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Towards Recommendations for Hemodynamic Simulations: Industry Needs

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Saving lives through the use of simulation AND saving millions of dollars for the Medical Device industry? This combined potential of proactive use of simulation for medical device design, as well as clinical diagnostics, motivated us to develop a best practices document for aneurysm modeling. It enables our clients to efficiently and accurately model aneurysm hemodynamics. Additionally, as a SW vendor, it helps us to further develop our tools to support and augment Clinical Trials for Medical Devices.

Therefore, we will briefly present the concept of Digital Evidence Generation for implanted devices, and then dive deeper into our work on aneurysm modeling, where our goal was twofold: to compile and summarize state-of-the-art hemodynamic metrics for aneurysm rupture prediction from literature, and to present the most accurate CFD methods for the aneurysm problem within STAR-CCM+.

The blood flow dynamics throughout the parent arteries and dilated region are thought to have a pivotal role in the pathogenesis, rupture onset, and treatment of intracranial aneurysms. Within the clinical environment, it is not uncommon for classification and treatment to be made based almost entirely on the aneurysm shape and size alone. This, as well as the large difficulty and high risk in taking in vivo measurements, speaks for the need of highly-technical blood flow simulations, defined here synonymously as CFD, to investigate the flow dynamics in a trustworthy and insightful fashion. The choice and details of the numerical modeling method used in a CFD investigation however are imperative. However, a ‘one-size-fits-all’, or ‘perfect’ set of practices and settings in literature do not exist for the aneurysm problem.