Master's or specialization project

Location: EPFL ENT-R CIBM-AIT, Bâtiment CH F.
Dates/Duration: Spring 2021 semester / 4 – 6 months.

Neuroprotection in chronic hepatic encephalopathy

Chronic hepatic encephalopathy (HE) is a severe complication of chronic liver disease (CLD), and finding the right treatment before liver transplant remains a challenge. Several treatments are currently used (i.e. antibiotics, probiotics, ammonium scavengers, neuroprotectors..) but their precise effect on brain metabolites or their synergetic effect have never been studied [1-4].

The aim of the study is: 1) to assess in vivo and longitudinally the synergetic of neuroprotectors and probiotics on bile duct ligated (BDL) rats, a model of chronic HE, on different brain regions using proton magnetic resonance spectroscopy (^{1}H MRS) and MRI; 2) to compare these results to a group of non-treated BDL rats. All the experiments will be performed on a 9.4T MRI system.

The project will involve data acquisition (^{1}H MRS and MRI) and data processing (i.e. determination of brain metabolite concentrations).

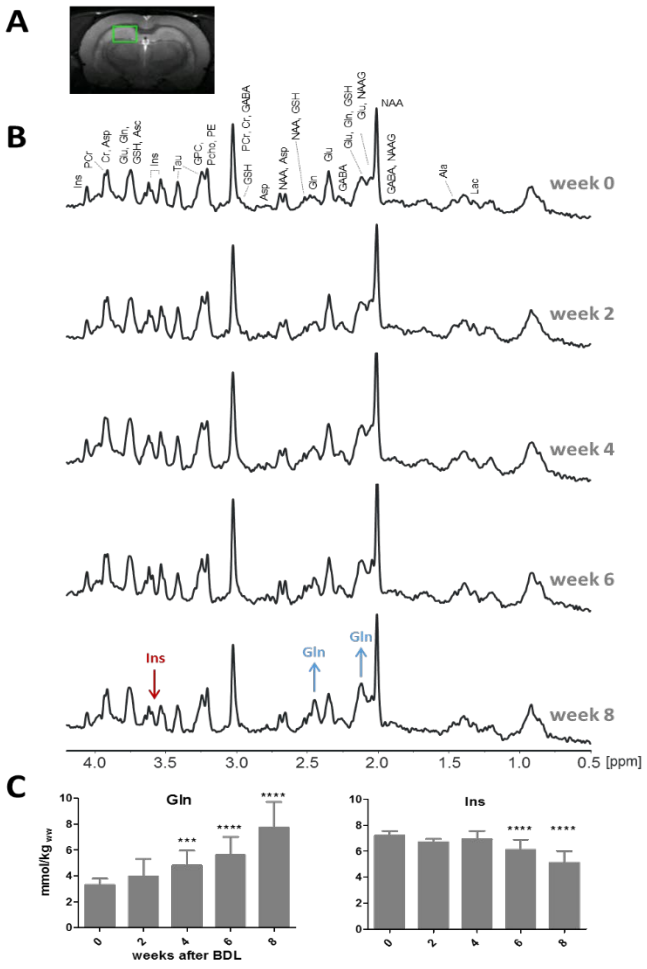

Figure 1: ^{1}H MR spectra acquired longitudinally in the hippocampus of a BDL rat together with the longitudinal evolution of two main organic osmolytes (glutamine/Gln and myo-inositol/Ins).

References

[1] Rackayova V, Braissant O, McLin VA, Berset C, Lanz B, Cudalbu C. 1H and 31P magnetic resonance spectroscopy in a rat model of chronic hepatic encephalopathy: in vivo longitudinal measurements of brain energy metabolism. Metab Brain Dis. 2016 Dec;31(6):1303-1314.

[2] Braissant O, Rackayová V, Pierzchala K, Grosse J, McLin VA, Cudalbu C. Longitudinal neurometabolic changes in the hippocampus of a rat model of chronic hepatic encephalopathy. J Hepatol. 2019 Sep;71(3):505-515

[3] Lanz B, Rackayova V, Braissant O, Cudalbu C. MRS studies of neuroenergetics and glutamate/glutamine exchange in rats: Extensions to hyperammonemic models. Anal Biochem. 2017 Jul 15;529:245-269

Supervisor

- **Main Supervisor:** Dr. Cristina Cudalbu, CIBM MRI EPFL AIT Section, https://cibm.ch/people/, cristina.cudalbu@epfl.ch
- **Collaborators:** Prof. Olivier Braissant, CHUV, Olivier.Braissant@chuv.ch; Prof Valerie McLin, HUG, Valerie.McLin@hcuge.ch

Skills

- **Qualifications, previous experience and background:** This project is suitable for students with a background in physics or biomedical physics or biology/biochemistry who are interested in biomedical applications of proton magnetic resonance spectroscopy (^{1}H-MRS) and imaging (MRI).
- **Desirable:** Course PHYS-438 (Fundamentals of biomedical imaging), Programming experience (Matlab,..)

How to apply: Please send your CV and motivation letter to the main supervisor: cristina.cudalbu@epfl.ch

---

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.

cibm.ch