

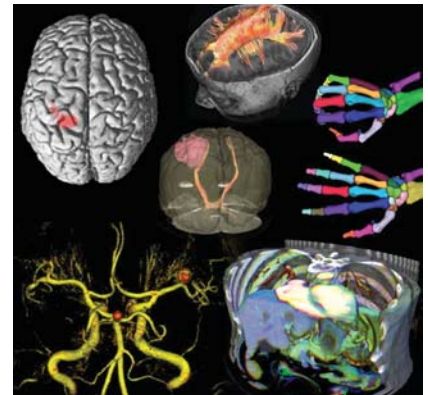
Radiology and Biomedical Engineering

Radiology

<http://www.ut-radiology.umin.jp/>

We have been performing a variety of clinically oriented research programs in biomedical imaging, voxel-based or ROI-based analysis, information analysis and radiotherapy, such as computer-assisted diagnosis (CAD), PET-based diagnosis, and intensity modulated radiotherapy (IMRT).

- Diagnostic Radiology
 - Multi-row detector (up to 16 rows) helical computed tomography
 - MR imaging, MR digital subtraction angiography, perfusion imaging, and diffusion tensor imaging/tractography
- Radiation Oncology
 - Physical engineering aspect of radiotherapy
 - Stereotactic irradiation by gamma knife and synergy system and IMRT
 - Clinical and biological studies for reduction of radiation-induced damage
- Nuclear Medicine
 - Functional imaging by radioisotope-labeled tracer technology
 - Evaluation of blood flow and metabolism by emission tomography (PET and SPECT)



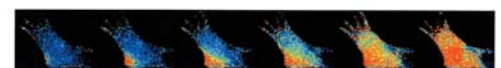
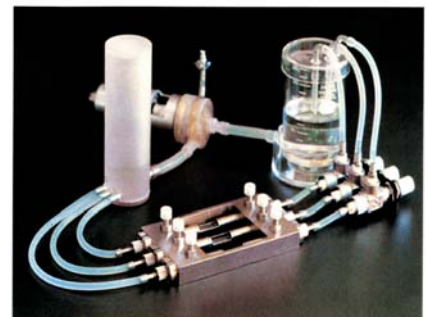
Representative images analyzed with computer-assisted technology

System Physiology

<http://bme-sysphysiol.m.u-tokyo.ac.jp/>

A variety of living cells respond to mechanical forces occurring both inside and outside a body. We have been pursuing biomechanical research focusing on the effects of shear stress generated by flowing blood on vascular cells and circulatory functions. Our analyses range all the way from genes to whole organs and systems. Research on the molecular mechanism of arterogenesis and biomechanical tissue engineering is also ongoing.

- Vascular cell responses to shear stress
- Identification of flow-sensing molecules
- Mechanical stress responsive genes
- Tissue engineering using mechanical stresses
- Atherosclerosis research from the aspect of hemodynamics
- Vascular system physiology
- Microcirculation study using optical imaging



Mechanical force-loading apparatus and calcium response in vascular cells

Our research fields include medical engineering high-technologies represented by artificial organs. Especially the research of artificial heart has gotten excellent results such as the world longest survival record in animal replaced with a total artificial heart. We are performing the researches from the basic to the application.

- Implantable total artificial heart
- Implantable ventricular assist device
- Polymer artificial valve
- Next generation artificial lung
- Tissue engineered artificial organs
- Blood compatible material
- Implantable pressure sensor
- Implantable angiogenesis observation probe
- Space medicine1



Implantable total artificial heart (Undulation pump total artificial heart) and artificial heart animal (goat)