Welcome to a new edition of the Cell & Molecular Imaging Core Newsletter. The Cell & Molecular Imaging Core is a shared resource of the Hollings Cancer Center and a component of the Center for Cell Death, Injury and Regeneration. The Imaging Core provides instrumentation and support for confocal/multiphoton microscopy and image analysis. The purpose of this newsletter is to inform the MUSC scientific community of core activities and resource. This month, we introduce some of the exciting developments in the Imaging Core and spotlight on intravital imaging.

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MAJOR ANNOUNCEMENT
Workshop on Light Microscopy for the Biosciences. From June 24-29 of 2012, the Cell and Molecular Imaging Core will hold the “Fourth Charleston Workshop on Light Microscopy for the Biosciences”. The Workshop will provide theoretical and hands-on training in basic and advanced light microscopy techniques. Major microscope vendors will provide their latest equipment for students to train on. Limited scholarships are available from the Hollings Cancer Center.

Spotlight on Intravital Imaging. Intravital imaging has become a powerful tool for imaging various vital organs and tissue over the past few years. Using introduced fluorophores, autofluorescence and GFP-expressing transgenic animals, many functional parameters may be monitored using intravital microscopy. Further, confocal and multiphoton fluorescence intravital microscopy increases effective resolution compared to widefield microscopy. Intravital microscopy with multiphoton excitation is particularly useful for imaging dense organs and tissue as the red/infrared excitation used in multiphoton microscopy allows deeper tissue penetration and imaging with less photodamage and more efficient collection of fluorescence in a scattering environment.
Intravital confocal/multiphoton fluorescence micrographs rival in quality and resolution to corresponding images collected from cell culture monolayers. For example Dr. Lemasters lab has done extensive intravital imaging of the liver for different research projects. Fig. 1. shows intravital multiphoton images of mouse liver for study of acetaminophen toxicity to the liver. The liver was imaged with a green fluorescing mitochondrial dye rhodamine 123 (Rh123). Rh123 gets taken by polarized mitochondria indicating punctate healthy mitochondria (sham, left panel). However treatment with acetaminophen (300 mg/kg) causes liver toxicity leading to mitochondrial depolarization as indicated by loss of punctate mitochondrial Rh123 fluorescence into a diffuse distribution(right panel). It is also accompanied by loss of cell viability as indicated by red nuclear staining of propidium iodide. All images were collected using Zeiss 510 NLO multiphoton microscope. These images of the liver mitochondria of a live mouse rival the images one can obtain with isolated mice liver cells. While this is one specific example of intravital imaging, laboratories across the world have been successful in intravital imaging of various organs and systems. A PubMed search using the key words intravital imaging shows up more than 500 publications. The imaging core has confocal and multiphoton microscopes geared towards intravital imaging. We encourage our users to explore the possibility of using intravital imaging in their research projects using this system. To learn more about our intravital imaging equipment and possible applications to your project please e-mail Venkat Ramshesh at ramshes@musc.edu

Fig. 1. Images show sham (left panel) and acetaminophen (right panel) treatment of a mouse liver. While punctate green fluorescence of polarized mitochondria can be observed in sham, acetaminophen treatment led to depolarization of mitochondria (diffuse green fluorescence) and cell death (red PI fluorescence). Courtesy of Dr. Jiangting Hu.

To learn more about the core services, equipment and charges, please go to:

www.musc.edu/ccdirc
or
http://hcc.musc.edu/research/resources/cellandmolecularimaging/