

# OSHIMA LAB.

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

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

Computational Fluid Dynamics

Department of Mechanical Engineering /  
Interfaculty Initiative in Information Studies

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

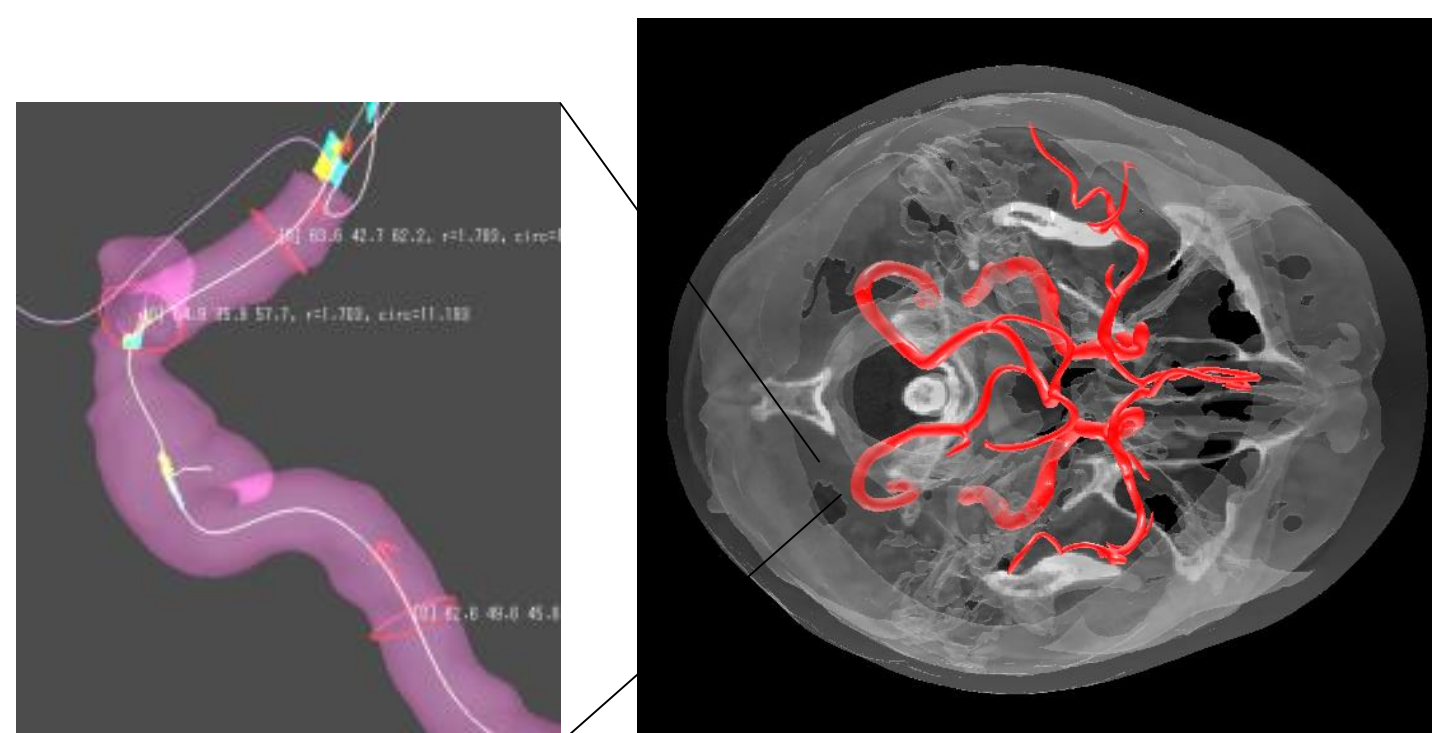
### Investigation of Bio/Micro-fluid Mechanism

