Neuroimaging for Spinal Cord Injury: Refining the Diagnosis

Course ID 174

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Structural Magnetic Resonance Imaging (MRI) is currently considered the gold standard conventional clinical imaging modality to evaluate the extent of trauma to the spinal cord following an injury. While conventional T_2-weighted MRI principally detects edema and hemorrhage and has modest prognostic value, it lacks the specificity to be used as a biomarker. Many advanced MRI techniques have been demonstrated in the spinal cord that are sensitive to various pathophysiological processes including microscopic structure and axonal injury, myelin integrity, perfusion, and metabolite content. In the context of acute spinal cord injury (SCI), these promising tools aim to better detect the underlying tissue damage and predict an individual's prognosis and recovery potential, ideally allowing clinicians to identify the best course of treatment for each patient. This course will address the current diagnostic and prognostic use of MRI in SCI population in addition to the advantages and challenges of using advanced MR technology. Additional goals of this course are to address the current clinical needs of advanced imaging techniques, highlight the current capability of MRI in the animal model of SCI, and identify which techniques are feasible to move forward to the clinical population.

The first speaker, Patrick Freund, MD, PhD a clinician-scientist from Balgrist University Hospital will present an overview on the current MRI metrics and classification schemes used to diagnosis and treat individuals sustaining an SCI. He will also provide a clinical perspective on what is needed to move advanced imaging techniques closer to clinical application. Our second speaker Matthew Budde, PhD a basic and translational scientist from the department of neurosurgery at the Medical College of Wisconsin will present the current advancements of MRI in the animal model where he will discuss the unaddressed clinical issues and the benefits of completing preliminary protocol refinement in preclinical models, and provide insight into how these imaging techniques can be translated into clinical application. Our final speaker, Feroze Mohamed, Ph.D, an MR physicist from the department of Radiology at Thomas Jefferson University will present the principles behind these techniques and discuss how to overcome the challenges of using advanced MRI techniques in the clinical population. He will also provide examples of the advantages these techniques have when compared to classical imaging alone. This course will end with a panel discussion.

Faculty represents diverse geographical locations and career stages.

Draft Agenda
1:40-1:45   Opening remarks/overview (Laura Krisa, Ph.D.)
1:45-2:05   Patrick Freund, MD, PhD
2:05-2:25   Matthew Budde, Ph.D
2:25-2:45   Feroze Mohamed, Ph.D.
2:45-3:00   Panel Discussion/Questions

Learning Objective 1 Discuss the current use of MRI in the clinical diagnosis and prognosis of SCI and highlight the challenges and advantages of advanced imaging techniques.

Learning Objective 2 Understand what information the use of advanced neuroimaging techniques adds to classical MRI images.

Learning Objective 3 Explain the differences in the research design between animal and human SCI studies. Understand the next steps needed to employ these advanced imaging techniques in the clinical setting.