CISS

OSHIMA LAB.

[Bio fluid mechanics, micro-fluid and biochemical system]

Department of Mechanical and Biofunctional System /
Center for Research on Innovative Simulation Software

http://www.oshimalab.iis.u-tokyo.ac.jp/

Department of Mechanical Engineering /
Interfaculty Initiative in Information Studies

Computational Fluid Dynamics

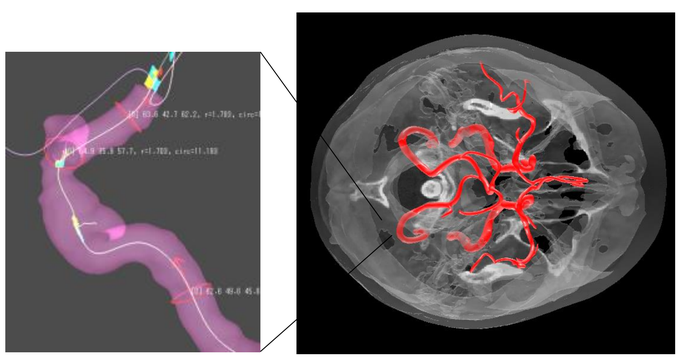
Investigation of Bio/Micro-fluid Mechanism

Objectives:

- To investigate and elucidate the influences of vascular geometry on the hemodynamics
- To develop a simulation system for the clinical study and treatment

