Conclusion Estimates of stress MBF and MPR by perfusion-CMR in this study were greater in diastole than systole in normal and CAD patients. Although the diagnostic accuracy of both phases was similar, the MPR cut-off values were different. These observations are relevant to any form of dynamic myocardial perfusion assessment and are of particular importance to promising developments in 3D perfusion-CMR and CT perfusion imaging where the acquisition phase may be specifically chosen. Different estimates of MBF and different MPR cut-off values between phases mean a universal standard needs to be agreed for 3D acquisitions.

086 ASSESSMENT OF ISCHAEMIC BURDEN IN PATIENTS WITH THREE-VESSEL CORONARY ARTERY DISEASE USING HIGH-RESOLUTION MYOCARDIAL PERFUSION CARDIOVASCULAR MRI

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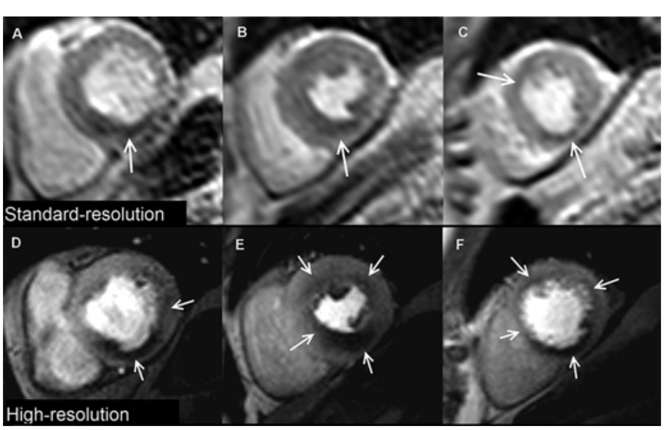
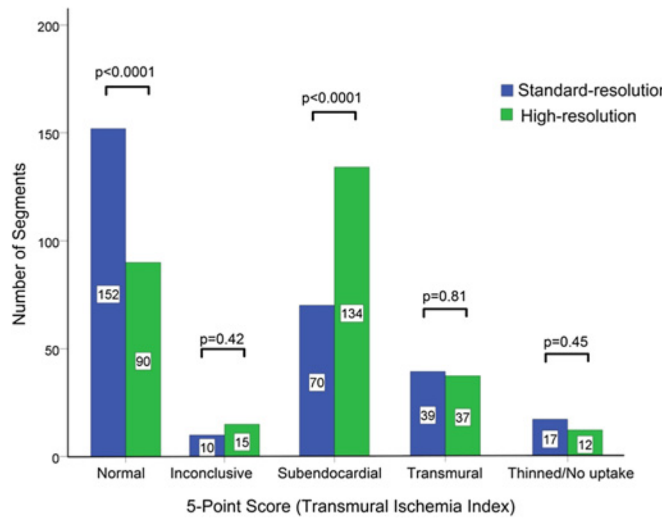
Introduction Patients with three-vessel disease (3VD) have a worse prognosis than those with less extensive disease; but detecting a 3VD pattern of ischaemia can be very challenging due to balanced hypoperfusion. However, a large ischaemic burden can also correctly stratify patients with 3VD as high-risk and prompt the appropriate management. We hypothesised that high-resolution perfusion-CMR would detect more ischaemic burden than standard-resolution due to better detection of subendocardial ischaemia. This study compared ischaemic burden detected by standard-resolution and high-resolution cardiovascular magnetic resonance (CMR) perfusion imaging in patients with 3VD.
Methods CAD was defined as coronary stenosis >70% (QCA). 48 patients (24 with 3VD; 24 with no CAD) underwent stress/rest perfusion-CMR (1.5T Philips) with standard-resolution (2.5 mm in-plane) using twofold SENSE and on a separate visit high-resolution (1.6 mm in-plane) achieved by eightfold k-t broad linear speed up technique (BLAST) acceleration (Abstract 086 figure 1). Perfusion was visually graded in each segment on a 5-point scale and summed to produce a perfusion score for each patient.



Abstract 086 Figure 1 Case example—standard-resolution shows perfusion defects (white arrows) in the basal inferior (A), mid inferior, mid inferoseptal (B), apical anterior and apical inferior segments (C), High-resolution demonstrates additional ischaemia in the basal lateral (D), mid anterior and mid anterolateral segments (E) with a circumferential defect in the apical slice (F), perfusion defects are also better delineated at high-resolution and the transmural extent of ischaemia more clearly seen.

