Table 1

	Prehospital CPR (n=359)	No preshospital CPR (n=425)	p-value
Age (years)	66.0	72.0	0.001
Women	23.9%	35.3%	0.001
Renal insuffiency	16.6%	24.7%	0.005
Diabetes	27.1%	39.7%	0.001
STEMI	63.9%	60.5%	0.34
3-vessel disease	44.7%	60.1%	0.001
TIMI 0/1 before PCI	74.2%	72.4%	0.61
TIMI 3 after PCI	82.4%	78.3%	0.15
30-day mortality	48.2%	40.5%	0.04
12-month mortality	57.3%	51.4%	0.1

procedural features and outcomes in the two groups with and without CPR are given in the table.

Conclusion: Patients with pre-hospital CPR represent about 50% of the population with AMI complicated by cardiogenic shock. They are younger, have less risk factors and less extensive coronary disease. Despite a high success rate of PCI patients with CPR have a higher 30-day and 12-month mortality.

CLINICAL IMPORTANCE OF QUANTIFICATION IN IMAGING

3003
Machine learning improves the long-term prognostic value of sequential cardiac PET/CT

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Background: Machine Learning (ML) constitutes a revolutionary path to elucidate complex patterns from data in order to optimize prediction and can be applied at different levels of data integration. Cardiovascular imaging classification represents a well suited purpose for ML implementation. Although ML has been increasingly applied to diagnostic classification in non-invasive cardiac imaging, implementation in prognostic data is currently lacking. A sequential approach in hybrid PET/CT for suspected CAD (i.e. initial CTA with selection for further stress myocardial perfusion PET within the same imaging session) has demonstrated diagnostic and prognostic efficacy. However, traditional statistical analyses of these data may be unable to exploit the full potential of extensive structured clinical, CTA and PET data. Therefore, we aimed to implement a stepwise ML workflow considering clinical and hybrid PET/CT data for the identification of patients suspected with CAD who developed MI or death in a long-term follow up registry.

Methods: Data from 951 symptomatic patients with suspected CAD that underwent sequential 15O-water PET/CTA and completed an average follow-up of 6 years were analyzed. Clinical data on demographics and risk factors were extracted from the electronic patient records (sex, age, smoking, diabetes, hypertension, dyslipidemia, fam history, chest complaints and dyspnea). CTA images were evaluated segmentally in terms of: system dominance, segment anatomy, the presence of an atherosclerotic plaque, % stenosis and plaque calcification. Stress PET perfusion data were evaluated regionally (LAD, LCx and RCA) in absolute terms (ml/g/min). Prior feature selection, modeling was conducted utilizing 10-fold cross validated boosted random forests (RF) ensembles to process structured clinical, PET and CTA data. Predictive performance for the development of MI or death was evaluated through AUCs and accuracy.

Results: There were 525 women and 426 men with a mean age of 61±9 years. 24 MI and 49 cardiac death events were documented during follow-up (range: 1 month – 9.6 years), while 109 patients underwent early revascularization. Boosted RF ensembles predictive performance was discrete for clinical data (AUC = 0.65, Acc = 90%) and moderate for clinical + quantitative PET data (AUC = 0.69, Acc = 92.5%), while there was significant performance improvement (p=0.005) when integrating clinical + quantitative PET + CTA data (AUC = 0.82, Acc = 95.4%) in the identification of patients who experienced MI or death during follow up independently from early revascularization.

Conclusion: Stepwise ML implementations for the integration of clinical and hybrid sequential cardiac PET/CT data can improve the identification of symptomatic patients with suspected CAD at who will develop MI or death in long-term follow up. This supports the added prognostic value of ML in cardiac hybrid imaging. Further research into the real-world clinical value of such estimations is warranted.