#### Objectives:

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

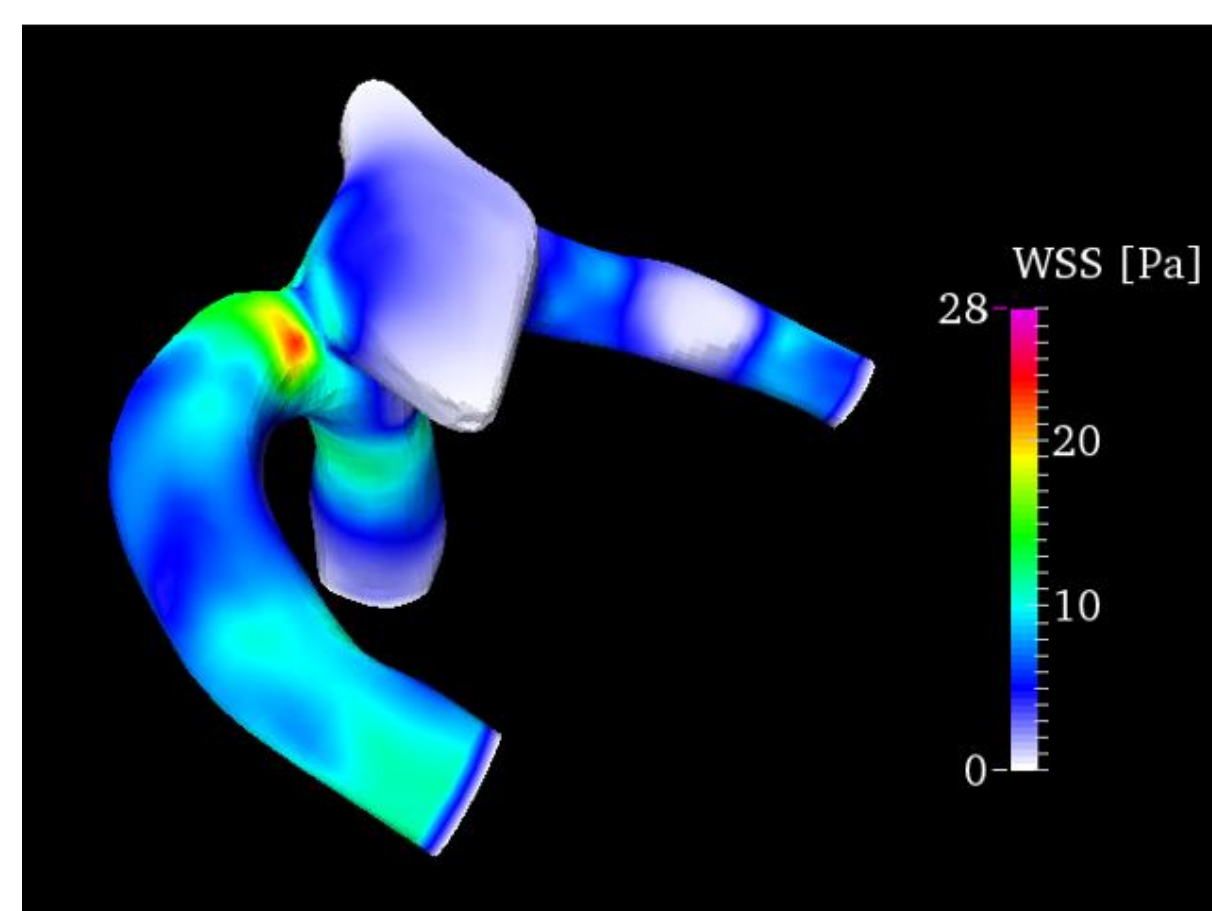
#### Simulation

- Three-dimensional geometric modeling from medical images

