



Patrick Freund, MD PhD

Professor of experimental imaging of spinal cord injury
University Hospital Balgrist
University of Zurich
Switzerland

Presentation Title

The role of the corticospinal tract for functional restoration after spinal cord injury?

Abstract:

Recovery from any spinal cord injury – and its attendant neurodegenerative processes – can follow a complicated trajectory spanning several years after injury. The ability to track injury-induced structural changes across the neuroaxis provides the opportunity to quantify pathological processes driving disability and recovery-related plasticity. During my talk, I will present evidence from quantitative MRI to highlight the role of preserved tissue bridges, and the extent of progressive volume, myelin, and iron changes along the projections of the corticospinal tract. Moreover, I will show how serial myelin and iron-sensitive multiparametric mapping during a period of intensive motor skill acquisition revealed temporally and spatially distributed, performance-related microstructural changes in the grey and white matter across the motor system in SCI patients. Finally, I will show the latest developments in high-resolution MRI sequences at 7T and optimized post-processing methods to assess the interaction of degenerative changes and recovery-related plasticity at the level of the spinal cord and brain, simultaneously.

Short CV:

Patrick Freund received his doctorate in biology (Fribourg) in 2008 and in medicine (Zürich) in 2014. In 2018 he received the SNF Eccellenza Professorship at the University of Zurich. In 2020 he was awarded the Schellenberg price. In 2023 he became a professor of experimental imaging of the spinal cord at the University of Zurich. He is an Honorary Professor at the Wellcome Trust Centre for Neuroimaging at the Queen Square UCL Institute of Neurology and a research associate at the Department of Neurophysics at the Max Planck Institute in Leipzig. Based on his educational background (medicine and neuroscience) in combination with his interests in the complex statistical analysis of imaging data he is

spearheading the assessment of spinal cord injury beyond clinical and neurophysiological readouts by means of neuroimaging. In particular, his research focuses on the multimodal assessment of functional and structural changes in the entire central nervous system caused by focal lesions of the spinal cord. His interdisciplinary work focuses on the development of high-resolution imaging techniques (3T and 7T) and therapeutic training as well as interventional studies. So far, he has secured in excess of 17 million CHF as a PI/work package leader.