Investigation of Bio/Micro-fluid Mechanics

**Objectives**
- To investigate the influences of vascular geometry on hemodynamics
- To develop a numerical simulation system for clinical diagnosis

**Simulation**
- 3D modeling of arterial shape using machine learning and blood flow prediction using statistical shape models
  
  ![Automatic extraction of vascular regions from medical images by machine learning](image)
- 3D blood flow simulation for diagnostic aid
  
  ![Left: Wall shear stress distribution on cerebral aneurysm wall Right: Streamlines of blood flow inside an abdominal aortic aneurysm and intra-wall accumulation of dosed drug](image)
- Machine learning assisted prediction of hemodynamics in the cerebral circulation after stenting
  
  ![3D simulation of cerebral blood flow and stenting](image)

**Experiment**
- Stereo-PIV flow measurement in realistic blood vessel geometry
  
  ![Realistic model of cerebral aneurysm Streamlines inside aneurysm](image)
- Flow measurement for droplet formation inside microchannel using digital holography
  
  ![3D interfacial geometry between water and oil 3D flow inside droplet](image)
- Empirical evaluation of endothelial cell damage under wall shear stress (WSS) load
  
  ![Uniformly distributed Local separation](image)
- Simultaneous measurement of the motion of a single Red Blood Cell and surrounding flow using multicolor confocal micro-PIV
  
  ![Tank-treading motion and surrounding velocity distribution of a single RBC](image)