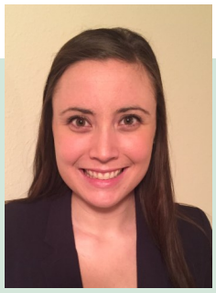
Medical Physics Seminar

Monday, April 18th, 2016

1345 HSLC ~ 4:00 P.M.



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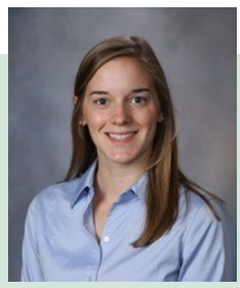
Bridging the gap: connecting imaging phenotypes and cellular genotypes

Functional imaging can be used to survey malignancies within a patient by capturing functional characteristics of disease; however, it does not match the amount of biological characterization possible from molecular and genetic analyses of tissue samples. This work explores ways to improve sampling and analysis for comparisons of functional imaging biomarkers and genetic signatures of disease. Positron emission tomography (PET) allows for precise monitoring of total disease burden throughout therapy, essential in patients with multiple lesions. This seminar will focus on recent investigations of imaging biomarkers in metastatic prostate cancer patients imaged with 18F Sodium Fluoride (NaF) PET/CT. Currently in patients with multiple lesions, anatomically guided bone biopsies aim to target the largest, most superficial lesion. We propose and validate prospective biopsy site selection based on patient-based optimization of lesion-specific imaging response and clinically-relevant characteristics.

MRI and PET neuroimaging methods for stem cell tracking

Stem cell therapies hold great potential for treatment of neurodegenerative diseases. In this setting, the inability to monitor grafted cell dynamics in the central nervous system limits understanding of cell fates underlying therapeutic response, making therapy design and optimization significantly more challenging. To address this limitation, we aim to design, evaluate, and develop new approaches for imaging human stem cells in vivo. Over-expression of the manganese transporter protein DMT1 in human neural progenitor cells (hNPC) significantly increases intracellular accumulation of the T1-shortening agent Mn2+ and the novel positron emitter 52Mn2+. This work addresses three specific hypotheses: (1) hNPC over-expressing DMT1 are suitable for in vivo cellular imaging, (2) in vivo 52Mn PET and manganese-enhanced MRI are applicable for cell tracking in the rat brain, and (3) Mn-based imaging can be used to detect grafted stem cells in vivo.



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1345 Health Sciences Learning Center (HSLC) 4:00 - 5:00 P.M.