Index of myocardial resistance: a simple way to quantify microvascular disease invasively

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FRACTIONAL FLOW RESERVE: CLINICAL APPLICATIONS

**P2224** Validation of fractional and relative coronary flow reserve measurements in patients with prior myocardial infarction
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**Background:** The accuracy of the fractional flow reserve (FFR) and coronary flow reserve (CFR) to identify significant coronary stenoses is well established in normal myocardial regions. The validity of FFR has been demonstrated with PET in non-infarcted areas. In partially infarcted regions, the mass of viable myocardium depending on the infarct related artery (IRA) is smaller and resistive vessels may be dysfunctional. The purpose of the present study was to assess whether FFR measurements are also valid in IRAs.

**Methods:** Patients with prior infarction and 1 or 2 vessel disease were studied. Relative myocardial flow reserve (MMFR), defined as the ratio of maximum perfusion in the infarcted area to the maximum perfusion in the contralateral normally perfused area during hyperemia (IV adenosine), was assessed by 152-labeled water and PET. The ratio of CFR (ratio of maximum to baseline flow) in the infarcted area to CFR of the reference region was also compared with FFR. On the same day, catheterization FFR (ratio of mean aortic to distal coronary pressure at maximum hyperemia) was measured with a pressure wire in the IRA.

**Results:** Measurements were performed in 12 patients. Percent diameter stenosis in the IRA ranged from 27% to 83% (mean 47 ± 20%). FFR from 0.43 to 0.94 (mean 0.77 ± 0.18), MMFR from 0.43 to 0.97 (mean 0.76 ± 0.16) and the ratio of CFR from 0.44 to 0.97 (mean 0.78 ± 0.14). A close correlation was found between MMFR and FFR (R2 = 0.83) and between the ratio of CFR and FFR (R2 = 0.84).

**Conclusion:** FFR correlates well with MMFR and the ratio of CFR derived from PET measurements in patients with prior myocardial infarction. This validates the use of the pressure and Doppler flow wires in the assessment of coronary stenoses in IRAs.

**P2226** Index of myocardial resistance: a simple way to quantify microvascular disease invasively
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**Background:** Myocardial disease (MD) is a systemic and a coronary circulation. In this model, also arteriolar and the microvasculature are mimicked realistically and true myocardial resistance is calculated using electromagnetic flow measurements and can be varied over the complete physiological range. Six different levels of myocardial resistance were applied. At every level of microvascular resistance, 4 different degrees of epicardial stenosis were induced, using an external occluder. For each combination of myocardial resistance and epicardial stenosis, IMR was determined and compared to Rmvo. Simultaneously, distal coronary pressure, aortic pressure and fractional flow reserve (FFR) were measured throughout the experiment.

**Results:** A total of 24 measurements were performed. Blood flow varied from 42 - 203 ml/min and Rmvo varied from 0.39 to 1.63 dynes.s.cm-5. An excellent correlation between IMR and Rmvo was found (R²=0.94, p<0.0001). Importantly, IMR was not dependent on the severity of any stenosis in the epicardial vessel, and thus specific for true myocardial resistance.

**Conclusion:** In this in-vitro set up, IMR correlates well with true myocardial resistance and is not dependent on the severity of the epicardial stenosis. Therefore, using one single guide wire, both FFR and microvascular resistance can be measured in an easy and simple way as indexes of epicardial and microvascular disease, respectively.