



Letter to the Editor

Response to the letter by Dr. Horszczaruk: Pressure-bounded coronary flow reserve – Yet a meaningless concept?



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References

- [1] G.W.M. Wijntjens, M.A. van Lavieren, T.P. van de Hoef, M. Echavarría-Pinto, M. Meuwissen, V.E. Stegehuis, et al., Pressure-derived estimations of coronary flow reserve are inferior to flow-derived coronary flow reserve as diagnostic and risk stratification tools, *Int. J. Cardiol.* 279 (2019 Mar 15) 6–11.
- [2] T.P. van de Hoef, M.A. van Lavieren, P. Damman, R. Delewi, M.A. Piek, S.A.J. Chamuleau, et al., Physiological basis and long-term clinical outcome of discordance between fractional flow reserve and coronary flow velocity reserve in coronary stenoses of intermediate severity, *Circ. Cardiovasc. Interv.* 7 (3) (2014 Jun) 301–311.
- [3] S.A.J. Chamuleau, R.A. Tio, C.C. de Cock, E.D. de Muinck, N.H.J. Pijls, B.L.F. van Eck-Smit, et al., Prognostic value of coronary blood flow velocity and myocardial perfusion in intermediate coronary narrowings and multivessel disease, *J. Am. Coll. Cardiol.* 39 (5) (2002 Mar 6) 852–858.
- [4] G.W.M. Wijntjens, M.A. Van Lavieren, T.P. Van De Hoef, J.J. Piek, Physiological assessment of coronary stenosis: a view from the coronary microcirculation, *Interv. Cardiol.* 7 (4) (2015) 401–413.

We thank Dr. Horszczaruk and colleagues for their interest in our study. Dr. Horszczaruk and colleagues are to be congratulated with their study, where they surmise meaningful correlation between CFR_{pb} and CFR_{thermo} in vessels with concordant CFR derived by both techniques. Although promising, it should be acknowledged that this correlation derives from only 13 vessels, where no information is provided on the distribution of these cases with respect to actual CFR values. In fact, we know that correlations are importantly affected by value distributions. In our large cohort [1], we demonstrate poor correlation between CFR_{pb} and CFR_{thermo} (Spearman $R = 0.53$ for both bounds, $p < 0.001$) also in this particular group of vessels with concordant CFR_{pb} and CFR_{thermo} ($n = 63$). Absolute classification agreement between CFR_{flow} and CFR_{pb} was only numerically higher for vessels with Δ -pressure gradient >0.12 compared to our general cohort (79% versus 72%). This may be explained by the observation that a large Δ -pressure gradient may be governed by either a large increase in coronary flow over a moderate non-flow-limiting coronary stenosis or by a severe flow-limiting stenosis. These mechanisms may induce similar changes in ΔP , but have an opposing relationship with CFR_{flow} , and opposing prognostic implications [1–4]. Notwithstanding the efforts from Dr. Horszczaruk and colleagues to identify subsets of patients in whom CFR_{pb} might be of use, our dataset substantiates that CFR_{pb} actually has poor diagnostic power to correctly identify those patients with $CFR_{flow} < 2.0$ across the whole spectrum of values, which is not substantially improved in patients with Δ -pressure gradient >0.12 . Hence, clinical application of this tool cannot be supported by current evidence.

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