

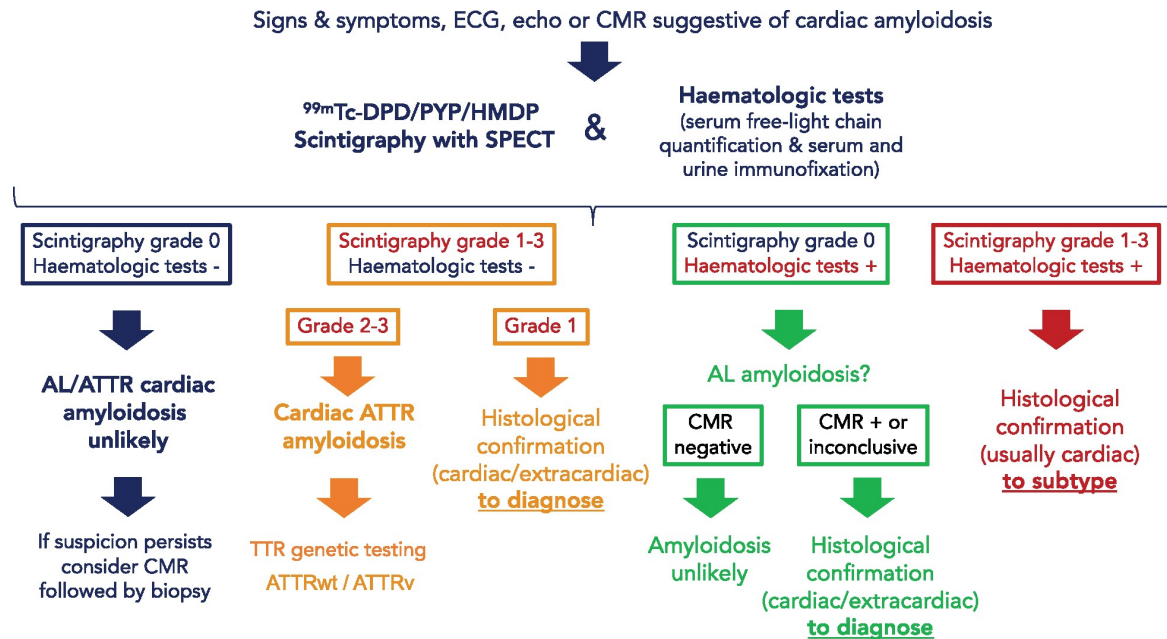
DIAGNOSI E GESTIONE DELL'AMILOIDOSI CARDIACA

