Centre De Résonance Magnétique Biologique et Médicale – CRMBM

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

2-year postdoctoral position available in CRMBM, Marseille, France

Multi-contrast qMRI in neuroimaging @ high and ultra-high fields

Context:

Quantitative Magnetic Resonance Imaging (qMRI) can deliver accurate information on physiological processes in healthy and diseased tissues and is a technology of choice in the field of precision medicine. Despite this strong potential and the numerous quantitative biomarkers it provides, qMRI in neurology is not currently established in conventional radiology. The NormaBRAIN project proposes to deliver fast and reproducible qMRI sequences, to establish the normal distribution in the healthy population, and to develop automatic processing and reporting pipelines for the evaluation of the proposed framework in a context of multiple sclerosis. The objective is to complement conventional qualitative MRI by providing quantitative standards to democratize the use of qMRI at the individual level in neurology.

Project description:

The primary focus of this position is the creation of age-varying templates by modeling the biomarkers variability within single-subject comparison against the derived models. The processing framework will be developed using advanced statistical methods to analyze and understand the rich multi-parametric neuroimaging dataset generated by the project. This work will be conducted in close interaction with MRI physicists, computer scientists and clinicians to generate automated statistical markers of disease using several quantitative MRI techniques.

Required qualifications:

We are looking for a motivated, team-oriented candidate currently holding a Ph.D. degree in computer science, physics, or biomedical engineering with a focus on AI or MR physics. Expertise in image post-processing and analysis, numerical methods and modeling is required. Proficiency in various programming/scripting languages (Python, MATLAB, bash, C/C++) is required; ability to quickly prototype in Python and bash is a must. Prior knowledge in development of innovative AI/ML tools would be advantageous but is not mandatory. Good writing and communication skills in English are required.

Impact:

The NormaBRAIN project is part of an active collaboration between CRMBM, SIEMENS Healthineers and major French University Hospitals (Marseille and Montpellier) focusing on developing fully automatized quantitative MRI tools and pushing them to the clinical use. The impact of this project is of very high importance, as it should allow wider and improved applicability of quantitative MRI techniques into the clinic, leading to a better understanding of tissue alteration occurring in neurodegenerative diseases.

Extra information:

The successful candidate will work in the CRMBM laboratory (www.crmbm.univ-amu.fr), located in the center of the lively Marseille city, within La Timone university hospital.

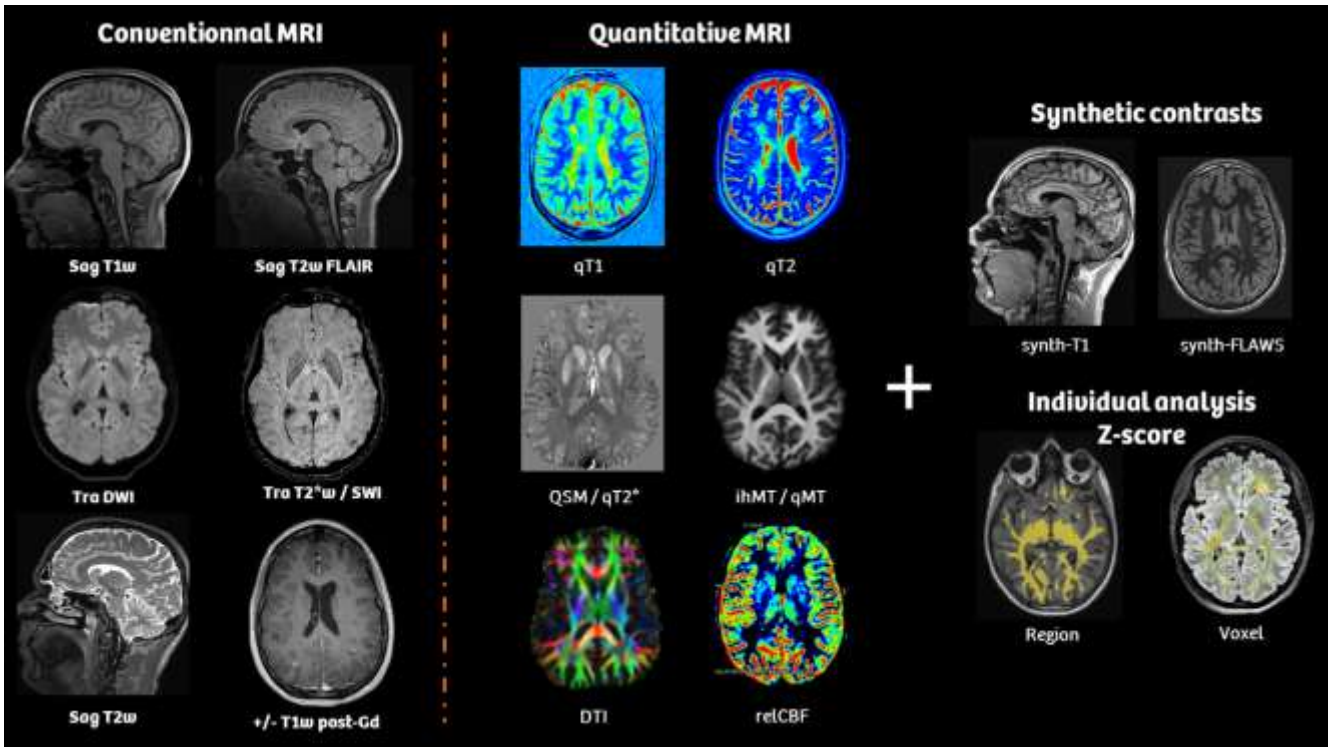
Expected starting date: position open until filled

Interested candidates should send applications, including, CV, motivation letter and 2-3 professional references from previous position to:

- Olivier Girard (olivier.girard@univ-amu.fr)
- Thomas Troalen (thomas.troalen@siemens-healthineers.com)
- Lucas Soustelle (lucas.soustelle@univ-amu.fr)

Funding: The NormaBRAIN project is funded by the French National Research Agency (ANR-22-CE17-0060)

Illustration of the NormaBRAIN project



Advanced MR sequences and reconstruction algorithms, combined with pre-processing steps, allow to retrieve parametric maps. A second processing step gives access to synthetic MR contrasts used in conventional radiology, together with automatic brain tissue segmentations, MS lesion detection and statistical z-score mapping of physiologically meaningful qMRI parameters. The final step consists of designing an automatic reporting of regional analysis and patient's follow-up of disease progression, all encompassed into an integrated decision support software.