Version 2.0

Abstract

Back to Hit List

Grant Number:	1R01AR044812-01
PI Name:	BREZINSKI, MARK E.
PI Email:	mebrezin@mit.edu
PI Title:	SENIOR SCIENTIST
Project Title:	ASSESSMENT OF EARLY OSTEOARTHRITIC CHANGES WITH OCT

Abstract: DESCRIPTION (Adapted from Applicant's Abstract): The long term objective of this work is to develop a new method of intra articular imaging to overcome current limitations in reheumatologic diagnostic imaging. Recent reports suggesting that the progression of articular cartilage damage in osteoar-thritis may be modified have heightened the need for better methods to image early changes in cartilage and monitor the progression of these changes. A variety of imaging modalities have been applied to the assessment of early osteoarthritic abnormalities with limited results. The hypothesis is that optical coherence tomography (OCT), a new method of fiber optic based micron scale imaging, can be developed as a method of high resolution, minimally invasive, intra articular imaging to address current limitations in joint diagnostics. OCT is analogous to ultrasound B mode imaging using infrared light rather than acoustical waves. OCT is attractive for intra articular diagnostic imaging because of its high resolution (4-20 um), broad dynamic range (110 dB), small compact design and ability to perform imaging through small optical fibers. The applicants proposed to test the hypothesis principally through background feasibility experiments designed to assess the ultimate utility of the approach. These background experiments focus on identifying advantages and limitations of OCT for intra articular imaging and maximizing performance. The specific aims are to: 1. To perform imaging on a wide range of articular cartilage to identify limitations and advantages associated with OCT imaging. 2. To use the quantitized nature of light-molecular interaction to spectroscopically explore the biochemical changes of osteoarthritic articular cartilage. 3. To demonstrate the ability of OCT to perform in vivo imaging in a rabbit knee joint.

Thesaurus Terms:
articular cartilage, biomedical equipment development, early diagnosis, fiber optics, osteoarthritis, skeletal visualization, tomography
diagnosis design /evaluation, method development, orthopedics, skeletal disorder diagnosis, synovial fluid, synovial membrane
bioengineering /biomedical engineering, histopathology, knee, laboratory rabbit

Institution:	MASSACHUSETTS GENERAL HOSPITAL 55 FRUIT ST BOSTON, MA 02114
Fiscal Year:	1998
Department:	
Project Start:	12-JAN-1998
Project End:	31-DEC-2000
ICD:	NATIONAL INSTITUTE OF ARTHRITIS AND MUSCULOSKELETAL AND SKIN DISEASES
IRG:	ZRG7

Version 2.0

Abstract

Back to Hit List

Grant Number:	5R29HL055686-03
PI Name:	BREZINSKI, MARK E.
PI Email:	mebrezin@mit.edu
PI Title:	SENIOR SCIENTIST
Project Title:	INTRAVASCULAR IMAGING WITH OPTICAL COHERENCE TOMOGRAPHY

Abstract: DESCRIPTION (Adapted from Applicant's Abstract): The goal of this research is to develop a new method of intravascular imaging, which has the possibility of identifying atherosclerotic lesions. The lesions would then be characterized as to their potential for progression to alteration or rupture. The possibility of identifying and discriminating those lesions which are at risk for rupture has great significance. The applicants proposed to use optical coherence tomography (OCT) to develop a high resolution intravascular imaging system for the diagnosis of atherosclerotic lesions. The applicants noted the analogy of OCT to B Mode ultrasound imaging. However, the use of infrared light rather than acoustical waves should provide high resolution, broad dynamic range, and easy integration into cardiovascular catheter systems. The principal focus of this application is the development of background feasibility experiments designed to assess the feasibility of this approach. These background experiments focus on identifying advantages and limitations of OCT for intravascular imaging and maximizing performance. The specific aims are: 1) To perform imaging on a wide range of plaque morphologies and vascular components; 2) To determine the limitations associated with imaging through whole blood; 3) To identify the optimal incident wavelength for OCT imaging of the vasculature; 4) To directly compare the ability of both OCT and high frequency ultrasound (IVUS) to assess micropathology within human atherosclerotic plague in virtu; and 5) To demonstrate the ability of OCT and IVUS to perform in vivo imaging of an intravascular stent within a rabbit aorta.

Thesaurus Terms:
angiography, atherosclerotic plaque, biomedical equipment development, method development, tomography
cardiovascular disorder diagnosis, infrared spectrometry, optics
diagnostic catheterization, human subject, laboratory rabbit

Institution: MASSACHUSETTS GENERAL HOSPITAL
55 FRUIT ST
BOSTON, MA 02114
Fiscal Year: 1998
Department:
Project Start: 01-AUG-1996
Project End: 31-JUL-2001
ICD: NATIONAL HEART, LUNG, AND BLOOD INSTITUTE
IRG: ZRG7