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Hemodynamics and Aneurysm Formation

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Aneurysms develop due to a multitude of factors. Traditionally, research surrounding aneurysm formation has examined an individual's lifestyle and medical co-morbidities, such as hypertension, nicotine use, and a pre-existing family history. With improvements in technology and the ability to more accurately model hemodynamic forces, research has also focused on the role of hemodynamic forces on aneurysm development, remodeling, and the risk of aneurysm rupture. Computational fluid dynamic studies allow researchers to quantify the effects of fluid movement within a vessel and aneurysm. They can also identify parameters, such as wall shear stress and oscillatory shear index, which likely induce changes within the vessel to promote aneurysm formation and remodeling through complex biological pathways. We will review the current knowledge and beliefs regarding aneurysm formation and examine how computational fluid dynamics has added to our understanding of aneurysm pathophysiology and how it influences clinical decision making.