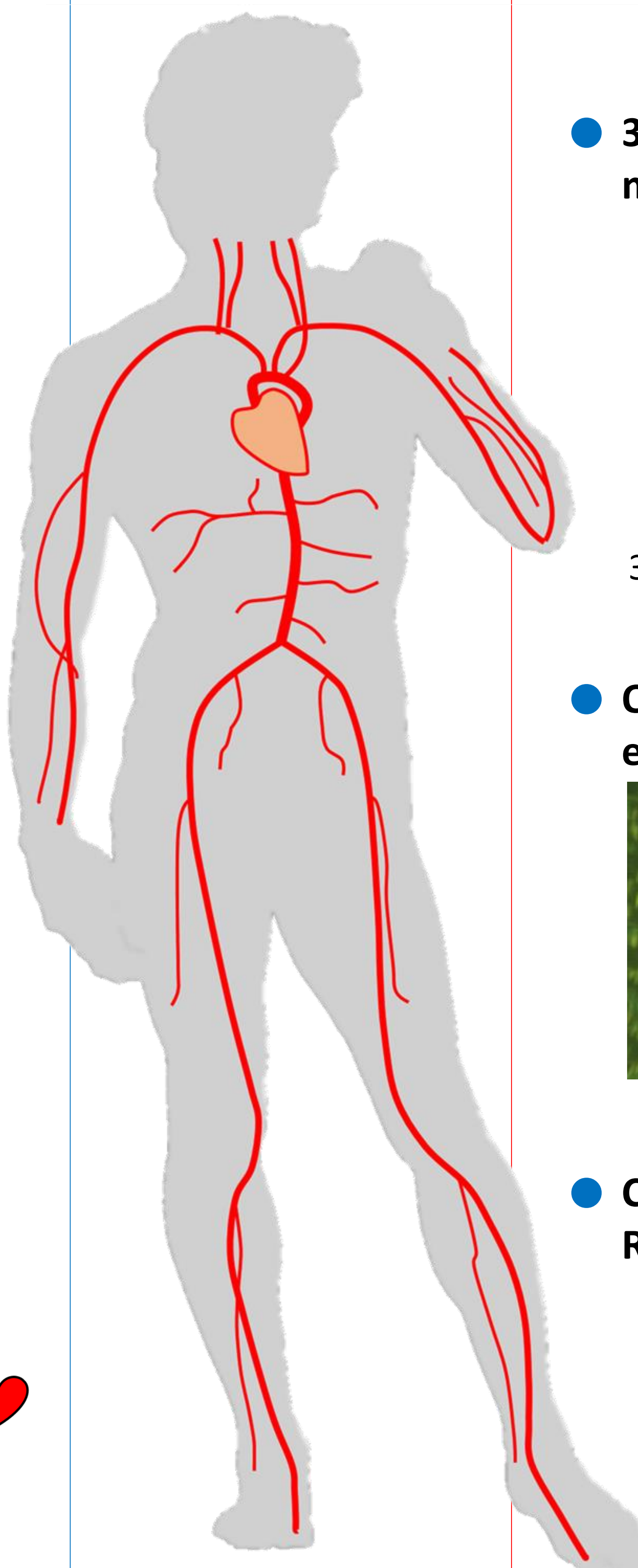
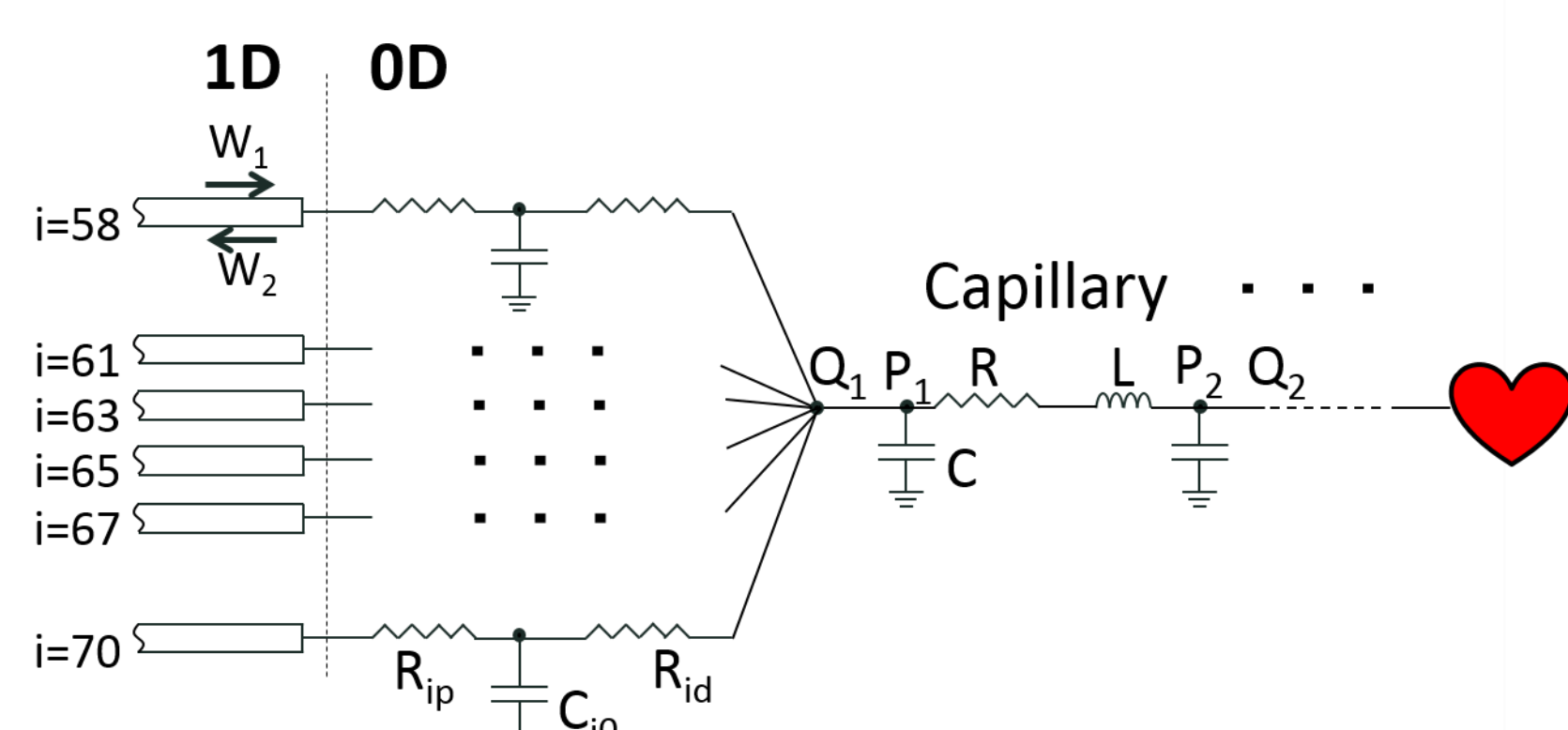


