

Projet de stage personnel

Titre: *Implementing an experimental framework for quantitative imaging of the central nervous system myelin using inhomogeneous Magnetization Transfer MRI*

Description: inhomogeneous magnetization transfer (ihMT) is an MRI technique highly specific to the myelin of the central nervous system (Fig1).

The ihMT image is created by the linear combination of 3 images (MT^+ , MT^- , MT^\pm), each with a proper contrast generated by the application of appropriate saturation radiofrequency pulses (at the frequency $+f$ or $-f$) (Fig. 2a). Usually, the MT images are acquired separately leading to a long acquisition time, thus preventing the repetition of acquisitions with different saturation pulse parameters. Varying the saturation parameters is however required for quantitative imaging and hence strategies for reducing the scan time are mandatory.

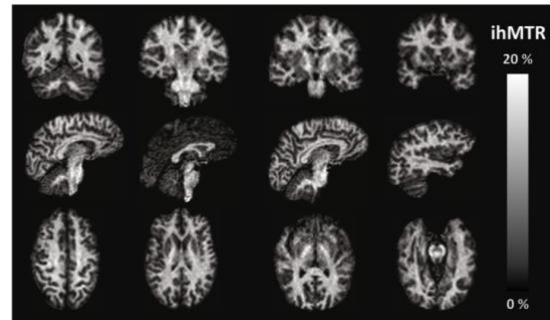


Fig1: 3D whole-brain ihMT MRI images (axial, sagittal and coronal views) acquired on a healthy volunteer on a clinical 1.5 Tesla scanner. The signal highlights the myelin-rich white matter.

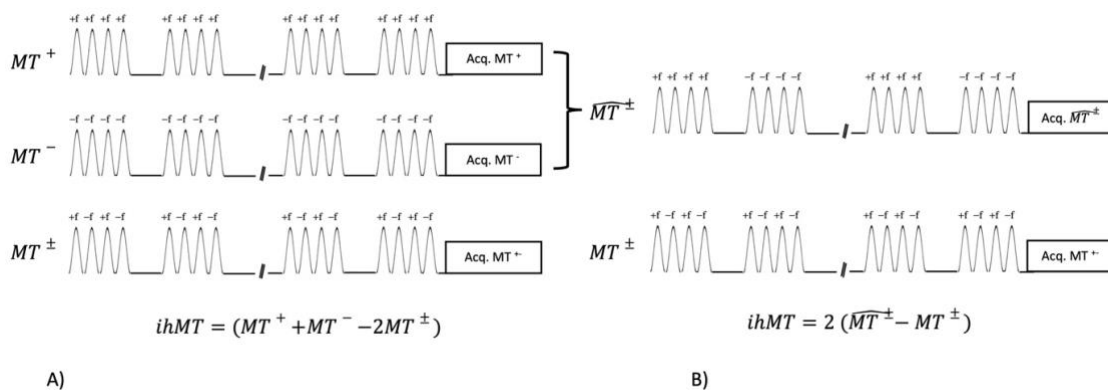


Fig. 2: a/ conventional ihMT experiment requiring 3 acquisitions. b/ accelerated sequence, allowing the simultaneous acquisition of the MT^+ and MT^- average image.

The goal of this internship is to validate the technique described in Fig.2b, which should allow reducing the scan time by 33%. This validation will be performed by numerical simulations and *in vitro* and *in vivo* experiments performed on preclinical and clinical scanners.

Candidate: We are looking for a motivated, team-oriented student with a background in physics, computing science or imaging and willing to perform both theoretical and experimental investigations. The candidate will be integrated into a team of MR physicists including researchers, PhD students and postdoctoral fellows. More details on the team here: <https://crmbm.univ-amu.fr/topic/pheniqs/>