CMR in Cardiac Amyloidosis: beyond hypertrophy

Dott. Alessandro Nudi

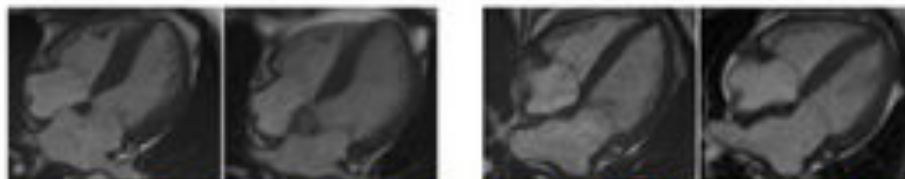


Diagnostic Algorithm

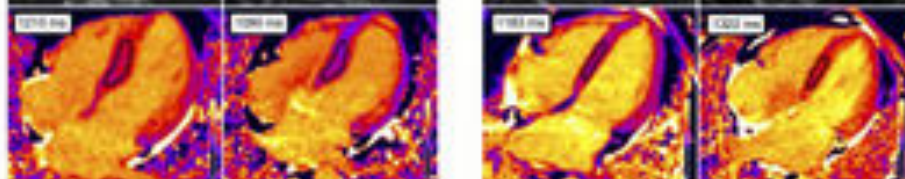


CMR protocol

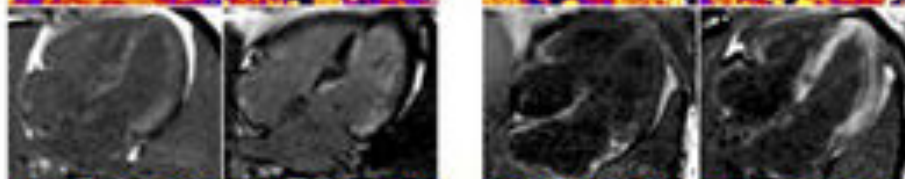
Cine SSFP



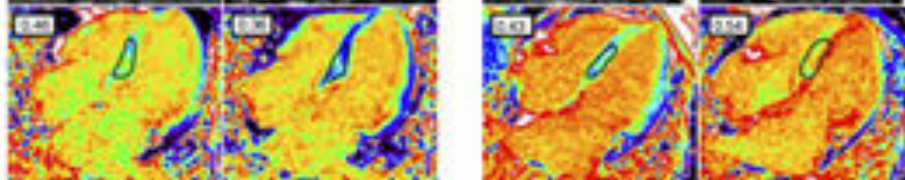
T1 map



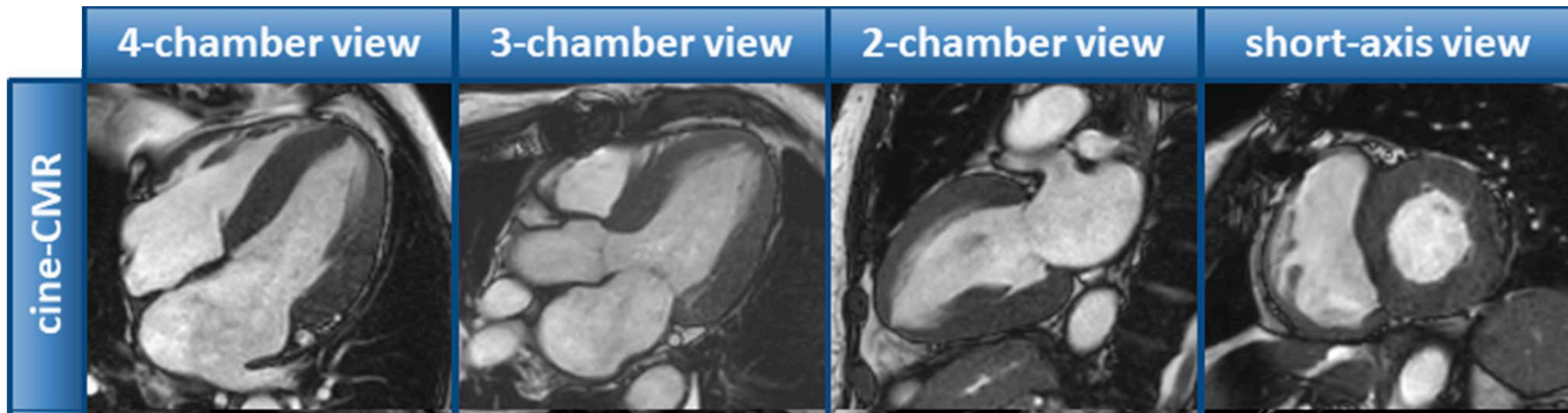
LGE PSIR



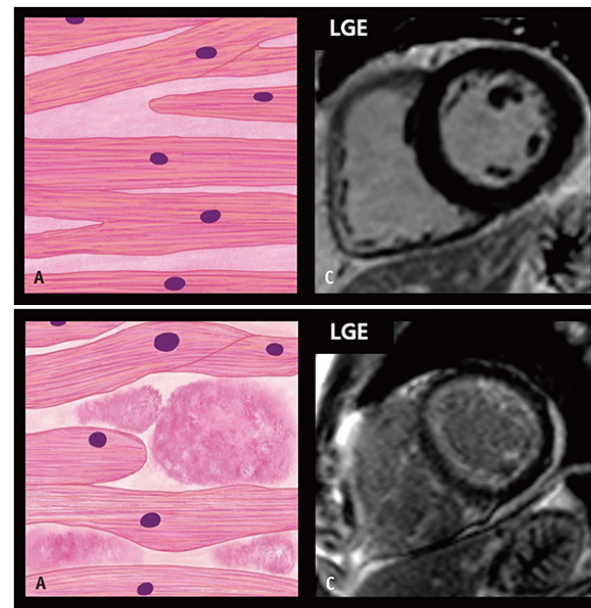
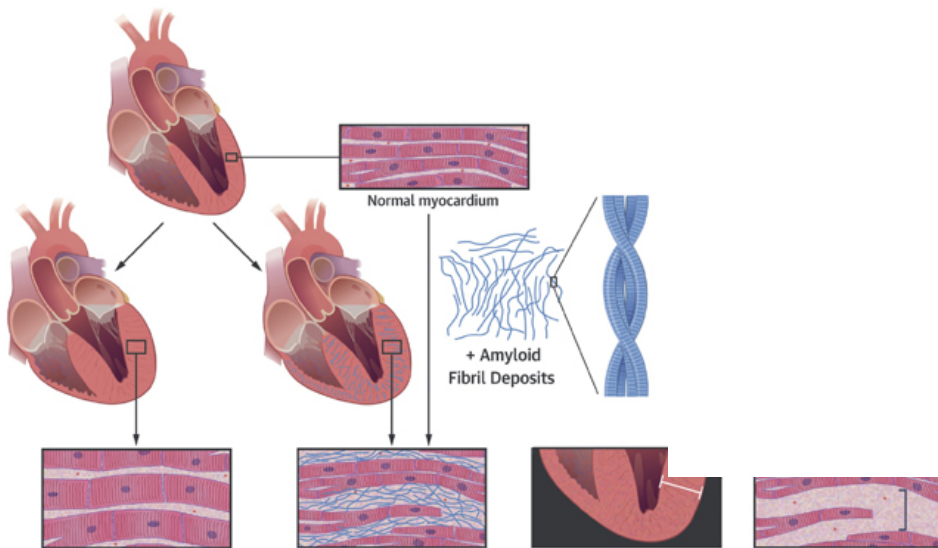
ECV



