nificantly with increase in serum caffeine concentration (-0.09/mg/l, 95% confidence interval [CI] -0.12 to -0.05/mg/l, P<0.0001). Using a serum caffeine level of 2.3 mg/l, equal to 100 mg of caffeine one hour prior to scan, as a cut off value, the predicted difference in MFR between 2.3 mg/l and 0 mg/l was -0.19, 95% CI -0.27 to -0.12. This was within the measurement uncertainty of MFR.
Conclusion: In healthy volunteers, MFR decreased with intake of 200 mg caffeine and above. No difference in MFR was seen with intake of up to 100 mg of caffeine one hour prior to 82Rb-PET/CT scan, approximately the content in one cup of coffee reflecting a serum caffeine level of 2.3 mg/l right before scan. MFR decreased significantly with increasing serum caffeine yet a serum caffeine level ≤2.3 mg/l right before scan may be used as a cut off value. For clinical routine, we therefore suggest that accidental consumption of one cup of coffee should not lead to cancellation of 82Rb-PET/CT adenosine myocardial perfusion scan. If doubt on caffeine intake exists, measurement of serum caffeine may determine whether the investigation can still be performed.

3008
Reduced global myocardial perfusion reserve in DCM and HCM patients assessed by CMR-based velocity-encoded coronary sinus flow measurements and first-pass perfusion imaging

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Background: Coronary microvascular dysfunction (CMD) is an independent predictor of poor prognosis in patients suffering from dilative or hypertrophic cardiomyopathy (DCM / HCM). To assess CMD, quantitative myocardial first-pass perfusion (1P) cardiovascular magnetic resonance (CMR) can be performed. Coronary sinus flow (CSF) measurements at rest and during maximal vasodilatation are an alternative and well-validated approach for the quantification of global myocardial blood flow (MBF) in CMR.
Methods: Global myocardial perfusion reserve (MPR) was used to compare both methods, 1P and CSF. This measure reflects the ratio of myocardial blood flow during maximal coronary vasodilatation over rest. 1P-MPR and CSF-MPR were calculated in seventeen HCM patients, fourteen DCM patients and sixteen controls, who underwent a stress CMR study to rule out obstructive coronary artery disease. All patients were examined on a 1.5-T system and the study protocol comprised both, first-pass myocardial perfusion imaging (MPI) and velocity-encoded (VENC) phase-contrast imaging of coronary sinus flow (CSF) during rest and adenosine stress.
Results: 1P-MPR was significantly decreased only in HCM patients compared to controls (1.14 vs. 1.43, p=0.045) whereas CSF-MPR was significantly reduced in both patient groups, HCM and DCM, compared to controls (2.38 and 2.07 vs. 3.18, p=0.041 and p=0.032). CSF-MBF at maximal stress was significantly lower in HCM and DCM patients compared to the control group (0.11 ml/min/g and 1.23 ml/min/g vs. 1.58 ml/min/g, p=0.008 and p=0.040). A moderate but significant correlation between CSF-MPR and 1P-MPR was observed (r=0.39, p=0.011). A negative correlation between LV wall thickness and CSF-MBF at rest and stress was found in the DCM group using VENC-based CSF measurements (r = -0.64, p=0.013 and r = -0.69, p=0.006) - but not using 1P-MPI. Post-proceeding analysis regarding 1P-MPR and CSF-MPR measurements required 20.1 min and 6.5 min, respectively (p<0.001).
Conclusion: The presence of microvascular disease can be non-invasively and quickly detected by VENC-based CSF-MPR measurements during routine stress perfusion CMR in both HCM and DCM patients. Compared to conventional 1P-MPI, VENC-based CSF-MPR is particularly useful in DCM patients with thinned ventricular walls.

3009
Quantitative CTA analysis of coronary plaque progression in SMARTool clinical study: the association between baseline clinical parameters and plaque progression

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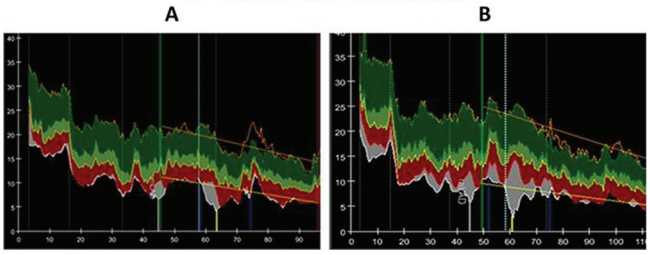
Background/Introduction: The SMARTool clinical study (Horizon 2020) aims to develop an integrated artery- and patient-specific comprehensive predictive model of plaque progression using serial coronary CT angiography (CTA). Although semi-automated techniques for quantitative assessment of coronary plaques are highly reproducible, only few studies have investigated the use of these techniques to assess plaque progression.
Purpose: The purpose of our study was to assess the association between baseline clinical parameters and plaque progression using serial coronary CTA.
Methods: Patients were prospectively included to undergo serial coronary CTA. Quantitative assessment of all coronary plaques was performed using a dedicated software package (QAngio CT RE, Medis, Leiden, The Netherlands). Plaque progression was defined by an increase in plaque volume above the median. A binomial logistic regression was performed, including the baseline clinical parameters, low-density lipoprotein (LDL) and statin use at follow-up as independent variables and the annual change in plaque volume (also classified according to the tissue components) as dependent variable.
Results: In total, 590 coronary segments from 212 patients were quantitatively assessed with a mean interscan period of 6.2±1.4 years. The median annual change in overall plaque volume was 2.33 (interquartile range (IQR) 0.36–6.46) mm^3. Moreover, the median annual change in plaque volume for the fibrous, fibrous-fatty, necrotic core and dense calcium tissue components were -0.16 (IQR -2.44–1.57) mm^3, -0.04 (IQR -0.88–0.77) mm^3, 0.81 (IQR -0.20–2.91) mm^3 and 1.41 (IQR 0.24–3.70) mm^3, respectively. In multivariable analysis, only hypertension was independently associated with an annual change in overall plaque volume (odds ratio (OR) 1.64, 95% confidence interval (CI) 1.17–2.31; P=0.004). Although statin use at follow-up was not associated with an annual change in overall plaque volume (OR 1.02, 95% CI 0.71–1.46; P=0.93), an independent association with dense calcium volume change was found (OR 1.88, 95% CI 1.22–2.89; P=0.004).

Example of a patient with plaque progression and calcification of the plaque
(A = baseline scan; B = follow-up scan)



Plaque progression and calcification

Conclusion(s): Hypertension was the only clinical parameter associated with overall plaque progression, assessed by quantitative CTA analysis. Although statin use did not show any effect on overall plaque progression, its use was associated with a significant increase in dense calcium volume, thereby potentially reducing coronary plaque vulnerability.
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3010
Myocardial perfusion single photon emission computed tomography and computed tomography coronary angiography in patients with intermediate pre-test probability of coronary artery disease

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Background: Relationships between computed tomography (CT) indices of coronary atherosclerotic burden and myocardial perfusion patterns remain incompletely elucidated.
Purpose: To study the patterns of myocardial perfusion heterogeneity in patients with stable ischemic heart disease and different degrees of coronary artery stenosis on CT.
Methods: We selected 94 patients (58 men; mean age of 62.9±7.3 years) with intermediate pre-test probability of CAD. All patients underwent coronary CT angiography (CCTA) and stress-rest myocardial perfusion imaging (MPI) using GE Discovery NM/CT 570C. Coronary plaques were considered significant, intermediate, and non-significant when associating with a luminal narrowing ≥70%, 40% to 69%, and <40%, respectively. The Segment Involvement Score was calculated as the total number of coronary artery segments with atherosclerotic plaques. The Segment Stenosis Score was computed by grading each coronary segment with a 5-point scoring system (0 = no plaque; 1 = 1–24% stenosis; 2 = 25–49% stenosis; 3 = 50–69% stenosis; and 4 = ≥70% stenosis). The summed rest score (SRS), stress score (SSS), and difference score (SDS) were derived from MPI images.
Results: The median Segment Involvement Score and Segment Stenosis Score were 4.0 (interquartile range 2.0- 5.0) and 7.5 (interquartile range 3.0; 13.0), respectively. Normal MPI images were observed in 38 patients, abnormal in 56. The frequencies of normal and abnormal MPI in patients with <40% (normal MPI 53%; abnormal MPI 47%) and 40% to 69% (normal MPI 44%; abnormal MPI 56%) coronary artery stenosis did not significantly differ (p=0.40 and p=0.22, respectively). In patients with ≥70% coronary artery stenosis, abnormal MPI was observed significantly more often (normal MPI 29%; abnormal MPI 71%) than normal MPI (p=0.001). In the overall population, both Segment Involvement Score and Segment Stenosis Score had weak correlations with SSS (r=0.3 and r=0.34, respectively; P<0.01 for both), SRS (r=0.27 and r=0.35, respectively; P<0.01 for both), and SDS (r=0.3 and r=0.36, respectively; P<0.01 for both). In patients with <40% stenosis neither CT scores correlated with MPI parameters, while