

## Optical coherence tomography in biomedical research

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Optical imaging is becoming a method of choice in applications where high resolution images are required non-invasively. Optical imaging technologies are capable of representing the internal structure of the sample investigated across a range of spatial scales. In this talk, I focus on one of the most popular optical imaging systems; optical coherence tomography (OCT). OCT is a non-invasive, non-ionizing imaging modality which uses light interferometry for imaging microstructures within tissues. The principle of operation of OCT, its applications in biomedical research and the importance of OCT among the other imaging modalities, such as magnetic resonance imaging (MRI), ultrasound, and microscopy are explained. Moreover, resolution and penetration depth of OCT is compared to those of the existing imaging modalities. I also briefly describe the limitations of such imaging systems with proposing some solutions. In the second part of the talk, I walk the audience through a more powerful type of OCT, dynamic focus (DF-) OCT, which can be used in dermatology to assist specialists in differentiating basal cell carcinoma (BCC) skin from healthy skin. It is explained that how DF-OCT can give the surgeon understanding of the extent of the lesion and to better plan excisional surgery with full knowledge of the size and position of the edges of the lesion. In the end an optical properties extraction algorithm is explained. This algorithm provides an estimate of scattering coefficient, calculated from the OCT image based on enhanced Huygens-Fresnel (EHF) light propagation theorem to automatically discriminate BCC lesion from normal skin.

### Biography

Mohammadreza Nasirivanaki has completed his Ph.D. at the age of 29 years from Kent University in medical image computing, focusing on optical coherence tomography signal/image processing. He is currently doing research in Biomedical engineering department of Washington University in Saint Louis. He has published several papers in reputed optics and engineering journals mostly in the subjects related to optical imaging systems development, biomedical image and signal processing, and medical image compression. He is also serving as Emeritus Professor in Karaj Azad University.

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