Cine SSFP



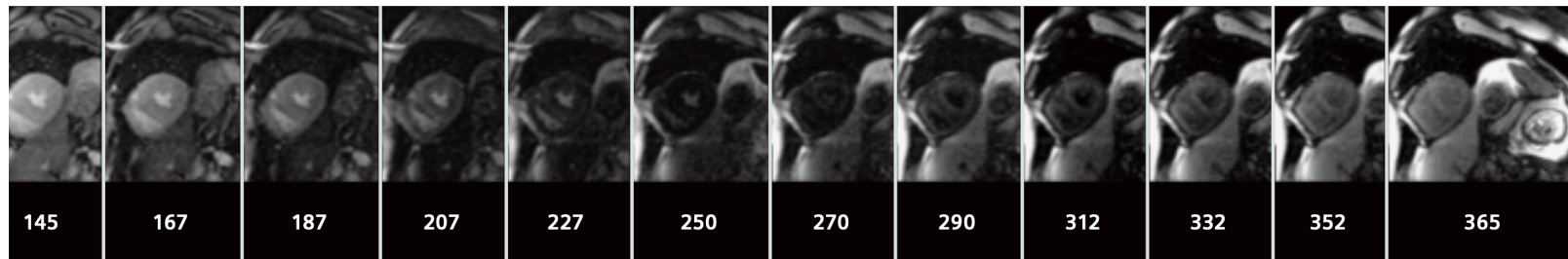
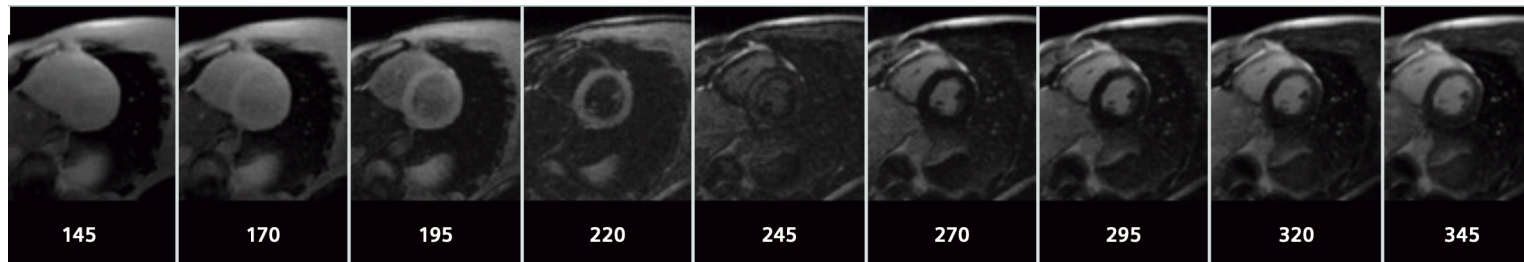
Late Gadolinium Enhancement (LGE)



