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Effects of Mixing on the Conductance Measurements of Artery Cross-Section Area QING HAO, HYO WON CHOI, GHASSAN KASSAB, Indiana University Purdue University, Indianapolis — Turbulent dispersive mixing occurs during injection of saline into artery for the conductance catheter measurement of lumen cross section area (CSA). The objective of present study is to evaluate the accuracy of conductance catheter measurement in relation to dispersion. Computational fluid dynamics (CFD) simulations were performed to describe fluid flow, mass and electric field in artery with saline injected through different catheters and for different injection times. The simulation results showed that axial velocity profiles in all cases can reach stable after 0.5 sec and a recirculation zone exists distal to the saline injection site for Craya-Curtet number below critical value (0.7-0.98). A stable mixture ratio of saline and blood was reached in a distance of 8 artery diameters downstream of saline injection site. The results also showed that the accuracy of conductance catheter is affected by injection time, artery size, and conductance catheter location. The mixing ratio of saline and blood was shown to be a major factor affecting the accuracy of the conductance catheter measurement of CSA. A modification of electrical conductivity according to the mixing ratio improved the accuracy of conductance measurements and decreased the error to an acceptable level ($<10\%$) regardless of the vessel size and injection flow rate.

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