Results In the 3VD group, high-resolution identified more abnormal segments per patient (7.3±3.7 vs 5.2±3.9; p=0.01), more abnormal territories per patient (2.0±0.9 vs 1.46±1.0; p=0.02) and a higher overall perfusion score (17.7±8.6 vs 13.9±10.2; p=0.03). The number of segments with subendocardial ischaemia was greater for high-resolution (134 vs 70 segments; 47% vs 24%; p<0.001) (Abstract 086 figure 2). The sensitivity, specificity and area under the curve (AUC) for identifying any perfusion defect were similar for both methods (high-resolution: 92%, 74% and 0.94 respectively vs standard-resolution: 79%, 84% and 0.87; p>0.05).



Abstract 086 Figure 2 Distribution of transmural ischaemia index. High-resolution perfusion CMR detected significantly more subendocardial ischaemia and fewer normal segments than standard-resolution in angiographically underperfused segments.

Conclusion In patients with 3VD, high-resolution perfusion-CMR detected more ischaemic burden than standard-resolution by identifying more segments with subendocardial ischaemia. High-resolution perfusion-CMR therefore has incremental value in correctly stratifying this high-risk patient group.

087 INCREMENTAL VALUE OF HIGH-RESOLUTION CARDIOVASCULAR MAGNETIC RESONANCE MYOCARDIAL PERFUSION IMAGING IN SUSPECTED CORONARY ARTERY DISEASE

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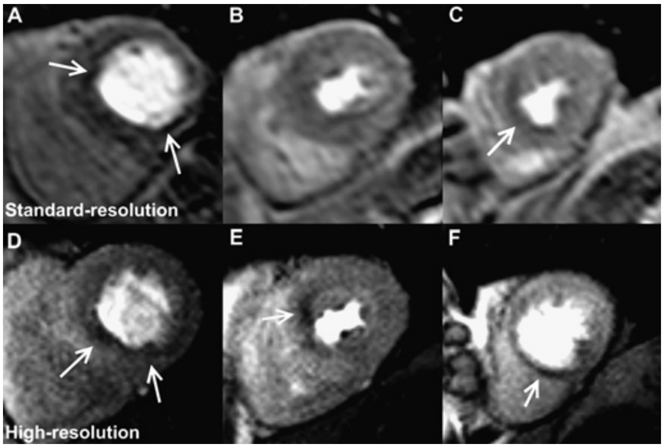
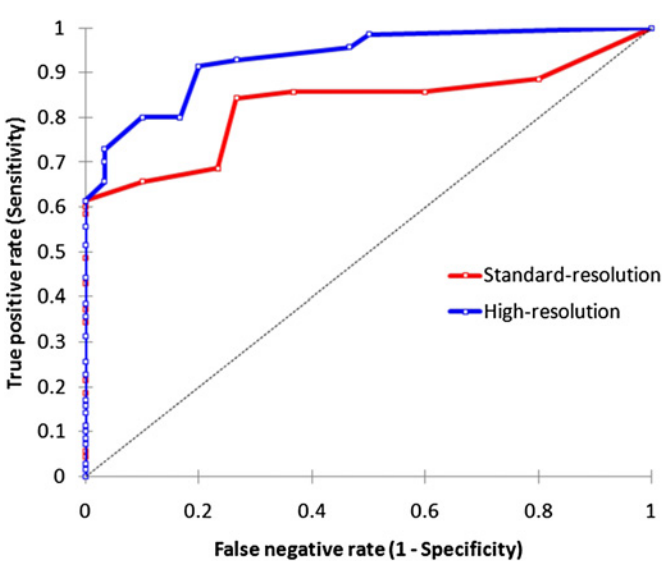
Introduction Although accelerated high-spatial-resolution cardiovascular magnetic resonance (CMR) perfusion imaging has recently been shown to be clinically feasible, there has not yet been a direct comparison with standard-resolution methods. We hypothesised that higher spatial resolution detects more subendocardial ischaemia and leads to greater diagnostic accuracy for the detection of angiographically defined CAD. This study compared the diagnostic accuracy of high-resolution and standard-resolution CMR perfusion imaging in patients with suspected coronary artery disease (CAD).
Methods A total of 111 patients with suspected CAD were prospectively recruited. All patients underwent two separate perfusion CMR studies on a 1.5 Tesla CMR scanner (Intera CV, Philips Healthcare, Best, the Netherlands), one with standard-resolution (2.5×2.5 mm in-plane resolution) and one with high-resolution (1.6×1.6 mm in-plane resolution) acquisition. High-



Abstract 087 Figure 1 Case example: Proximal left anterior descending and right coronary artery disease standard-resolution shows possible perfusion defects (white arrows) in the basal anteroseptal, inferoseptal and inferior segments which are difficult to distinguish from dark-rim artifacts (A); and a more convincing perfusion defect in the apical septal segment (C). High-resoultion more clearly delineates perfusion defects in the basal infero-septal, basal inferior (D), mid-anteroseptal (E) and apical septal (F) segments. At high-resloution, the transmural extent of ischaemia can be clearly assessed (the basal and mid-ventricular defects appear subendocardial) and the perfusion defects are better delineated.

resolution acquisition was facilitated by eightfold k-t broad linear speed up technique (BLAST) acceleration. Two observers visually graded perfusion in each myocardial segment on a 4-point scale. Segmental scores were summed to produce a perfusion score for each patient. All patients underwent invasive coronary angiography. Significant CAD was defined as a coronary artery stenosis of ≥50% diameter on quantitative coronary angiography.