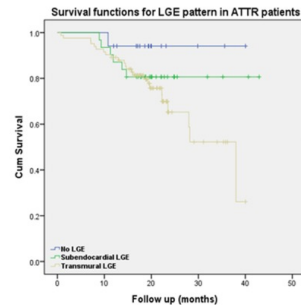
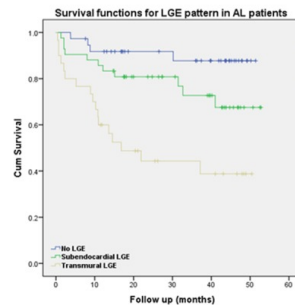
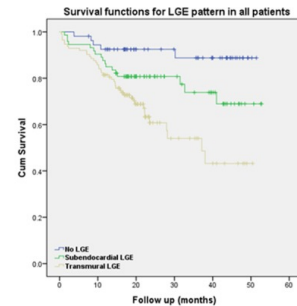
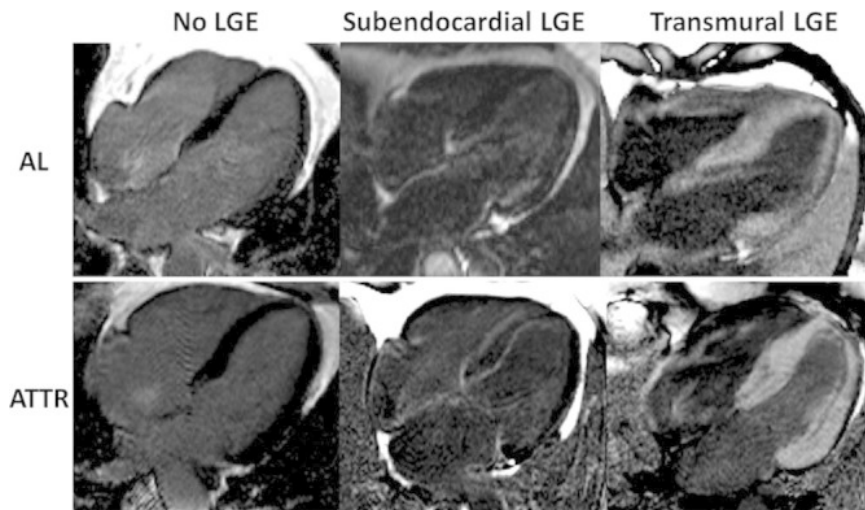
Sharmila Dorbala et al. *J Am Coll Cardiol Img* 2019; 13:1368-1383.



Abnormal gadolinium kinetics



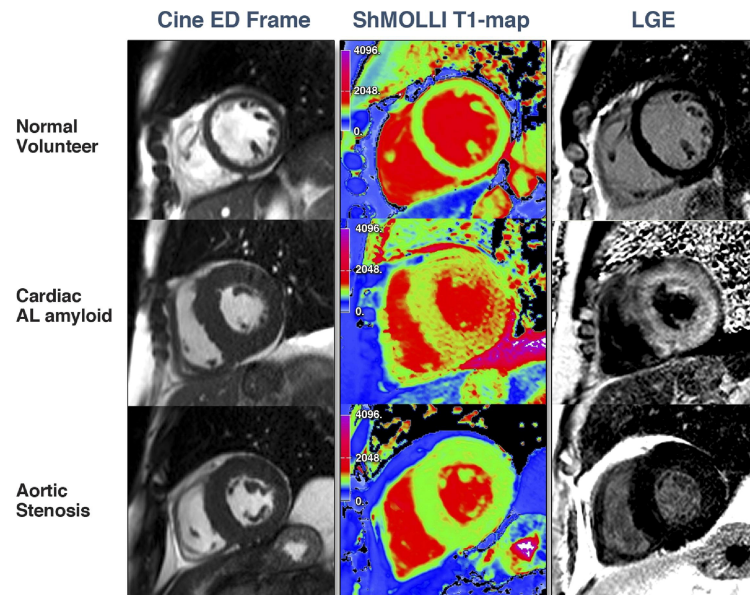
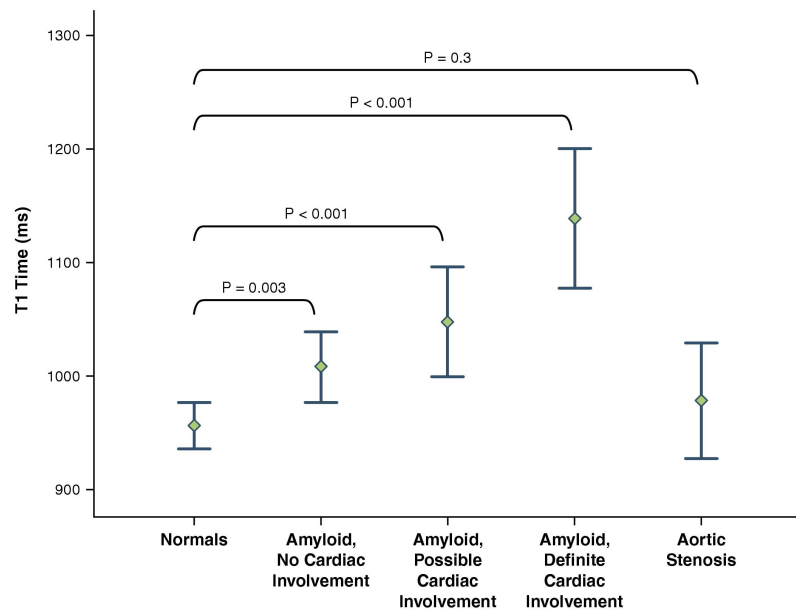
LGE Pattern



