FIU Biomedical Engineering
FLORIDA INTERNATIONAL UNIVERSITY

Biomedical Engineering
Wallace H. Coulter Foundation
Lecture Series

WALLACE H. COULTER Foundation

"Musculoskeletal Magnetic Resonance Relaxometry and Macromolecular Mapping"

Dr. Richard G.S. Spencer
Chief, Magnetic Resonance Imaging & Spectroscopy Section
Director, MRI Core Facility for Translational Research
NIH/National Institute on Aging
Intramural Research Program

Friday, November 18th, 2016
Lecture: 9:00 AM-10:00 AM
ENGINEERING CENTER
ROOM EC 2300
10555 WEST FLAGLER STREET
MIAMI, FL 33174

Abstract: There is an unmet need for improved non-invasive definition of tissue- and molecular-level changes in degenerative cartilage, and for improved diagnostics for early osteoarthritis (OA). Our work in this area combines basic science studies in magnetic resonance imaging and relaxometry with emerging methodologies that carry translational potential. We will discuss multi-exponential transverse relaxation analysis as a means to identify underlying macromolecular compartments in normal and degraded cartilage, as well as important extensions of this work, based on higher dimensional relaxometry and compressed sensing. We will describe the mathematical setting for this work as a linear inverse problem. Further work in human studies requires introduction of a nonlinear model system. We will describe several approaches to these problems and indicate the potential for improved detection of early cartilage degradation. All of these studies are centered around the clinical goal of improving the ability of magnetic resonance methods to diagnose osteoarthritis and monitor therapeutic interventions.

Biography: Richard Spencer is Chief of the Magnetic Resonance Imaging and Spectroscopy Section of the National Institute on Aging of the National Institutes of Health in Baltimore, Maryland. He obtained his Ph.D. in Medical Physics from the Massachusetts Institute of Technology and his M.D. from Harvard Medical School in 1988. He was a postdoctoral fellow at the Francis Bitter National Magnet Laboratory of MIT before joining the NIH. He completed medical residency training at Johns Hopkins Bayview Medical Center in Baltimore and is a Diplomate of the American Board of Internal Medicine. Dr. Spencer's laboratory has most recently been active in application of statistical and mathematical modeling techniques for improved tissue characterization using magnetic resonance imaging and relaxometry.