Mechanical / Biomedical Engineering

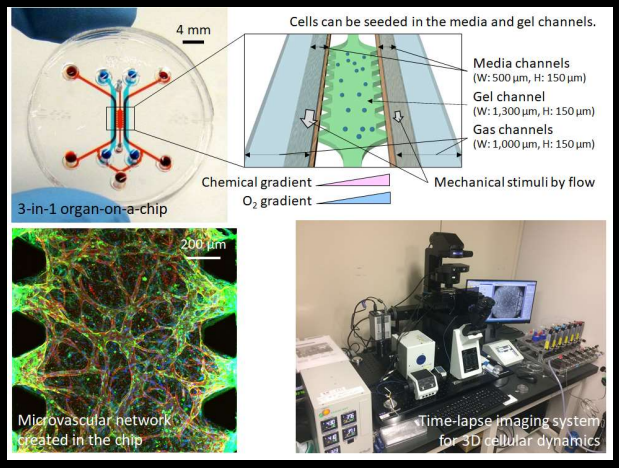
Integrated Simulation Biomedical Engineering Lab. (Institute of Fluid Science)

Funamoto Laboratory

For technical innovation of treatment and prevention for diseases, it is essential to elucidate mechanisms for maintenance of homeostasis and *in vivo* phenomena related to development and progression of the diseases. We perform interdisciplinary research based on fluid engineering, integrating biomedical engineering and cell biology.

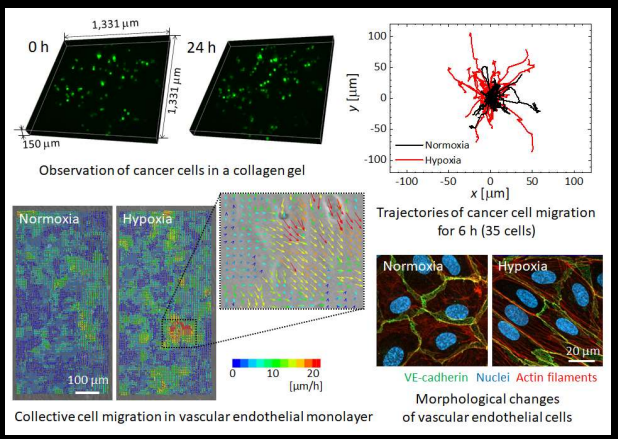
Development of 3-in-1 organ-on-a-chip

Cells respond to mechanical stimuli caused by motion and blood flow and chemical stimuli by chemicals. We develop a "3-in-1 organ-on-a-chip" which controls oxygen concentration and mechanical and chemical stimuli to cultured cells. The chip contributes to elucidation of physiological and pathological phenomena in *in vivo* microenvironments, and is useful as a platform for drug discovery for diseases.



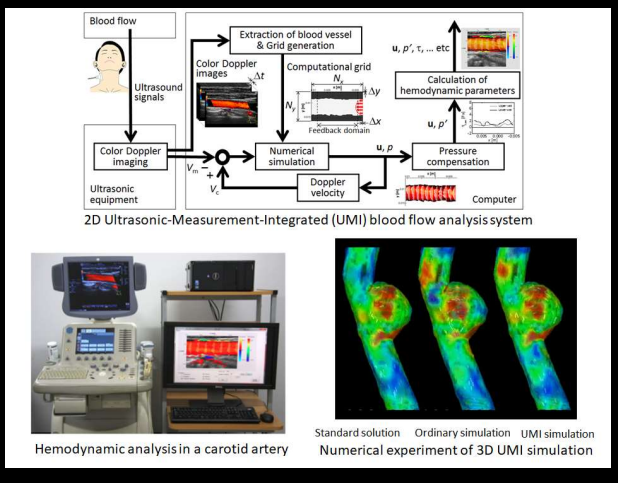
Elucidation and control of cellular responses to hypoxic stresses

An *in vivo* oxygen tension is lower than the atmospheric one and has spatial and temporal variations. We elucidate oxygen-dependent cellular dynamics and characteristics, e.g., cancer cell migration and vascular endothelial permeability, and investigate how to control them.



Hemodynamic analysis by integration of measurement and numerical simulation

Accurate diagnosis of circulatory diseases is a critical issue to realize a healthy society. We are doing a research to realize an advanced medical care by understanding complex hemodynamics through measurement-integrated simulation of blood flows.



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