Fontana et al. Circulation 2015



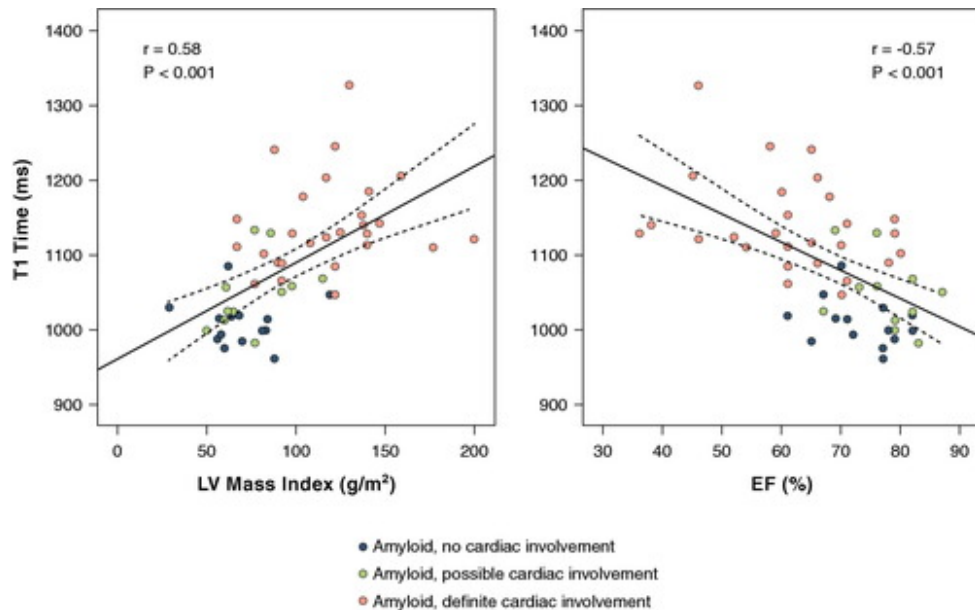
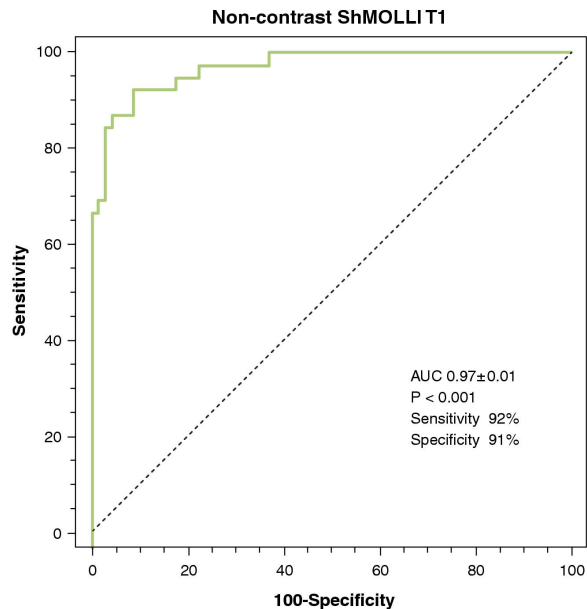
Native T1 mapping



Theodoros D. Karamitsos et al. *J Am Coll Cardiol Img* 2013; 6:488-497.



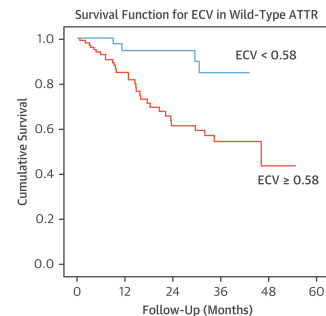
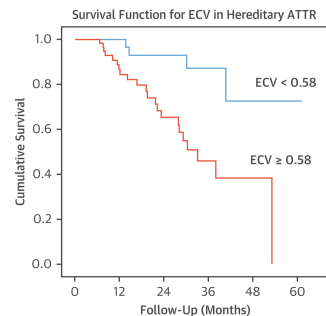
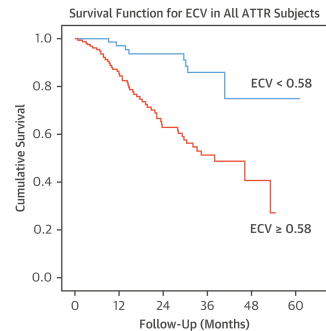
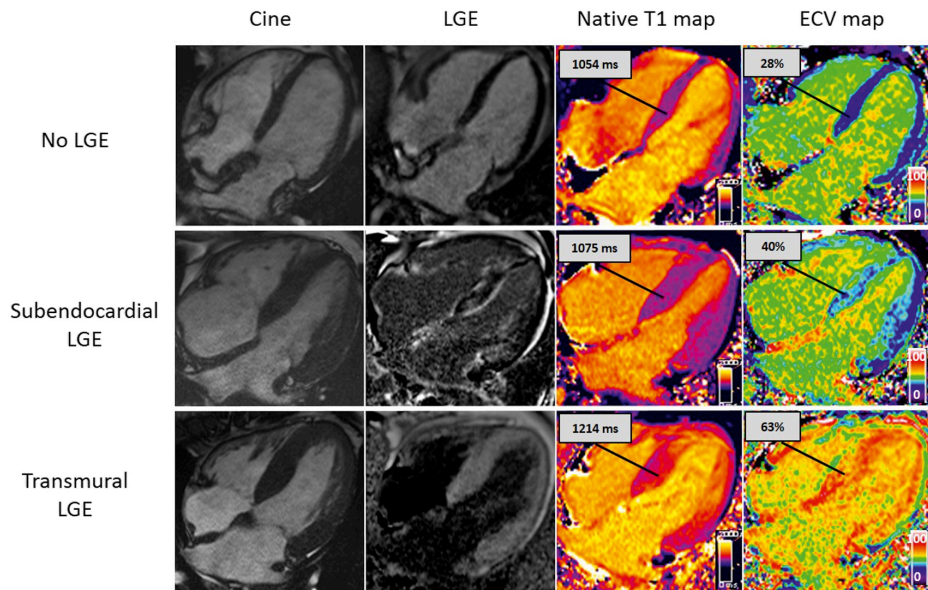
Native T1 mapping



