

## NEW MATHEMATICAL TOOLS FOR CLINICAL MEDICINE

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### MINI-SYMPOSIUM PROPOSAL

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### MINI-SYMPOSIUM PROPOSAL

In this mini-symposium, we will present several topics arisen in collaborations between mathematical science and clinical medicine. Our targets include geometrical characteristics study related to cardiovascular diseases, fluid–structure interaction analyses for accurate heart valve simulations, medical imaging technologies for a supporting system for endoscopic operations, deep learning for medical imaging detection/diagnosis, and mathematical foundations inspired by medical applications. Although patient-specific simulations are extremely useful for grasping the accurate information and for treatment planning, they remain insufficient to elucidate the general mechanisms of targeted diseases. Several mathematical approaches should play important roles in this context, for example, providing new mathematical modeling and new viewpoints. Furthermore, strong mathematical foundations are indispensable for efficient implementations during computational analyses. Based on close collaborations with medical doctors, these analyses can yield greater understanding leading to better risk assessments. Throughout this mini-symposium, we would like to discuss how mathematical science could contribute to clinical medicine in our near-future society.

In planning this mini-symposium, we have communicated with the following researchers and they have agreed to participate in our mini-symposium by themselves or their colleagues.

- Takuya Ueda, MD, PhD, Tohoku University Hospital, Japan, Topic: Summary for mathematical tools in clinical medicine;
- Kenji Takizawa, PhD, Waseda University, Japan, Topic: Fluid–structure interaction for heart valve and blood flow analysis;
- Yoshitaka Masutani, PhD, Hiroshima City University, Japan, Topic: Medical imaging technology with deep learning approaches;
- Norikazu Saito, PhD, The University of Tokyo, Japan, Topic: Mathematical foundation for clinical problems;
- Hiroshi Suito, PhD, Tohoku University, Japan, Topic: Geometrical characteristics analysis for clinical medicine.

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