

Development of Novel Carotid Stent for Stroke Prevention

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Stroke is the third leading cause of death and more importantly the number one leading cause of disability in the United State and European Union. Carotid artery stenosis is one of the three most common causes of stroke and is treatable. There are basically two treatments for such disease: the surgical procedure which is called carotid endarterectomy (CEA) and the minimal invasive procedure called CAS. However, several large-scale randomized controlled studies reported that the peri-procedural stroke and death rate of CAS is higher than CEA. This is a major problem which hinders the development of CAS. To overcome the limitations, new stents or embolic protection devices have been invented. In this paper, we will introduce our novel stent design project. The main objectives of the project is to proof the concept of preferential covered stent by designing the novel covered stent, conducting experiments using bench mechanical models with pulsatile fluid flow, and computational modeling and simulation for validation and optimization of the design.

Keywords: Carotid artery stenting, Covered stent, Computational hemodynamics, PIV