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"Imaging the thoracolumbar spinal cord: insights, challenges, and applications in an understudied anatomy"

Abstract:

Advanced magnetic resonance imaging (MRI) techniques for evaluating the human spinal cord have largely been limited to the cervical spinal cord and applied in a small set of neurological conditions. Improved and advanced techniques, such as quantitative or functional MRI, are rarely studied in thoracolumbar spinal cord, even though there is motivation to do so. For example, it is estimated that 40% of multiple sclerosis (MS) spinal cord lesions are located in the thoracic and lumbar segments, but they are tremendously understudied in vivo. Additionally, the thoracolumbar spinal cord has a critical association with lower limb and bladder dysfunction, the most prevalent symptoms and deficits in MS. Conventional clinical MRI lacks sensitivity to lesions and microscopic pathology that may drive impairment and is limited in discerning the extent of demyelination or altered function at any spinal cord level, but these limitations are exacerbated in the lower spinal cord. Our recent work focuses on developing and optimizing advanced structural, quantitative, and functional MRI methods to characterize tissue structure and function in the thoracolumbar spinal cord, and translation to patient populations. In this talk, I will share some of the imaging challenges in this anatomy and strategies for overcoming them, as well as results from application to patients with relapsing-remitting MS.