



Predicting Thrombus Formation, Deformation, and Embolization: A Look at Devices, Stroke, and Deep Vein Thrombosis

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Thrombosis remains a significant clinical issue manifesting in heart attacks and strokes but also challenges the success of cardiovascular devices. Given the complex process associated with thrombosis, developing accurate computational models is difficult as validation needs to occur over a range of flow and surface interactions and at different temporal and spatial scales. Thrombi are particularly interesting because of their inherent heterogeneity. Leveraging canonical experiments that acquire a breadth of data will be crucial to validate any computational model, but do these experiments accurately represent how thrombi form, deform, and embolize in the context of devices, stroke, and deep vein thrombosis? This presentation will cover the development and experimental validation of our computational models in these areas and the complications posed with blood experiments.



ABOUT the SPEAKER

Dr. Keefe B. Manning is a Professor of Biomedical Engineering and Professor of Surgery (courtesy) at The Pennsylvania State University. He completed his B.S. in Bioengineering in 1995 and his M.S. in Bioengineering in 1997 at Texas A&M University. Subsequently, he completed his Ph.D. in Biomedical Engineering in 2001 at Virginia Commonwealth University studying flow of a centrifugal blood pump. He spent 2001-2004 as a post-doctoral scholar at Penn State studying the fluid mechanics of prosthetic heart valves before starting his faculty appointment in 2004 at Penn State. Dr. Manning and his research team study flow associated with cardiovascular devices (e.g., blood pumps, valves, IVC filters, cannulae, thrombectomy technology, and ECMO). His group also studies how clotting occurs with these devices and is developing computational models to predict clot formation and embolization. His group studies acute ischemic stroke and venous thromboembolism. His research has been sponsored by the National Institutes of Health, National Science Foundation, American Heart Association, U.S. Food and Drug Administration, Department of Defense, Grace Woodward Foundation, and industry. He holds fellow status in the American Heart Association, American Institute for Medical and Biological Engineering, American Society of Mechanical Engineers, and Biomedical Engineering Society.

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1003 Engineering Centers (Tong Auditorium)