Theodoros D. Karamitsos et al. *J Am Coll Cardiol Img* 2013; 6:488-497.



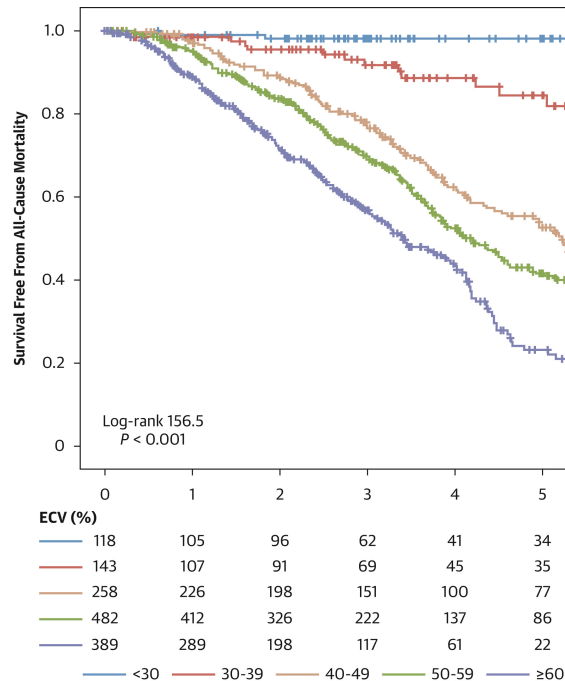
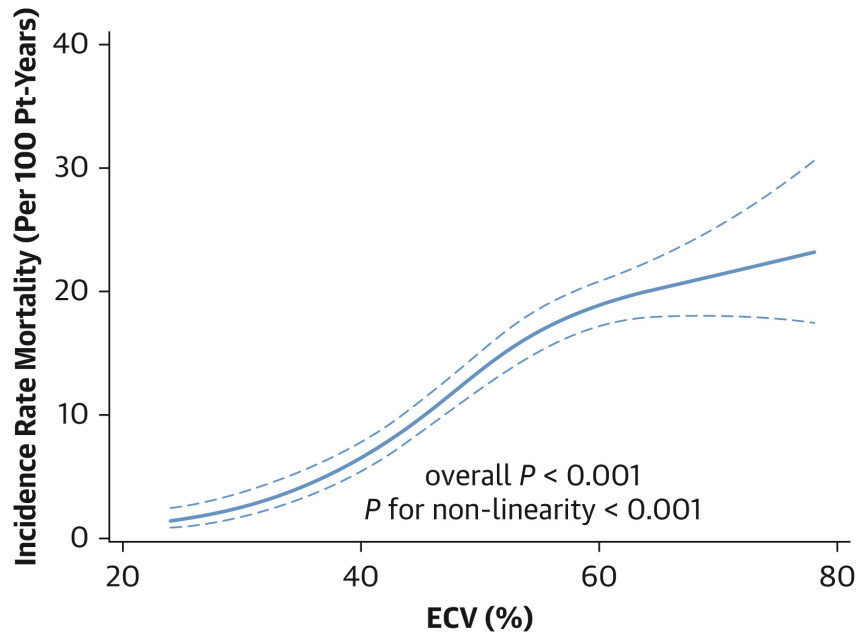
Extracellular Volume



Martinez-Naharro, A. et al. J Am Coll Cardiol. 2017;70(4):466-77.