Cerebral aneurysm      Circle of Willis

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

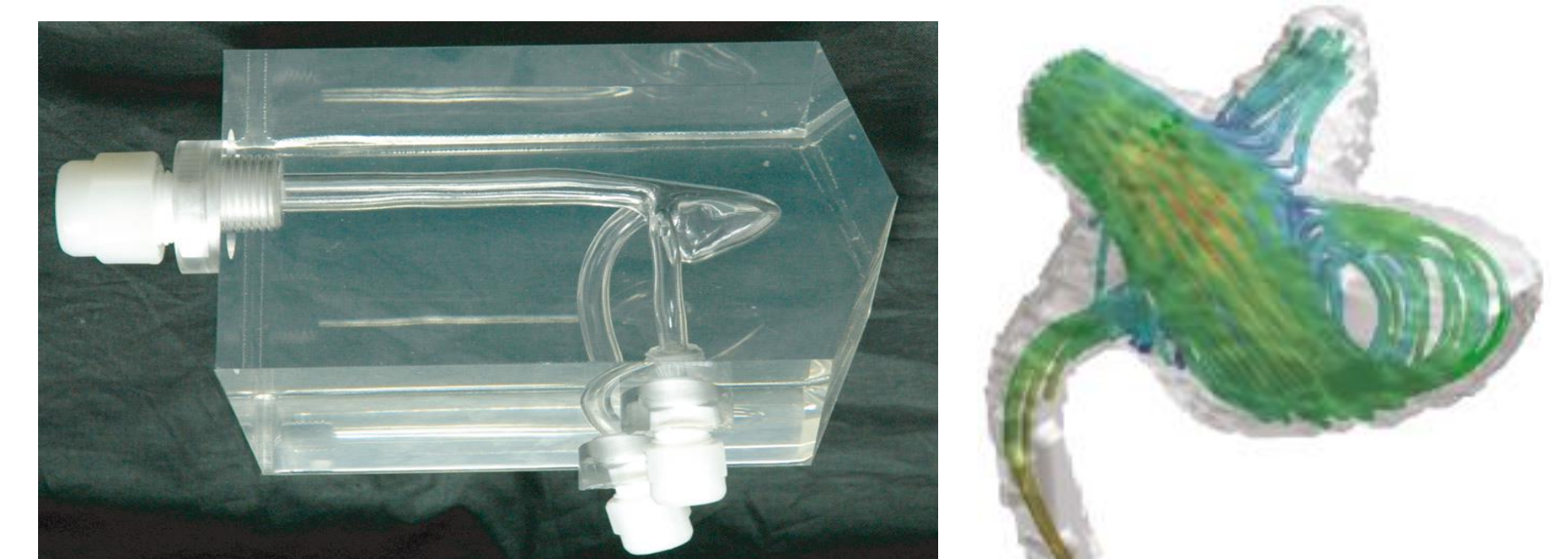


- 1D-0D blood flow simulation



#### Experiment

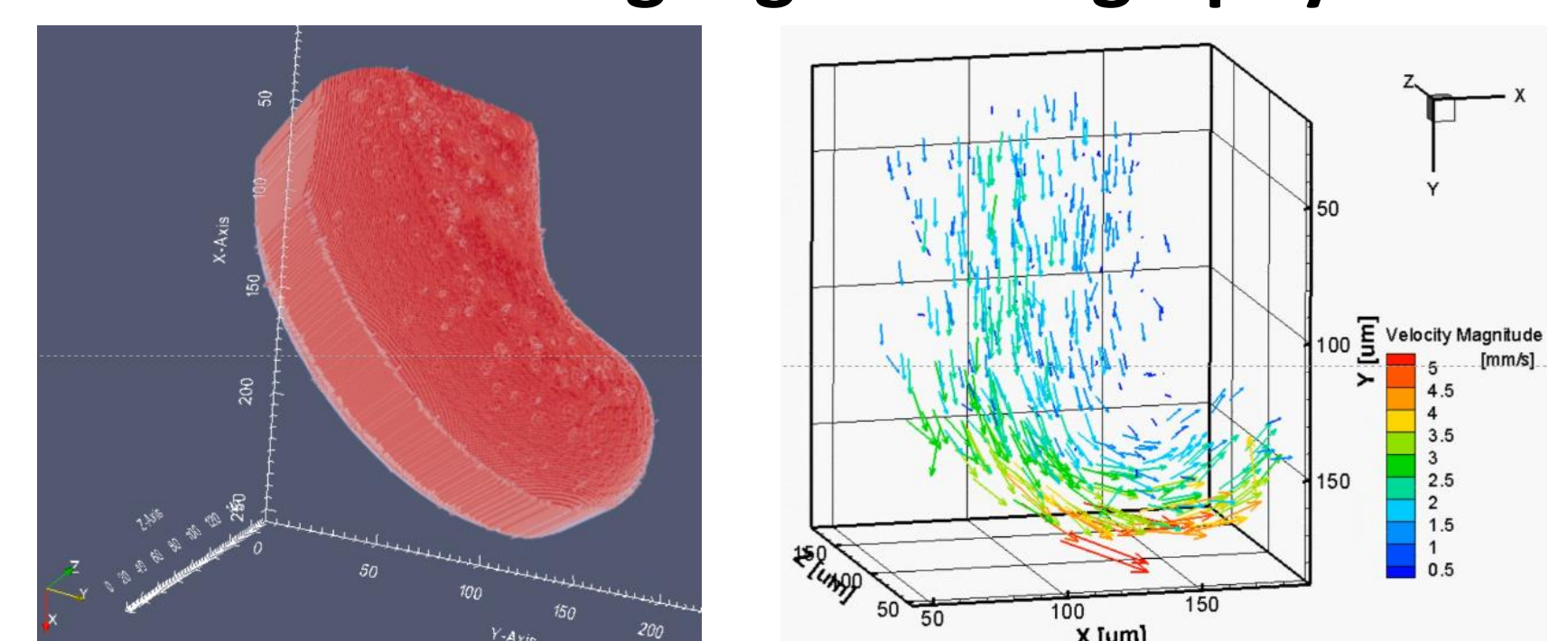
- Stereo-PIV measurement of blood flow in the realistic geometric model



