

Post-Doc researcher position in the project ‘*non-invasive Deep Brain Stimulation to enhance cognitive functions in Traumatic Brain Injury (nDBS-TBI)*’

The Laboratory of Clinical Neuroengineering, directed by Friedhelm Hummel (<https://www.epfl.ch/labs/hummel-lab>), has an open position for a Post-Doc researcher on the topic of noninvasive deep brain stimulation to enhance memory, impaired memory and motivational behavior, and symptoms of impaired motivation like apathy.

Project description:

Everybody from teacher to metal welder needs good cognitive functions such as attention, memory, or motivation to perform well in daily life. Traumatic brain injury after accidents is a frequent and disabling disorder leading to significant deficits in such cognitive functions, especially in memory and motivation, even when the trauma was only mild. These deficits have a massive impact on the daily professional and private life of the patients, the relatives, the health system and the economy. Unfortunately, a treatment that can effectively reduce the deficits and restore these functions beyond neuropsychological training does currently not exist. This strongly limits the recovery of the patients on their way back to normal life. Novel, innovative technologies, such as fully *non-invasive deep brain stimulation (nDBS)*, provide the exciting opportunity to significantly enhance the recovery process of the patients by stimulating key deep brain structures of cognitive functions such as the hippocampus or the striatum without surgery.

We pioneered a disruptive method that allows to target these deep brain structures non-invasively in humans and evaluate its effects (Wessel, Beanato *et al.* 2023 Nature Neuroscience, Vassiliadis *et al.* 2024 Nature Human Behavior; Vassiliadis *et al.* 2024 JNE; Beanato, Moon *et al.* Science Advances, in press, Hummel & Wessel 2024 Nature Reviews Neurology). These findings open exciting novel opportunities of tTIS for translational neuroscience as a novel innovative treatment strategy for neurological and psychiatric disorders where the hippocampus or the striatum play a key role in the pathophysiology of the disorder. Specifically, this disruptive technology provides (a) the opportunity to better understand causal relationships of deep brain structure and their functional role in humans as well as (b) the exciting opportunity to enhance the recovery process of important cognitive functions, such as memory and motivation. Our aim is to develop a novel treatment strategy for impaired cognitive functions in TBI, understand its underlying mechanisms and translate it towards clinical use.

Here we are interested in specific cognitive functions like associative memory, spatial navigation and motivation that are impacted by TBI, determine their underlying subcortico-cortical network mechanisms and their disruption due to the TBI, and develop and apply nDBS by means of tTIS to ameliorate the symptoms.

Post-doc researcher position:

The project plans to investigate non-invasive deep brain stimulation applied to the hippocampus during spatial navigation and associative memory tasks and to the striatum during motivation-related tasks in TBI patients and healthy controls. The Post-doc researcher will add to the better understanding and treatment of impairments in cognitive functions in brain lesioned patients and further develop this neurotechnology.

The ideal candidate should have a PhD degree (or equivalent degree) in neuroscience, medicine or psychology, computer science or engineering, be strongly motivated with a (1) strong neuromodulation background, especially non-invasive brain stimulation, (2) strong neuroimaging background, especially in MRI and or M/EEG, (3) Strong programming skills in machine learning and modelling, (4) good communication skills, (5) previous research experience in human experimental translational neuroscience is a plus.

Working environment:

The successful applicant will join the EPFL Defitech Chair of Clinical Neuroengineering, which is led by Prof. Friedhelm Hummel and focuses on translational human neuroscience and neuroengineering with a focus on learning and memory in healthy aging and in patients suffering from stroke, traumatic brain injury or dementia. The Lab is based in Geneva's beautiful Campus Biotech, right next to Lake Geneva with a second strategic Lab hub in an hospital environment in Sion in the heart of the beautiful area of Valais. You will work in an interdisciplinary, international team of researchers. English proficiency is necessary, French proficiency a plus.

We offer:

- A dynamic, interdisciplinary, and international team of very motivated people.
- A stimulating working environment
- Access to cutting-edge technology and state-of-the-art resources.

Start of position:

From 01/2025

How to apply:

Please send your CV, contact of two references and a motivation letter to friedhelm.hummel@epfl.ch