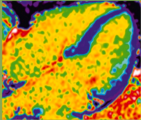
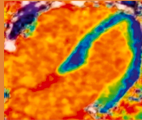
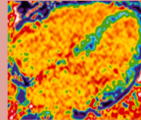
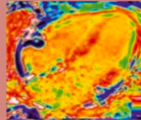
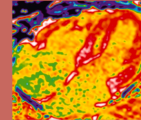
Extracellular Volume



Awais Sheikh et al. *JACC* 2025; 87:505-518.



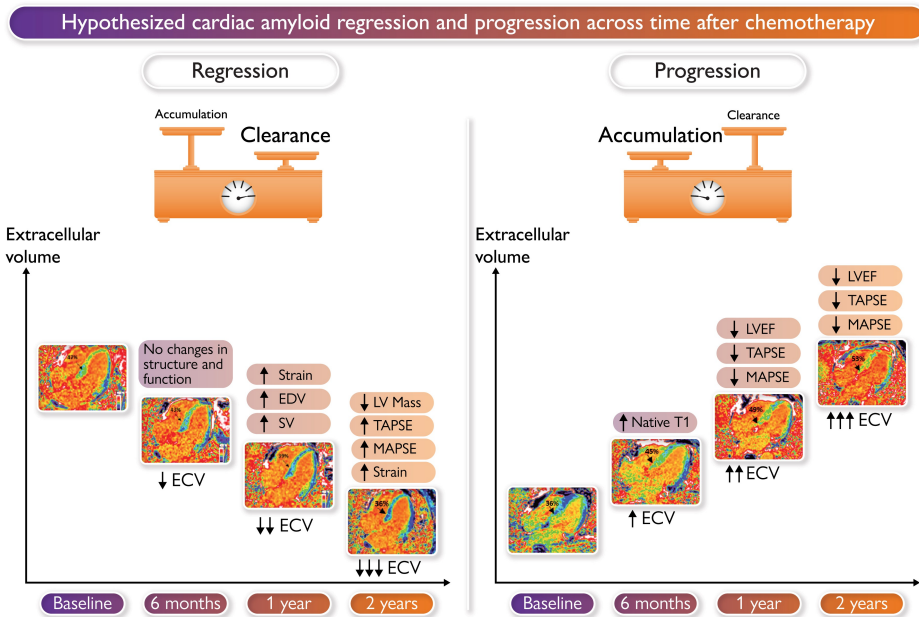
Extracellular Volume

ECV Thresholds: Meaning, Clinical and Research Applications					
					
	ECV <30%	ECV 30-39%	ECV 40-49%	ECV 50-59%	ECV ≥60%
Clinical meaning 	No/early infiltration Low risk	Early infiltration Intermediate risk	Overt cardiac disease High risk		
Therapy 	Surveillance	Potential for early therapy (stabilizer/silencer)	Therapy (stabilizer/silencer) Possible future development: addition of depleters (response tracked through serial CMR and ECV monitoring)		
Trial design 	Low risk, consider for prevention studies	High risk, consider for prevention/early treatment studies	Overt disease Efficacy drug trials		

Awais Sheikh et al. *JACC* 2025; 87:505-518.



