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Department of Biomedical Engineering
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SEMINAR NOTICE

Imaging the ear with optical coherence tomography and high frequency ultrasound

Assistant Prof. Rob Adamson
School of Biomedical Engineering
Dalhousie University

FRIDAY, FEBRUARY 24TH, 2017
1:00 P.M. ROOM 333 - DUFF MEDICAL BUILDING
3775 UNIVERSITY ST.

The middle ear is a crucial part of the auditory system responsible for transmitting sound form the eardrum to the cochlea. Disorders of the middle ear lead to conductive hearing loss which affects hundreds of millions of people worldwide. Unfortunately, conventional non-invasive imaging modalities like CT and MRI lack the resolution needed to adequately visualize the tiny structures of the middle ear and lack any ability to measure how the ear responds functionally to sound. As a result, the non-invasive middle ear diagnostic tools available to clinicians are subjective and inaccurate compared to those used in other fields of medicine.

I will present progress in addressing these shortcomings of current diagnostic technology with two novel imaging technologies, optical coherence tomography (OCT) and high-frequency ultrasound for structural and functional imaging of the middle ear. The prototype optical coherence tomography middle ear imaging system we have built and deployed in our clinic has allowed us to obtain the first non-invasive structural images of middle ears in various states of disease and the first phase-sensitive OCT functional images of the middle ear's vibration in response to sound in live patients. Our high-frequency ultrasound systems have allowed us to make non-invasive measurements of vibration in the middle ear and cochlea in animal and human temporal bone models in a form factor that is compatible with clinical translation. These two new approaches to imaging the ear have the potential to play an important role in the diagnosis and treatment of hearing loss in the coming years.

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