



BIOENGINEERING

UNIVERSITY of WASHINGTON

A Department of the College of Engineering & School of Medicine

## BIOEN 509 – DEPARTMENTAL SEMINAR SERIES

Thursday, May 5, 2010, 12:30-1:20 PM

Foege Bioengineering Building N130A

# Slice tissue with photons: imaging tissue microstructure and microvasculature using optical coherence tomography

*Dr. Ricky RK Wang*

*Department of Biomedical Engineering, Oregon Health & Science University*

Advances in optical technologies have spurred many new applications of light in biology and medicine. The expanding fields of optical diagnostics and therapeutics include such diverse topics as photodynamic therapy for cancers and other diseases, fluorescence endoscopy for early tumor detection, photoacoustic imaging for deep tissue vascular visualization, and optical coherence tomography (OCT) for superficial tissue assessment. OCT is a new medical imaging modality in which the coherent interference of a wide spectrum light source is used to create a high resolution (micron-scale) subsurface image of tissue microstructure. Recently, we have supplemented the microstructural OCT images with additional contrast mechanisms such as blood flow imaging using the static and dynamic (Doppler) speckle effects, which provide us the ability to perform label-free optical microangiography (OMAG) of microcirculatory tissue beds. The ability to visualize tissue blood flow at the microcirculation level is important in a variety of biomedical applications, some of which (along with the OCT basics and the enabling technologies) will be highlighted in this talk, with examples drawn from our own work.

*Dr. Ruikang Wang is a mechanical engineer/metrology by training (from Tianjin University, China), with further specialization in biomedical optics, medical physics and applications of lasers in medicine. He gained his PhD in optical information processing from the University of Glasgow, Scotland, in 1995. He is currently a professor of Biomedical Engineering, of Anesthesiology & Perioperative Medicine, and of Otolaryngology – Head and Neck Surgery, School of Medicine at the Oregon Health & Science University. His research is the field of biophotonics & imaging, with particular emphasis on high resolution optical imaging of tissue morphology and microcirculations. He has published ~150 papers and book chapters on diagnostic and therapeutic uses of light in biomedicine, holds several patents in the field, and currently runs a*



*reasonable sized laboratory with 18 graduate students and postdoctoral/clinical fellows. His laboratory works closely with clinicians and physicians. He has served as a session chair and program organizer for various conferences in biomedical optics, such as Photonics West (San Jose and San Francisco), OSA Topical Meetings in Biomedical Optics (Miami), Physics in Biology and Medicine (Wuhan, China), etc. Dr. Wang is a frequent research grant reviewer/panelist for National Institutes of Health (NIH), Engineering and Physical Science Research Council (EPSRC, UK), and Biotechnology and Biological Science Research Council (BBSRC, UK), and several other research granting agencies worldwide. He has been a Guest Editor for special issues on Biomedical Optics for the Journal of Applied Physics, Journal of Biomedical Optics, and Biosensors and Bioelectronics, and currently serves as a topical editor for Journal of Biomedical Optics, and a founding associate editor for Biomedical Optics Express.*

*For more information please visit <http://courses.washington.edu/bioetalk>*