UEC-ERATO Symposium

～ Optical Coherence Tomography and Biomedical Imaging ～

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Massachusetts Institute of Technology (MIT), USA

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13:30 - 14:30

Room 301, Bldg. E-3

The University of Electro-Communications (UEC)

Abstract

Optical coherence tomography (OCT) is an example of a biomedical optical imaging technology that has been translated from bench to bedside. OCT has its origins in ultrafast optics, interferometry and coherent optical communications. It generates micron resolution, cross-sectional and three dimensional images of the internal structure of biological tissues or materials by measuring the magnitude and time delay of backscattered light. OCT imaging depth is limited by optical scattering and attenuation, however imaging can be performed using fiber optic catheters and endoscopes. OCT enables "optical biopsy", visualizing tissue pathology in situ and in real time without the need for tissue excision or histological processing. 3D functional imaging of Doppler blood flow and vascular contrast is also possible. OCT has applications in multiple situations, where biopsy is hazardous or impossible, guiding conventional excisional biopsy to reduce sampling errors, and guiding interventional treatment or monitoring treatment response.

It is estimated that there are ~30 Million OCT imaging procedures performed worldwide every year and the OCT system market is approaching $1B per year. OCT has helped diagnose patients with retinal disease at early treatable stages, preventing or greatly reducing irreversible vision loss. The technology has facilitated pharmaceutical development and contributed to fundamental understanding of disease mechanisms in multiple fields. The invention and translation of OCT from fundamental research to daily clinical practice would not have been possible without a complex ecosystem involving interaction among physics, engineering, and clinical medicine; government funding of fundamental and clinical research; collaborative and competitive research in the academic sector; entrepreneurship and industry; addressing clinical needs; harnessing the innovation that occurs at the boundaries of disciplines; and economic and societal impact.

This presentation discusses the development of OCT as well as its translation from fundamental research to clinical practice and commercial impact.

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