



High-Resolution Optical Coherence Tomography Imaging: A New Hope for Early Stage Cancer Diagnosis?

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Abstract

Optical imaging has demonstrated already to have a high potential for clinical medicine and developmental biology. Light has an unique potential for non-invasive tissue investigation. The relatively short wavelength of light allows for tissue imaging with a resolution close to the histopathology level. While the majority of optical imaging modalities are based on the strong multiple scattering of light in tissue, which makes attainment of high resolution difficult, optical coherence tomography (OCT) imaging relies on single scattered photons by using an optical gating technique, which makes micron scale imaging possible.

Although OCT imaging depth is limited to a few millimeters, it still has a high potential in the diagnosis of many important diseases because most pathology emanates from epithelial surfaces. For example, it is largely accepted that the detection of any cancer disease in its early stage requires careful examination of the epithelial cells. The fiber-optic implementation of this light-based high resolution imaging technique has brought us one step closer to minimally-invasive imaging of the architectural and cellular features of the tissue.

The basic principle of this technology, as well as its potential for cancer diagnosis is presented. The combination of this technology with other imaging modalities and molecular screening approaches will be presented as well. Preliminary clinical studies and future applications in clinical medicine and developmental biology will be summarized.

Bio:

Dr. Nicusor Iftimia is a principal scientist at Physical Sciences with over 14 years of experience in biomedical imaging. After completing his PhD at Bucharest University, Romania, in 1996, he joined Clemson University and latter on Wellman Center for Photomedicine as a Postdoctoral Fellow. In 2003 he was promoted as a instructor at Harvard Medical School and in 2004 he joined Physical Sciences as a Principal Scientist. Dr. Iftimia's research focus is in the area of optical imaging with applications in disease diagnosis, drug delivery, and therapy guidance. Dr. Iftimia is author/co-author of over 35 peer-review publications, over 100 conference papers, three book chapters, one book, and is currently editing another book about Advances in Optical Imaging for Clinical Medicine.