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Hemodynamics Assessments of Ascending Thoracic Aortic Aneurysm – the Influence of Hematocrit with Fluid-Structure Interaction Analysis HAN HUNG YEH, SIMON RABKIN, DANA GRECOV, The University of British Columbia — An aortic aneurysm is one of the cardiovascular diseases with localized abnormal growth of a blood vessel risking rupture or dissect. The precise pathological pathway for aneurysm progression and formation is not completely understood. In the current study, ascending thoracic aortic aneurysms (ATAA) are investigated using a fully coupled fluid-structure interaction method focusing on the changes in hematocrit under normotension and hypertension. Blood was modeled as a laminar incompressible flow using the Quemada model with varying hematocrits. The arterial wall anisotropy and hyperelasticity were considered. Given the influence of hematocrits on the degree of shear-thinning of blood, the current result could provide valuable information in clinical practice. Our results suggested that with the increase in hematocrit, the shear stress distribution and the maximum shear stress magnitude along the arterial wall would increase significantly. The wall stress distributions, however, remained unchanged with respect to the changes in hematocrit. In addition, the distribution of von Mises stress indicated that elevated stress under hypertension could depend on geometry. This geometrical influence in ATAA could be a risk factor predicting further aortic expansion.

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