Results CMR data were successfully obtained in 100 patients. A typical example is shown in Abstract 087 figure 1. In patients with CAD (n=70), more segments were determined to have subendocardial ischaemia with high-resolution acquisition than with



Abstract 087 Figure 2 Receiver-Operator Characteristic Curves. Standard and high-resolution perfusion CMR both had a high diagnostic accuracy for the detection of coronary artery disease but the high-resolution technique was superior. The arears under the curve were 0.83 (95% CI 0.75 to 0.91) for standard-resolution and 0.93 (95% CI 0.88 to 0.98) for high-resolution (p<0.001).

standard-resolution acquisition (279 vs 108; p<0.001). High-resolution acquisition had a greater diagnostic accuracy than standard-resolution acquisition for identifying single-vessel disease (area under the curve [AUC]: 0.88 vs 0.73; p<0.001) or multi-vessel disease (AUC: 0.98 vs 0.91; p=0.002) and overall (AUC: 0.93 vs 0.83; p<0.001) (Abstract 087 figure 2).

Conclusions Our study shows that high-resolution CMR perfusion imaging has greater diagnostic accuracy than standard-resolution acquisition for the detection of CAD in both single and multi-vessel disease patients and detects more subendocardial ischaemia.

088 COMPARISON OF CARDIOVASCULAR MAGNETIC RESONANCE STRESS PERFUSION WITH SINGLE PHOTON EMISSION CT (SPECT) IN PATIENTS WITH LEFT MAIN STEM DISEASE: A CE-MARC SUBSTUDY

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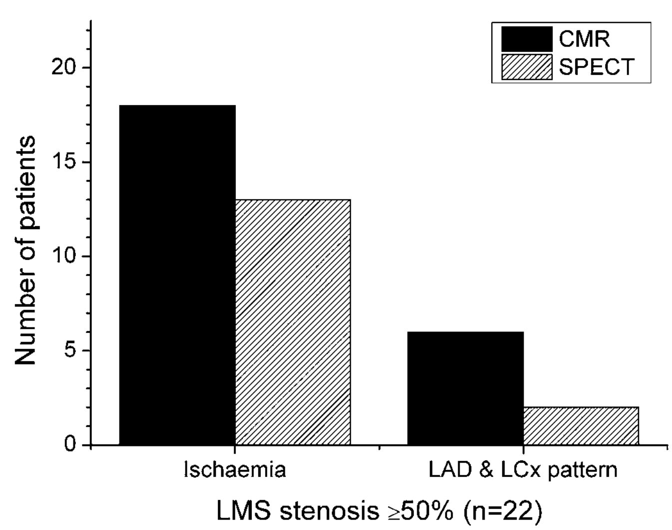
Introduction Approximately 5% of patients with stable angina have disease of the left main stem (LMS). Three-year survival in patients with >50% LMS stenosis may be as low as 50%. Single photon emission tomography (SPECT) fails to detect ischaemia in up to 15% of LMS stenoses, and identification of the "classical" pattern of both left anterior descending (LAD) and circumflex (LCx) coronary territory ischaemia is lower still. To date, the utility of cardiovascular magnetic resonance (CMR) perfusion in LMS disease is poorly established. The CE-MARC study was a prospective study of 752 patients with suspected coronary artery disease, enrolled to undergo CMR, SPECT and x-ray coronary angiography; we assessed the diagnostic performance of SPECT and CMR to detect LMS disease.

Methods All patients with LMS disease ≥50% on quantitative angiography were identified from the CE-MARC study. All patients had undergone adenosine stress perfusion by CMR and SPECT and also invasive x-ray angiography.[1] We compared detection rates for visual perfusion analysis from both the CMR and SPECT perfusion studies in patients with ≥50% and ≥70% LMS stenosis on angiography.

Results Of 23 patients in the CE-MARC cohort with LMS stenosis ≥50%, one patient could not be analysed. CMR identified evidence



Abstract 088 Figure 1 Detection rate of CMR and SPECT in patients with ≥50% LMS stenosis.