traindications for CMR, other more than mild valvular disease, known coronary artery disease or other known cardiomyopathy

Results: 123 patients were included: 55 patients with AR (mean age 59±16,93 years, males 80%) and 68 controls (mean age 49±16,71 years, males 56%). Distribution of different LV mechanic parameters in the AR and control groups is shown in the table. Significant differences were noted in mean longitudinal strain between mild-moderate AR and severe AR group (-18,38±3,12 vs. -15,06±3,88; p=0,03)

Table1. Left ventricular mechanics

	AR (n=53)	Control (n=65)	p value
Longitudinal strain	-16,52±3,21	-19,03±2,79	0,000
Circumferential strain	-18,24±3,19	-19,23±2,57	0,075
Radial strain long axis	36,71±9,54	37,33±8,93	0,71
Radial strain short axis	30,42±7,59	35,33±8,97	0,001

AR: Aortic regurgitation.

Conclusions: LV mechanics are impaired in patients with significant chronic AR. Even moderate degrees of volume overload have a detrimental effect on myocardial function. Further studies are needed to confirm these results and its role on clinical management.

P4679
Cardiac magnetic resonance deformation analysis and prediction of functional recovery after acute myocardial infarction: a validation study

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Aims: Cardiac magnetic resonance (CMR) deformation analysis allows quantification of segmental myocardial strain which was shown to predict recovery of function post-ST segment elevation acute myocardial infarction (STEMI). It was our purpose to identify cut-off values for longitudinal (LS), circumferential (CS) and radial strain (RS) for functional recovery and to validate them in a large external cohort.

Methods: In 92 STEMI patients who underwent successful primary percutaneous revascularization and were studied with CMR within 3–5 days, peak systolic LS, CS and RS were analyzed from routine SSFP images of 3 long-axis and a stack of short-axis slices. CMR was repeated at 6 months and optimal strain values for prediction of segmental functional recovery were obtained (RS 18%, CS -9%, LS -8%). These results were then applied to a similar population of 222 STEMI patients from another tertiary center. Functional recovery was defined as an improvement of wall motion score or persistent normokinesia from baseline to 6-month CMR.

Results: In the study population, 18.9% myocardial segments showed no functional recovery (n=279). Strain parameters were significantly worse in these segments and were predictive of non-recovery (Table). CS was the strongest predictor with an accuracy of 82%. Of the 3552 myocardial segments of the validation cohort, 18.5% showed no functional recovery (n=658). RS, CS and LS also showed good predictive value for non-recovery and the same cut-off values showed comparable sensitivities and specificities (Table). In the validation cohort, CS was also the strongest predictor of functional recovery.

	Study population			External cohort		
	RS	CS	LS	RS	CS	LS
AUC	0,827	0,832	0,796	0,841	0,845	0,781
Sensitivity	78	87	89	75	80	71
Specificity	69	59	49	78	71	73
PPV	92	90	88	84	92	92
NPV	40	51	50	41	35	36
Accuracy	76	82	81	75	79	71

Conclusion: CMR tissue tracking analysis of myocardial strain predicted segmental recovery of function after revascularized STEMI and CS was the strongest predictor with a cut-off of -9% showing an accuracy of 82%. These findings were confirmed in a large external validation cohort where strain values showed comparable predictive power and accuracy.

P4680
Left ventricular strain by cardiac magnetic resonance feature-tracking is a strong predictor of incident cardiovascular events

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Background: There is controversy regarding the utility of left ventricular (LV) mechanics assessed by tissue tracking (TT)-SSFP, a readily implementable technique in clinical practice. In particular, whether LV mechanics assessed by TT-SSFP predicts cardiovascular events, is unknown.

Purpose: To assess whether LV mechanics assessed with TT-SSFP cine MRI predicts adverse outcomes.

Methods: We prospectively studied LV mechanics in 596 adults without heart failure (no HF, n=416), HF with preserved ejection fraction (HFpEF, n=85), or HF with reduced ejection fraction (HFrEF, n=95) using TT-SSFP cine MRI.

Results: Overall sample was largely composed of middle aged to older men (Table). Over a mean follow-up of 40 months, 63 participants had HF admission, 62 died, whereas 111 reached the composite end-point (HF admission or death). In Cox proportional hazards models, lower global longitudinal [Standardized hazard ratio, sHR=1.51 (1.14–1.99), p=0.004], circumferential [sHR=1.46 (1.07–1.99), p=0.016], and radial strain [sHR=0.58 (0.41–0.82), p=0.002] were associated with the composite end-point. These models were adjusted for HF status, LVEF, age, sex, ethnicity, body mass index, systolic and diastolic blood pressures, hypertension, diabetes, coronary artery disease, glomerular filtration rate. Furthermore, global longitudinal strain, but not LVEF stratified risk of composite end-point across tertiles (Figure, note that the lowest tertile for LVEF was <51%).

Baseline characteristics of participants

Variable	No HF, n=416	HFrEF, n=95	HFpEF, n=85	P value
Age, years [mean (95% CI)]	58 (56–59)	64 (61–67)	64 (61–67)	<0.0001*#
Men	374 (90%)	94 (99%)	73 (86%)	0.0043
Race				0.045
African-American	167 (40%)	53 (56%)	48 (56%)	
White	227 (55%)	41 (43%)	34 (40%)	
Body mass index, kg/m^2	30 (29–30)	28 (27–29)	34 (33–36)	<0.0001#$
Hypertension	276 (67%)	77 (82%)	80 (94%)	<0.0001
Diabetes	146 (35%)	56 (60%)	50 (60%)	<0.0001
Coronary artery disease	103 (25%)	55 (58%)	32 (38%)	<0.0001

*No HF vs. HFrEF; #No HF vs. HFpEF; $HFrEF vs. HFpEF.
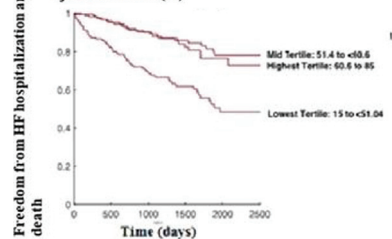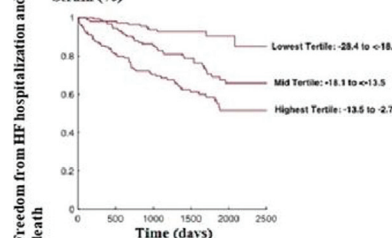
Kaplan Meier Survival Plots

Conclusion: In this prospective study, we found that LV longitudinal, circumferential and radial strain measured using TT-SSFP cine MRI (a readily implementable technique in clinical practice) predict the risk of adverse cardiovascular events, independently of LVEF. In patients with LVEF >50%, longitudinal strain is a more important predictor of adverse events than LVEF.

P4681
Exercise-induced myocardial edema in master triathletes: insights from cardiovascular magnetic resonance imaging

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Background: Strenuous exercise has been associated to functional and structural cardiac changes, local and systemic inflammatory responses reflecting oxidative, metabolic, hormonal, and thermal stress, even in healthy subjects.

Purpose: To assess changes in myocardial structure, function, and tissue composition by cardiovascular magnetic resonance (CMR) imaging before and after strenuous exercise.

Methods: Ten master triathletes (age 45±8 years) underwent CMR before and <3 h after a full Ironman triathlon competition (3.8 km swimming, 180 km cycling, and 42.2 km running) completed with a mean time of 12±1 h. Cine balanced steady-state free precession, T2-weighted STIR, tagging and late gadolinium en-