RESEARCH IN THE BIOFLUID DYNAMICS LAB:
Biomechanics, Imaging, Vascular Biology and Translation to Patients

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Current Projects

- Hemodynamics and atherosclerosis in mice
- Relation of wall shear stress to plaque progression and rupture in human coronary arteries
- Fluid dynamics of cerebral aneurysms
- Flow field effects on convection and attachment of nanoparticles in arteries
- Hemodynamics of the liver
What is the Vulnerable Plaque?

Quiescent

Fibrotic/Scarred plaque
→ angina

Vulnerable, Ruptured Plaque
→ MI, sudden death
Relationship with atherosclerosis – Examine the relationships between the flow and plaque distributions in the proximal segments of the coronary arteries
Hemodynamics and Atherosclerosis in Mice
Low Shear Stress Increases VCAM in Mice

Suo, Ferrara, Sorescu, Guldberg, Taylor, Giddens. ATVB. 2007;27:346
Plaque Progression in Human Coronary Arteries
Plaque Progression in Human Coronary Arteries

High shear

Low shear

LM

LCX

LAD

D1

Velocity

WSS in Dynes/cm²
Fluid Dynamics of Cerebral Aneurysms

Computational Mesh

Pathlines

Wall Shear Stress
Principal Collaborators and Students

- Jin Suo, Ph.D. – BME
- Hanjoong Jo, Ph.D. – BME/Cardiology
- Diego Martin, M.D. - Radiology
- John Oshinski, Ph.D. – Radiology/BME
- Habib Samady, M.D. - Cardiology
- Robert Taylor, M.D./Ph.D. – Cardiology/BME
- Frank Tong, M.D. – Radiology
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