interpreting perfusion in thin or fibrotic myocardium.

5. Tissue Characterization Notes

• T2-weighted imaging is often negative in chronic DCM.

• T1 mapping helps identify diffuse fibrosis even when LGE is negative.

• Mid-wall LGE (especially septal) is characteristic of non-ischemic DCM.

• ECV mapping adds prognostic value, particularly when >0.30.

6. Quality Assurance

• Always run a TI scout prior to LGE.

• Maintain consistent slice positioning across all sequences.

• Document artifact mitigation strategies (e.g., motion correction, gating mode).

• Follow ACR/ASRT QA standards for scanner performance.

7. Clinical Value & Outcomes

• Volumetrics influence ICD and CRT decisions.

• LGE presence strongly correlates with adverse outcomes.

• T1 and ECV mapping help detect diffuse fibrosis, guiding prognosis.

• Comprehensive scanning enables holistic functional and structural assessment.

Reference

Herzog, B. A., Greenwood, J. P., Plein, S., Garg, P., Haaf, P., & Onciul, S. (2017). Cardiovascular magnetic resonance pocket guide. *Eur Soc Cardiol*.