

Seeing Cancer through Optical Imaging: For improved disease diagnosis and treatment

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Optical imaging plays a crucial role in disease diagnosis and treatment. Light-tissue interactions allow measuring the optical properties of tissue, which enables the discrimination of healthy and abnormal tissue. Many advanced optical imaging methods have been developed and shown their potential in biomedical applications. However, only limited numbers of optical methods have been practically used in clinics due to challenges encountered during clinical translation, such as poor reproducibility or low clinician/patient acceptance. In order to overcome these challenges, I have focused on the development of the novel optical systems for practical clinical applications. In this talk, I will introduce three optical systems for preclinical and clinical studies: 1) Holographic imaging method for label-free cell phenotyping, 2) Hyperspectral endoscopy for the early detection of gastrointestinal cancer, and 3) Multimodal imaging system for rapid characterisation of intrinsic optical properties of freshly excised tissue. The clinical applications of developed optical systems in the States and the UK have been approved by the FDA and the NHS, respectively. I will show preliminary results of clinical studies as well as the approval process of using the developed optical systems in clinics. Moreover, I will present the short-term and long-term research plans that I want to do in the Department of Physics at Ajou University.