

Post-Doc researcher position in a project addressing underlying mechanisms on the physiology and pathophysiology of motivation and its neuromodulation

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 and their impact on memory.

Project description:

Changes in motivational states, reward processing and respective learning and memory is impaired in several neurological and psychiatric disorders such as Parkinson's disease, traumatic brain injury, dementia, schizophrenia or addiction with currently no established treatment strategy of them. Thus, there is a strong need for innovative neurotechnological interventional strategies to develop novel efficient treatments. These symptoms are associated with dysfunction in deep brain structures and subcortical-cortical circuits with the striatum as a core hub. The present project focuses on developing interventions and technologies that fully non-invasively allow to target the subcortical dysfunctional circuits to improve symptoms of impaired motivation or reward processing leading to e.g., apathy. To this end, transcranial temporal interference electrical stimulation (tTIS) offers a novel, innovative neurotechnology to target safely and focally deep brain structures. Here, we will develop and evaluate tTIS as a novel treatment strategy to improve symptoms of impaired motivation and reward processing.

We pioneered a disruptive method described in rodents (Grossman *et al.* 2017 Cell) that allows to target these deep brain structures non-invasively in humans and evaluate its effects for striatal and hippocampal stimulation (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 deep brain structures play a key role in the pathophysiology of the disorder. Here we are interested in transdiagnostic symptoms, i.e., symptoms that are common in different neurological and psychiatry diseases (e.g., apathy), determine their underlying subcortico-cortical network mechanisms and develop and apply novel non-invasive deep brain stimulation to ameliorate the symptoms.

Post-doc researcher position:

The project plans to investigate non-invasive deep brain stimulation during motivation-related behavior in healthy subjects and patients suffering from apathy. The Postdoc researcher will add to the better understanding and treatment of motivation, reward-associated impairments in neurological patients and to the further development of 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) good programming skills, (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.
- The project is within the interdisciplinary, interinstitutional Wyss Campus Biotech Lighthouse Partnership



Start of position:

From immediately

How to apply:

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