BHE-034

Numerical and In Vitro Assessment of Cerebral Protection in Endovascular Carotid Artery Repair

Ender A. Finol
Research Scientist, Institute for Complex Engineered Systems, Adjunct Faculty - Department of Biomedical Engineering, Carnegie Mellon University, Pittsburgh, PA

Industry Participant
Mark H. Wholey
Chairman, Pittsburgh Vascular Institute, University of Pittsburgh Medical Center, Pittsburgh, PA

Abstract

In recent medical practice, there is preference among vascular surgeons and radiologists to perform carotid artery stenting (CAS) with distal emboli protection to reduce the risk of one-year stroke and neurological event rates related to embolic complications. The current devices used for emboli protection are not reliable in all scenarios, as there is clinical evidence of failure in capturing all the plaque dislodged during stenting. To address the problem of risk of embolization in CAS, we propose to assess the functionality of embolic protection filters and provide design guidelines on the basis of an integrated approach of computational and experimental fluid dynamics techniques. To fulfill this goal, the following specific aims will be pursued: (1) experimental evaluation of the efficacy of embolic protection filters in the reduction of the risk of embolization, and (2) computational fluid dynamics modeling and evaluation of embolic protection filter performance. Through the integration of *in vitro* experimentation and computational modeling, the long-term goal of this research is to design and develop a novel cerebral protection device for reducing the risk of distal embolization in CAS.