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Absolute coronary flow measurement by continuous infusion thermodilution: in-vitro evaluation

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Introduction
Direct volumetric coronary blood flow measurement during catheterization has not been possible so far. Derived parameters could be assessed using Doppler probes or thermodilution by bolus injection. In this study, the application of continuous infusion of saline for volumetric flow measurement is assessed.

Materials and methods
The mixing is investigated in a physiologically representative in-vitro model of the coronary circulation (figure 2, [2]), using different over-the-wire infusion catheters (specially designed by Occam, commercially available Boston Scientific Tracker 18), at two infusion rates (15 and 25 ml/min), with coronary flow rates varying between 50 and 250 ml/min.

Results and discussion
The accuracy of the flow derivation increased with increasing infusion rate and decreasing coronary flow. With increasing coronary flow rate, the flow was progressively underestimated, indicating incomplete mixing and concentration of infusate around the wire in the middle of the vessel. The specially designed infusion catheter (Occam) had the best mixing properties: the coronary flow was reliably estimated over the entire range at an infusion rate of 25 ml/min.

Conclusion
This model study indicates appropriate application of the continuous infusion method for coronary flow measurement, using the specially designed infusion catheter.

References: