

Location: EPFL, Lausanne

Start Date: 1st Oct. 2023

Duration: Four years

PhD Position funded by the SNSF Consolidator grant project

The neurometabolic connectome: a new window on brain disease

Background:

The human brain is a complex and unique network across multiple levels of structural, molecular and functional organization, resulting in distinct cognitive processes and behavior. In recent years, in vivo brain connectomics using different magnetic resonance imaging (MRI) modalities, including diffusion and functional MRI, has emerged as a powerful approach for studying brain networks. However, little information is available regarding molecular interactions of the network, which makes the mechanistic interpretation challenging. Magnetic resonance spectroscopy and spectroscopic imaging could offer neurometabolic insights. Dynamic in vivo mapping of neurometabolism by magnetic resonance spectroscopic imaging and establishing the neurometabolic connectivity can potentially emerge as a new and exciting modality in neuroimaging, complementing the current MRI-based connectome to better decipher brain networks in health and disease.

Project description:

This SNSF Consolidator grant funded project aims to break the current technical barrier and establish in vivo neurometabolic connectomics with diverse MR measurables. The PhD candidate will develop advanced magnetic resonance spectroscopic imaging methods with a focus on mapping metabolites and energetics involved in synaptic transmission on a clinical 7T Terra-X human MRI scanner located in the campus biotech (Geneva).

Efficient under-sampling schemes, parallel imaging strategies, and cutting-edge reconstruction methods will be incorporated for reaching the highest spatial and temporal resolution needed in neurometabolic connectivity. The developed neurometabolic connectome in combination with other imaging modalities will be applied in healthy subjects and patients with psychosis, and to establish potential characteristic connectivity fingerprints for patient stratification.

Skills:

Your qualifications, previous experience and background:

- A master degree or equivalent in physics, mathematics, biomedical engineering, life science or related disciplines in neuroimaging.
- Excellent programming skills in C/C++, Python or MATLAB are required.
- Knowledge in MR physics or previous experience in MR sequence programming, data acquisition and processing is a plus.
- Good communication skill and strong interests in research field of biomedical engineering.
- English proficiency is necessary, French knowledge is a plus

Supervisors:

- Dr. Lijing Xin, CIBM MRI EPFL-AIT <https://people.epfl.ch/lijing.xin>
- Prof. Dimitri Van de ville, CIBM MRI EPFL-AIT <https://people.epfl.ch/dimitri.vandeville/?lang=en>

Collaborators:

Prof. Zhi-Pei Liang, University of Illinois at Urbana-Champaign, Illinois, USA

Prof. Philippe Conus, Lausanne University Hospital, Switzerland

Prof. Sebastian Walther, Psychiatric Outpatient Department, University of Bern, Switzerland

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.

How to apply:

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

Please note that the potential candidate should also send their submission to EPFL doctoral schools, please inquire Dr. Lijing Xin before submission.

About CIBM

The CIBM Center for Biomedical Imaging was founded in 2004 and is the result of a major research and teaching initiative of the partners in the Science-Vie-Société (SVS) project between the Ecole Polytechnique Fédérale de Lausanne (EPFL), the Université de Lausanne (UNIL), Université de Genève (UNIGE), the Hôpitaux Universitaires de Genève (HUG) and the Centre Hospitalier Universitaire Vaudois (CHUV), with the generous support from the Fondation Leenaards and Fondation Louis-Jeantet.

CIBM brings together highly qualified, diverse, complementary and multidisciplinary groups of people with common interest in biomedical imaging.

We welcome you in joining the CIBM Community.

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