

## Validation of Whole Heart CMR Perfusion Against Fractional Flow Reserve

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### Background

Three-dimensional (3D) myocardial perfusion cardiovascular magnetic resonance (CMR) overcomes the limited spatial coverage of conventional two-dimensional perfusion CMR methods and allows estimation of the extent of ischemia. Fractional flow reserve has been shown to be a more appropriate comparator for assessment of significance of coronary stenosis. In the catheter laboratory, the Duke Jeopardy Score (DJS) can complement FFR to estimate the myocardium at risk.

### Methods

Fifty-three patients referred for angiography underwent rest and adenosine stress 3D myocardial perfusion CMR at 3 Tesla. Perfusion was scored visually on a patient and coronary territory basis and ischemic burden was calculated by quantitative segmentation of the volume of hypoenhancement. FFR was measured in vessels with >50% severity stenosis. The DJS was calculated from the coronary angiograms to quantify the myocardium at risk.

### Results

In 64 of 159 coronary vessels FFR was measured and 39 had an FFR<0.75. Sensitivity, specificity and diagnostic accuracy of CMR for the detection of significant CAD were 91%, 90% and 91%, on a patient basis and 79%, 92% and 88%, respectively by coronary territory (fig1). There was a strong correlation between the DJS and ischemic burden on CMR ( $p<0.0001$ , Pearson's  $r=0.82$ ).

### Conclusion

3D myocardial perfusion CMR accurately detects functionally significant CAD as defined by FFR and provides an assessment of ischemia burden in agreement with the invasive DJS. The accurate detection of significant CAD combined with an estimation of ischemia burden holds promise for non-invasive 3D CMR perfusion guidance of therapy and risk stratification of patients with CAD.

***Fig 1 3D perfusion image of patient with FFR positive (0.3) circumflex disease – with an ischaemic volume of 18.3% and a duke jeopardy score of 6***

