

Rojas, K.*, McPherson, J. (2017) *Correlation between magnetic resonance imaging-based markers of spinal cord integrity and muscle composition in individuals with chronic spinal cord injury*. Department of Biomedical Engineering.

The purpose of this research project was to investigate potential relationships between magnetic resonance imaging (MRI)-based measures of the spinal cord and MRI-based measures of muscle physiology in 14 individuals with spinal cord injury. Such relationships – or lack thereof – may hold prognostic value for determining recovery of motor function in this population. We used simple linear regression as an initial tool to determine whether measures of damage to the spinal cord were associated with changes in muscle composition, including intramuscular fat and the diffusivity of fluid within the muscle. These muscle composition metrics are potential markers of denervation, in which a muscle no longer receives neural input from the spinal cord. These markers may also relate to physical functions such as walking. We found a significant linear relationship between the total spinal cord damage and muscle diffusion and ventral spinal cord damage and muscle diffusion, but not dorsal spinal cord damage and muscle diffusion. We also found that individuals who retained some ability to walk after SCI tended to exhibit higher muscle diffusion than individuals using wheelchairs for ambulation. Surprisingly, we found no correlation between muscle fat content and muscle diffusion. Future studies will extend these analyses to additional neurophysiological markers of motor impairment and performance.

Key Words

Spinal cord injury, magnetic resonance imaging, muscle, motor impairment, prediction