

## **Postdoctoral Researcher in MR Acoustic Radiation Force Imaging (MR-ARFI) for Focused Ultrasound Neurosurgery with Dr. Andres Lozano, MD PhD and Dr. Alexandre Boutet, MD PhD**

### **Krembil Brain Institute, Toronto Western Hospital, University of Toronto**

Dr. Andres Lozano is a world renowned functional neurosurgeon and University Professor at the University of Toronto, holding the Alan & Susan Hudson Cornerstone Chair in Neurosurgery at Toronto Western Hospital. He is a senior scientist at the Krembil Brain Institute and has authored more than 800 publications on deep brain stimulation and MR guided focused ultrasound, with several landmark contributions shaping the field of neuromodulation.

Dr. Alexandre Boutet is a neuroradiologist and early career clinician scientist with more than 150 publications and over 6000 citations. He serves as the Slight Neuroradiology Lead for Clinical Translation at the University Health Network. His group has developed high field fMRI methods for deep brain stimulation, advanced MR techniques for focused ultrasound, and safety frameworks that have enabled spine and brain imaging in patients with implanted DBS devices.

Location: Toronto Western Hospital

### **Project Summary**

This fellowship supports the development, optimization, and translation of MR Acoustic Radiation Force Imaging (MR-ARFI), an emerging MRI pulse sequence that encodes tissue displacement from a focused ultrasound (FUS) beam. MR-ARFI can provide direct confirmation of focal spot location at sub-ablative sonication energies, a long standing unmet need in transcranial MR guided FUS. The successful candidate will lead sequence development on a clinical 3T platform, validate performance in tissue mimicking phantoms, and then translate the sequence into patient studies in collaboration with the world leading transcranial FUS program at Toronto Western Hospital.

### **Responsibilities**

- Design, implement, and optimize MR-ARFI pulse sequences on a clinical 3T MRI system, including motion encoding gradients synchronized with FUS sonications.
- Build and characterize tissue mimicking phantoms suitable for transcranial and intracranial FUS testing.
- Conduct phantom experiments to quantify sensitivity, reproducibility, and localization accuracy of the MR-ARFI sequence.
- Lead translation of the optimized sequence into first in human studies, including protocol development, regulatory and ethics documentation, and on scanner data acquisition.
- Present results at international meetings (ISMRM, FUS Foundation) and lead first author publications in high impact journals.

### **Ideal Candidate**

- PhD in MRI physics, medical physics, biomedical engineering, or a closely related discipline.
- Demonstrated experience in MRI pulse sequence development and optimization.
- Strong background in MR signal processing, image reconstruction, and quantitative MRI.
- Experience with ultrasound physics, MR guided focused ultrasound, MR thermometry, or elastography is a strong asset.
- Proficiency in Python, MATLAB, and/or C++; experience with phantom design and benchtop experimentation preferred.
- Interest in translational MR physics and a clear motivation to move developments from the bench into patient care.

### **Opportunities**

- Work within one of the leading transcranial MR guided focused ultrasound programs internationally.
- Hands on access to clinical 3T MRI and transcranial FUS systems
- Opportunity to contribute to landmark first in human MR-ARFI translation at a world leading neurosurgical center.
- Mentorship from internationally recognized leaders in functional neurosurgery and neuroimaging, with strong industry and multi-site collaborations.