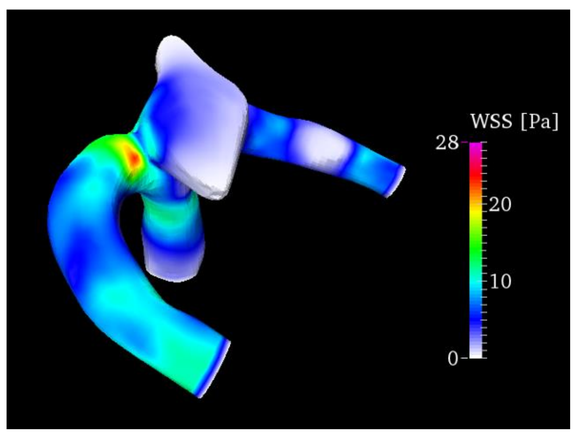
Simulation

● **Three-dimensional geometric modeling from medical images**

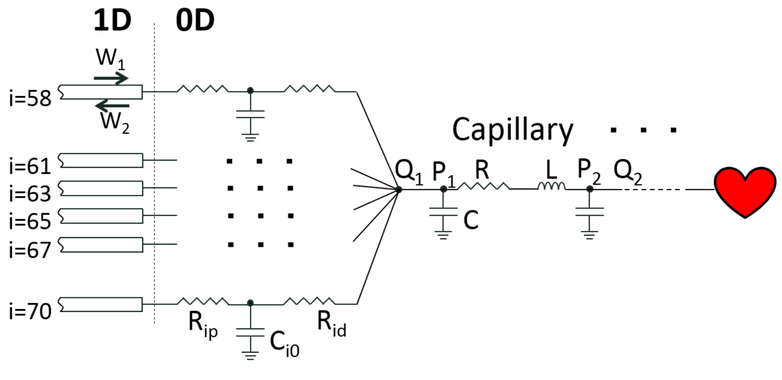


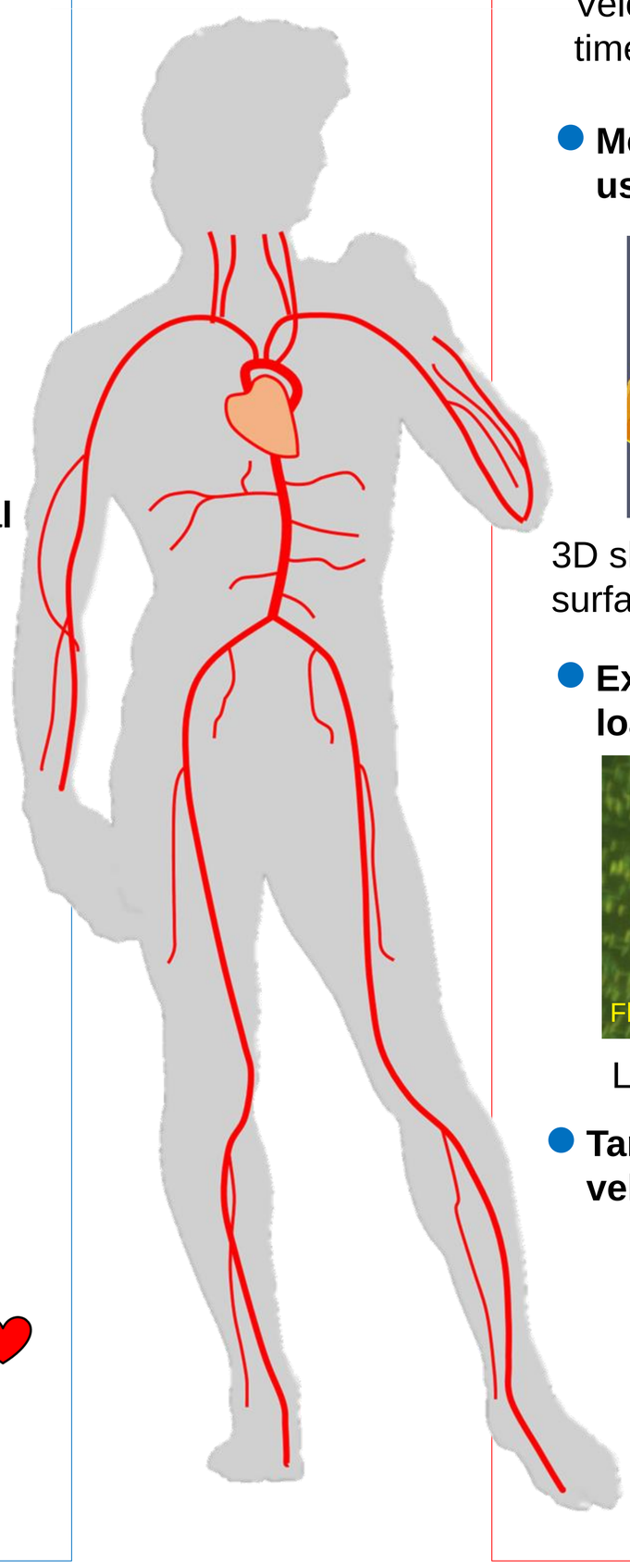
Cerebral aneurysm Circle of Wills

● **Wall shear stress(WSS) of the cerebral aneurysm by the FSI simulation**



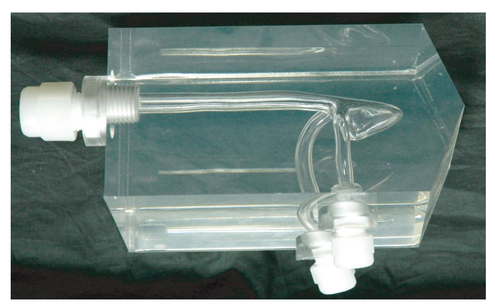
● **1D-0D bloodflow simulation**



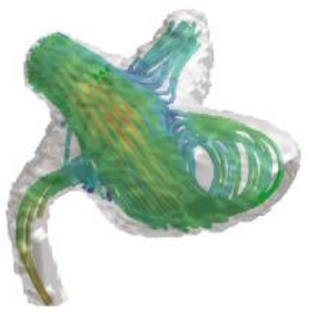


Experiment

● **Stereo PIV measurement of blood flow in the realistic geometric model**

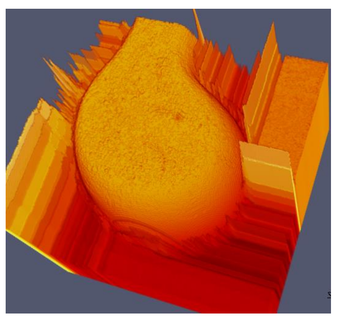


Velocity distribution at the time of the biggest inflow

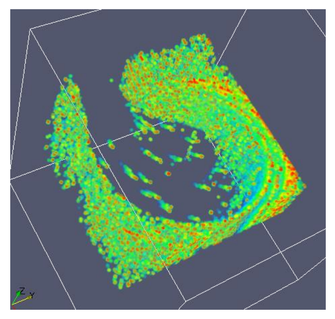


Pathline in the cerebral aneurysm

● **Measurement of the flow in microchannel using 3D digital holography**

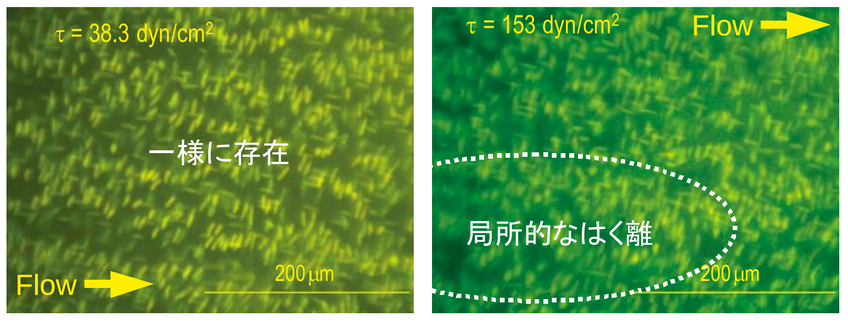


3D shape of boundary surface between water-oil



3D flow inside the droplet

● **Experiment of the effects of high WSS loading on the endothelial cells**



Low wall shear stress High wall shear stress

● **Tank Treading motion of a RBC and flow velocity distribution around the RBC**