3004
Pulmonary blood volume index as a quantitative biomarker of diastolic function in hypertrophic cardiomyopathy

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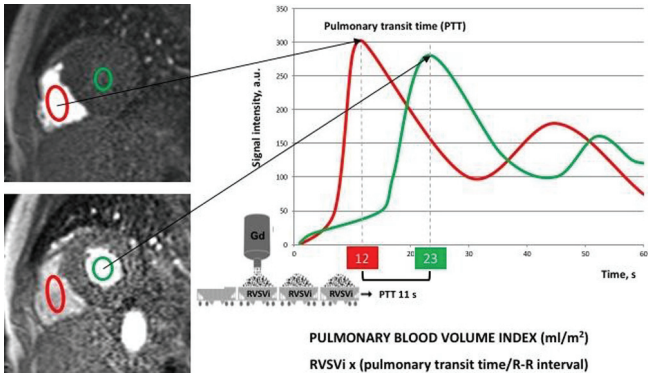
Background: Pulmonary blood volume index (PBVI) by cardiovascular magnetic resonance (CMR) imaging has been proposed as a quantitative marker of haemodynamic congestion.

Purpose: We aimed to assess the diagnostic accuracy of PBVI by CMR for the evaluation of LV diastolic function in patients with hypertrophic cardiomyopathy (HCM).

Methods: We retrospectively identified 69 consecutive HCM outpatients (age, 58±11 years; 83% men) who underwent both transthoracic echocardiography (TTE) and adenosine stress perfusion CMR imaging. The guideline-based diagnosis of LV diastolic dysfunction was assessed by TTE, blinded to CMR results. PBVI was calculated as the product of right ventricular stroke volume index and the number of cardiac cycles for an intravenous bolus of gadolinium contrast to pass through the pulmonary circulation as determined by first-pass perfusion CMR imaging at rest (Figure).

Results: Compared to patients with normal filling pressures, patients with LV diastolic dysfunction showed significantly larger PBVI (463±127 ml/m^2 vs. 310±86 ml/m^2, P<0.001). PBVI increased progressively with worsening NYHA functional class and echocardiographic stages of diastolic dysfunction (p<0.001 for both). PBVI yielded overall good diagnostic accuracy for the diagnosis of LV diastolic dysfunction (c-statistic 0.83, 95% CI 0.73–0.94), and using the best cut-off point of 413 ml/m^2, exercise test duration was significantly lower in patients with higher PBVI (P=0.04). At multivariable logistic regression analysis, PBVI was an independent predictor of LV diastolic dysfunction (hazard ratio per 10% increase: 1.97, 95% confidence interval: 1.06–3.68, p=0.03).



Pulmonary blood volume index

Conclusion: Pulmonary blood volume index analysis is a promising CMR application for diastolic function testing and assessment of haemodynamic congestion in patients with HCM. Future studies should investigate the prognostic role and the clinical utility of pulmonary blood volume index in the management of patients with HCM.

3005
Diagnostic value of longitudinal flow gradient for the presence of hemodynamically significant coronary artery disease

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Background: Although quantitative position emission tomography (PET) perfusion imaging is considered the gold standard in non-invasive ischemia testing, reduction in hyperemic myocardial blood flow (MBF) is considered relatively nonspecific as it may originate from either epicardial stenosis or microvascular dysfunction. The longitudinal MBF gradient has been suggested as a novel index for hemodynamic consequences of an epicardial stenosis.

Purpose: This study aimed to investigate the diagnostic value of longitudinal MBF gradient derived from PET for the presence of hemodynamically significant coronary artery disease (CAD).

Methods: Patients with suspected CAD underwent [15O]H2O PET followed by invasive coronary angiography with fractional flow reserve (FFR) assessment of all major coronary arteries. Longitudinal base-to-apex MBF gradients were assessed by two methods, using MBF in apical and mid (method 1) or in apical and basal (method 2) myocardial segments to calculate the gradient. The incremental diagnostic value of hyperemic longitudinal MBF gradient (by both methods) to hyperemic MBF alone for the presence of hemodynamically significant CAD (FFR≤0.80) was tested. Subgroup analysis was performed to determine the effect of coronary lesion location.

Results: A total of 603 vessels in 204 patients were included. Hemodynamically obstructive CAD as defined by FFR was present in 160 (26.5%) vessels. Mean hyperemic MBF gradient values calculated by method 1 did not significantly differ between vessels with (-0.03±0.42) and without (0.04±0.55) hemody-