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Effects of vascular structures on the pressure drop in stenotic coronary arteries[1] JAERIM KIM, HAECHEON CHOI, Seoul National University, JIHOON KWEON, YOUNG-HAK KIM, DONG HYUN YANG, NAMKUG KIM, University of Ulsan College of Medicine, Asan Medical Center — A stenosis, which is a narrowing of a blood vessel, of the coronary arteries restricts the flow to the heart and it may lead to sudden cardiac death. Therefore, the accurate determination of the severity of a stenosis is a critical issue. Due to the convenience of visual assessments, geometric parameters such as the diameter stenosis and area stenosis have been used, but the decision based on them sometimes under- or overestimates the functional severity of a stenosis, i.e., pressure drop. In this study, patient-specific models that have similar area stenosis but different pressure drops are considered, and their geometries are reconstructed from the coronary computed tomography angiography (CCTA). Both steady and pulsatile inflows are considered for the simulations. Comparison between two models that have a bifurcation right after a stenosis shows that the parent to daughter vessel angle results in different secondary flow patterns and wall shear stress distributions which affect the pressure downstream. Thus, the structural features of the lower and upper parts of a stenosis significantly affect the pressure drop.

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