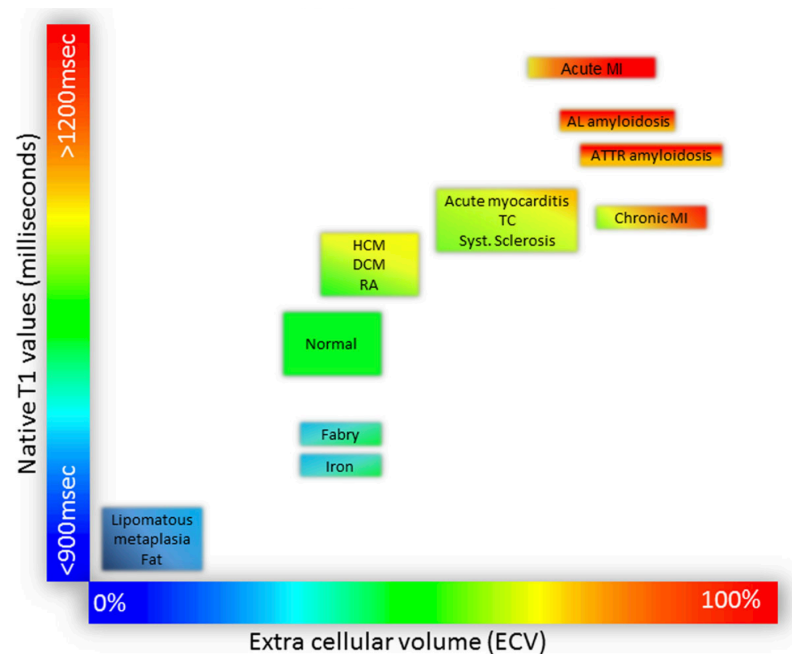
Treatment Response



Eur Heart J, Volume 43, Issue 45, 1 December 2022, Pages 4722–4735



T1 Mapping and ECV in Differential Diagnosis



Multiparametric Imaging

	Hypertrophic Cardiomyopathy	Hypertensive Heart Disease	Aortic Stenosis	Anderson- Fabry Disease	Amyloidosis	Mitochondrial Cardiomyopathy	Sarcoidosis	Athlete's Heart
LVH pattern	Asymmetric > Concentric	Concentric > Asymmetric	Concentric > Asymmetric	Concentric > Asymmetric	Concentric, Asymmetric	Concentric > Asymmetric	Concentric > Asymmetric (acute)	Concentric > Asymmetric
T1 value	↑	↑	↑	↓↓	↑↑	↑	↑	↓/↔
T2 value	↑/↔	↔	↔	↑/↔	↑	↑↑	↑ (acute)	↔
ECV fraction	↑	↑	↑	↑/↔	↑↑	↔	↑	↓
LGE	++/+/- Multifocal patchy	+/-	+/-	+/- Inferolateral	++/+ Circular subendocardial	+/-	++/+ Multifocal patchy, epicardial	Rare
LV strain on CMR	↓↓	↓/↔	↓ In severe AS	↓ Loss of base-to-apex circumferential strain gradient	↓↓ Relative apical sparing		↓	↔



Clinical Case



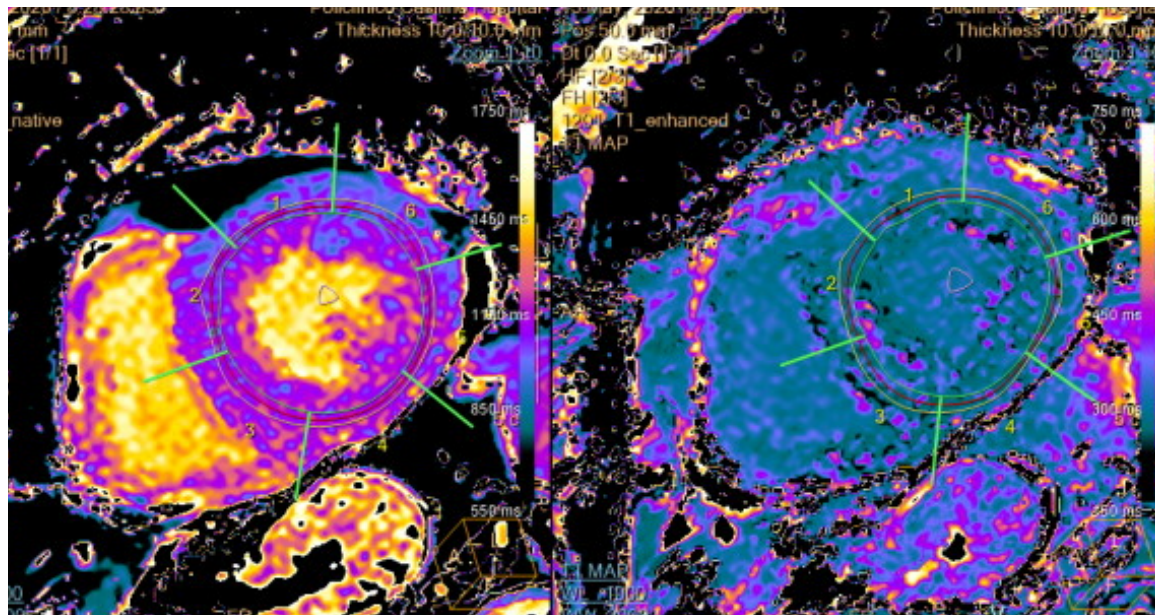
17 mm



Subendocardial LGE



Clinical Case



T1 native 1120 ms

ECV 50%



Take home messages

- CMR is the reference technique for myocardial tissue characterization in cardiac amyloidosis.
- Late gadolinium enhancement (LGE) identifies the characteristic pattern of myocardial infiltration and provides prognostic information.
- Native T1 mapping enables earlier detection of cardiac involvement and supports the differential diagnosis of left ventricular hypertrophy.
- Extracellular volume (ECV) is the most robust quantitative biomarker, reflecting myocardial amyloid burden and providing incremental prognostic value.
- The strength of CMR lies in its multiparametric approach, integrating morphology, tissue characterization, and quantitative assessment.





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