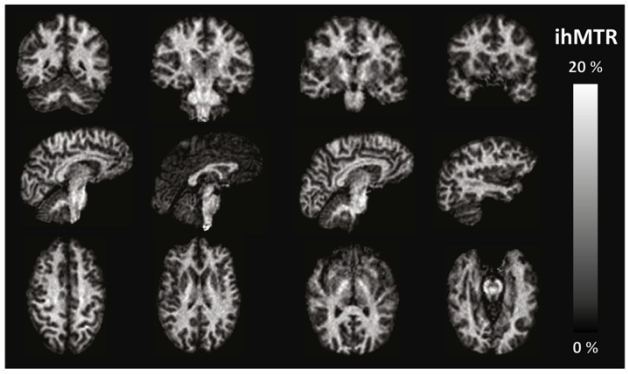
Centre de Résonance Magnétique Biologique et Médicale – CRMBM

UMR 7339 - CNRS, Aix Marseille University, Marseille, France

Postdoctoral Position

Application of inhomogeneous Magnetization Transfer (ihMT) MRI, a new myelin specific MRI contrast, to Multiple Sclerosis

Magnetization transfer (MT) magnetic resonance imaging (MRI) is an *in vivo* imaging modality sensitive to the macromolecular content of biological tissues. Large macromolecules exhibit a wide dipolar-broadened NMR spectrum, which can be selectively saturated and visualized by MRI following magnetization transfer to the free water pool. Although, this technique has found applications into the clinics, it suffers from a lack of specificity to the underlying physio-pathological changes as it is sensitive to all sorts of macromolecule. Recently an important characteristic of dipolar-broadened macromolecular lines has been observed using MRI through the discovery of inhomogeneous magnetization transfer (ihMT). This technique allows separating the contribution to MT arising from long-lived dipolar order, hence providing additional molecular specify to MT. **The ihMT technique applied *in vivo* on human and mice has shown tremendous specificity for brain white matter as compared to conventional MT**, presumably attributed to the myelin content of the NMR spectrum, and has raised enthusiasm into the clinics. **We are currently running at CRMBM an extensive research program on ihMT both on the fundamental side of this new contrast** (theoretical physical model, NMR of model samples, MRI sequence developments…) **and on (pre)clinical applications** (animal models, patient's follow-up).



The proposed project aims at assessing the clinical input of ihMT for characterizing myelin impairment occurring in early stage MS Patient at 1.5T. The goal will be to compare ihMT metrics with other metrics (e.g. conventional MTR) currently used in the clinics to follow up MS patients. The successful candidate will have in charge the conduct of the clinical study, including data acquisition, analysis and statistical comparison with reference techniques. She/He will work within the ihMT team, in interaction with the Neurology department of la Timone Hospital, and will receive support from the medical staff, including radiographers for patient handling. In parallel, the candidate will work on the physical development of a new ihMT approach, aiming at improving the sensitivity of the technique by moving to higher field systems, i.e. 3T. **The impact of this project is of very high importance, as it should i) provide demonstration of the utility of ihMT into the clinic and help yield to a better understanding of tissue alteration in MS and ii), allow deriving an optimal clinical ihMT sequence for investigations at 1.5T and 3T.**

We are looking for a motivated candidate with a Ph.D. in biomedical engineering, medical imaging, MR physics or related topic. Prior knowledge of myelin imaging MRI techniques and/or magnetization transfer would be advantageous. Good writing and communication skills in English are obviously required. The successful candidate will work in the ihMT team composed of 2 senior scientists and 3 PhD students, in close collaboration with the brain and spinal cord imaging research teams composed of scientists and clinicians and computational scientists. The duration of the project is 18 months with a salary based of previous experience. The position is granted by the SATT Sud-Est (http://sattse.com), the IP/valorization department of Aix Marseille University (http://www.univ-amu.fr) and CNRS.

The CRMBM laboratory (http://crmbm.univ-amu.fr) is located in the center of the lively Marseille city, within La Timone university hospital. More details on Marseille, http://www.marseille.fr/

Interested candidates should send applications including, CV, motivation letter as well as two reference letters to:

Guillaume Duhamel (guillaume.duhamel@univ-amu.fr), and Olivier Girard (olivier.girard@univ-amu.fr)