Imaging Sciences Pathway
Washington University in St. Louis

Special Imaging Science Seminar Co-Sponsored with Biomedical Engineering

Correlative Optical, X-Ray and Electron Microscopy in study of Disease Pathogenesis

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Abstract: Correlative Microscopy is a recent concept in cellular imaging to extract spatial information across multiple length scales by using different, yet complementary imaging modalities. In its simplest form, Correlated Light and Electron Microscopy (CLEM) couples the multiplexed detection ability of fluorescence microscopy with the nanoscale ultrastructural resolution of electron microscopy. Recent efforts in the group have focused on the development of a targeted CLEM approach to study the pathogenesis of urinary tract infection, in particular focusing on the identification and structural characterization of intracellular bacterial communities (IBC). In contrast, our recent development of Correlated X-Ray and Focused Ion Beam Nanotomgraphy allows the spatial targeting, in three-dimensions, of tissue specific structures in a whole organism for 3D ultrastructural imaging using Focused Ion Beam - Scanning Electron Microscopy (FIB-SEM). We have applied this novel approach to characterize defects in the elastic connective tissue of the heart muscle in a zebrafish model of dilated cardiomyopathy.

Time: 10:10 a.m.
Date: Thursday, November 2, 2017
Room: 218 Whitaker Hall

} NOTE SPECIAL DAY, TIME, AND PLACE

Biography: James Fitzpatrick, Ph.D., joined the School of Medicine on June 1, 2015 as the inaugural Scientific Director of the Washington University Center for Cellular Imaging (WUCCI). Prior to his appointment, he was Senior Director of Biophotonics and Strategic Technology Initiatives at the Salk Institute for Biological Studies in La Jolla, CA. Dr. Fitzpatrick completed his undergraduate studies in Chemistry at Kings College, London and undertook graduate training in optical physics at the University of Bristol. During his Ph.D. he designed and developed a novel injection seeded optical parametric oscillator (OPO) laser system for the study of nuclear hyperfine structure in the excited electronic states of gas phase free radical species. As a post-doctoral fellow at the University of Pittsburgh in Pennsylvania, he shifted his focus to study biological molecules such as peptide mimics and their micro-solvated clusters in the gas-phase using high-resolution fluorescence spectroscopy. In his second post-doc at Carnegie Mellon University, he spent his time studying protein-protein interactions using tools such as fluorescence microscopy and fluorescence correlation spectroscopy (FCS). Dr. Fitzpatrick's primary research interests lie in the integration and application of multi-scale optical and charged particle imaging technologies -- specifically, biological applications of ion microscopy, development of correlative 3D light and electron microscopy approaches, and new computational tools to visualize and manipulate large-scale multi-dimensional datasets.