Realistic model of the cerebral aneurysm

Streamline in the aneurysmal model

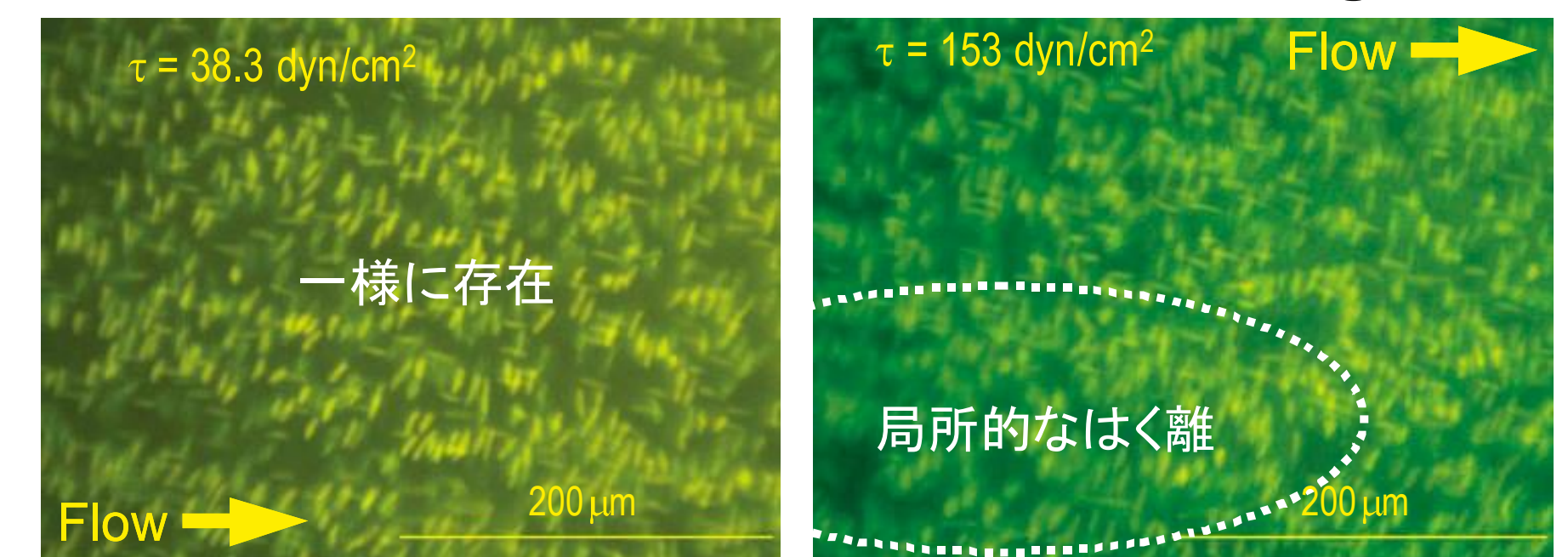
- 3D Measurement of the flow in the microchannel using digital holography



3D interfacial geometry between water and oil

3D flow inside the droplet

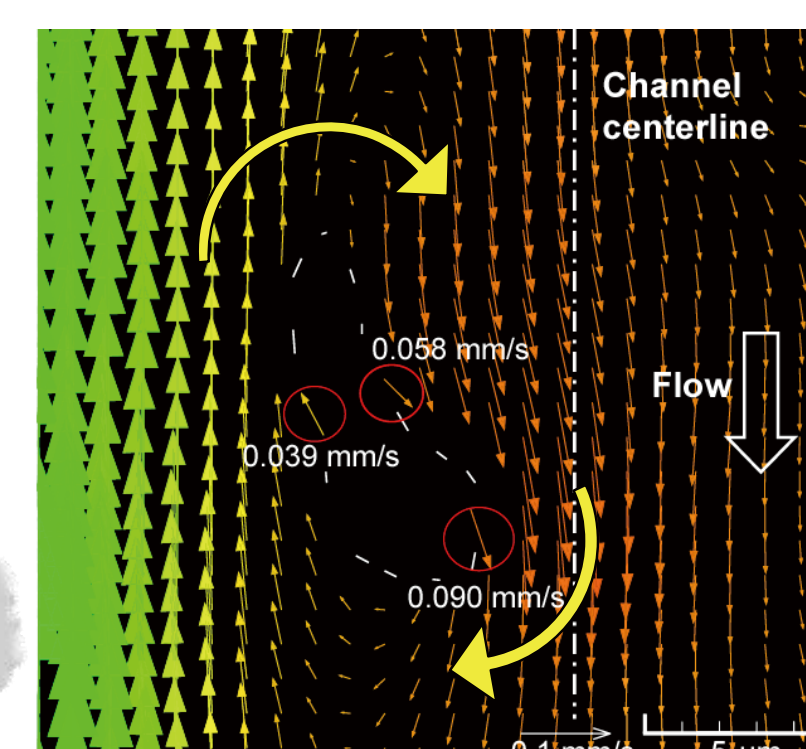
- Quantitative damage evaluation of endothelial cells under the WSS loading



Low wall shear stress

High wall shear stress

- Confocal micro-PIV measurement of single RBC motion and the surrounding flow



Tank-treading motion of single RBC and the velocity distribution of the surrounding flow