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Reproducibility Assessment of Different Functional Intracoronary Diagnostic Techniques

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**Background:** Current guidelines recommend the use of fractional flow reserve (FFR) for guiding the decision for coronary revascularization. Recently, new parameters are being validated for intracoronary ischemia detection. There are few data on the intrinsic biological variability of these measurements. The objective of this study was to evaluate the reproducibility of the different methods of intracoronary diagnosis.

**Methods:** We prospectively enrolled consecutive intermediate coronary lesions during a 6-month period. In all cases we systematically obtained measurements of the following parameters (in the same lesion using the same sequence): Pd/Pa, iFR, FFRic (after 80 mg intracoronary adenosine) and FFRiv (after intravenous adenosine at 140 mg/kg/min). At least two measurements of each parameter were obtained separated by a minimum interval of 3 minutes. The agreement between the measurements of each parameter was assessed using the intra-class correlation coefficient (ICC) and the Bland-Altman method. The variability of the four parameters was estimated using the variation coefficient (VC).

**Results:** Fifty three lesions were included. The mean values of each parameter were: 0.74 ± 0.48 for Pd/Pa; 88.0 ± 5.1 for FFR; 81.3 ± 8.3 for FFRic and 81.6 ± 11.3 for FFRiv. The concordance of each parameter was very good, with coefficients close to 1.0 and very precise ICC confidence and with very precise ICC confidence intervals. The ICC values were: 0.95 (95% CI: 0.91-0.97) for Pd/Pa; 0.99 (95% CI: 0.98-0.99) for iFR; 0.97 (95% CI: 0.96-0.98) for FFRic; and 0.97 (95% CI: 0.95-0.98) for FFRiv. The mean difference was not different from 0 for any parameter (Student-t test for related samples with p values < 0.05 in all cases). The Bland-Altman analyses showed a good agreement in all cases. The CV, however, showed greater variability for FFRiv, with a CV of 13.8% compared with 5.1%, 9.2% and 10.2% of Pd/Pa, iFR and FFRic, respectively.

**Conclusions:** Our findings suggest that the reproducibility of the different methods of functional diagnosis is excellent. Nonetheless, the variability of these parameters should be taken into account when making treatment decisions.

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FFR-guided complete revascularization during primary PCI: Preliminary data from the COMPARE ACUTE trial

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**Background:** The debate on multi-vessel PCI in STEMI. This preliminary data from the COMPARE ACUTE trial indicates the need for FFR-guided complete revascularization during primary PCI.

**Methods:** A total of 109 consecutive patients with 124 intermediate coronary lesions (30-80% stenosis area by QCA) were included in the study during a 6-month period. iFR, FFRic (600 µg ic adenosine) and FFRiv (200 µg/kg/min) were systematically determined in all patients. The diagnostic accuracy of the 2 tests were calculated against the reference standard of FFRiv using a cut-off diagnostic threshold set at 0.80. The area under the curve of each test was also analyzed.

**Results:** 44 lesions were included. The mean age of patients was 66±11, 81% were male and 29% were diabetics. The most frequent indication was stable angina (56%) and the most frequent vessel was left anterior descending coronary artery (47%) and most lesions were located at proximal segments (51%). The average age of the patients was 75±9 years and the mean FFR was 0.81±0.09. iFR (optimal cut-off value found 0.89; sensitivity 100%) was higher than FFRic (89%). However, the specificity of iFR (70%) was less than that of FFRic (96%). Using a sequential approach with initial determination of iFR followed by FFRic for cases positive according to iFR an AUC of 0.98 (0.92-1) was obtained.

**Conclusions:** Our findings suggest that iFR as a high sensitivity whereas FFRic has a high specificity, as compared with FFRiv. The sequential combined use of both tests appears to be very simple, provides a very high diagnostic yield.

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Does Coronary Physiology or Anatomy Better Predict the Capacity to Increase Flow?

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**Background:** Coronary stenoses are stented to improve coronary flow with the majority selected using angiographic anatomical parameters. We sought to quantify the change in coronary flow velocity after angiographically successful stenting and quantify the predictive capabilities of anatomical parameters to predict flow increase after stenting and compared them to physiological indices of lesion severity.

**Methods:** 75 stenoses (67 patients, 62±9 years) selected for PCI on the basis of angiographic diameter stenosis ≥ 50% and coronary flow velocity measurements using a combined Doppler flow and pressure wire, before and after stenting. The relationship between the change in hyperemic flow after stenting and both anatomical parameters (measured by quantitative coronary angiography) and physiological indices (FFR, measured during hyperemia and the instantaneous wave-free ratio (iFR) measured at rest) was assessed.

**Results:** Before PCI, stenosis diameter was 61±14%; FFR was 0.68±0.17 and iFR was 0.73±0.23. Hyperemic flow velocity rose significantly after PCI (30±20m/s to 51±25m/s, p<0.001). Anatomical parameters had a weak but significant relationship with the change in hyperemic flow; diameter stenosis (R² 0.18, p=0.0002) and area stenosis (R² 0.11, p=0.008). Physiological indices, in contrast, were strongly predictive: iFR (R² 0.51, p<0.001, FFR R² 0.42, p<0.001). For intermediate stenoses (50-70% lesions), physiological parameters retained their stronger predictive value, iFR (R² 0.65, p<0.001, FFR R² 0.35, p<0.001), while the anatomical parameters had little value (diameter stenosis R² 0.005 p=0.80; stenosis area R² 0.07 p=0.16).

**Conclusions:** Both resting and hyperemic pressure-only physiological indices are better than anatomical parameters in predicting the capacity of stenting to increase flow.