

Industry-Sponsored Postdoctoral Research Fellowship

Lawson Health Research Institute (London, Ontario) in association with Siemens Healthcare Limited are offering a three-year Post-Doctoral Fellowship (PDF) involving the application of MRI and PET/MRI for detecting microbiome bacteria. The project will focus initially on MRI, but will provide an opportunity for the applicant to gain knowledge and skills in PET/MRI. The PDF will join a city wide imaging research program including state of the art research imaging platforms (whole body and small animal PET/MRI, PET/CT, 3TMRI and 256 slice CT systems) and engage with 20 plus PhDs (imaging physicists, molecular and microbiome biologists) and MD imaging researchers along with more than 100 plus trainees (PDFs and graduate students) with an onsite medical cyclotron, small animal and large animal facilities and prototyping facilities.

Project: Detection of Microbiome Bacteria with MRI

The human microbiome plays an essential role in human health, not only regarding gastrointestinal functions, but also in supporting a strong immune system. The development of imaging methods to directly detect bacteria in the microbiome would provide a valuable tool for monitoring changes associated with various therapies for gastrointestinal disorders including fecal transplants and ingestion of probiotics. Recently we have discovered that samples of microbiome bacteria known as *Lactobacillus crispatus* have a unique MRI feature, in particular, they are associated with very short longitudinal and transverse relaxation times (T1 and T2). Given the large number of commensal and pathogenic bacteria species influencing humans it is reasonable to expect that other species with very short relaxation times also exist. An additional interesting feature of *L. crispatus* (and certain other bacteria) is the production of hydrogen peroxide.

The PDF will focus on the development of MRI methods for the detection of *L. crispatus* first *in-vitro*, then in an animal model and finally in human subjects. Within the animal model, detection and quantification accuracy will be assessed by comparing MRI measures with PET signals from radiotracer labelled bacteria (using our 3T PET-MRI system). An ultrashort echo time (UTE) sequence will be utilized to exploit the uniquely short relaxation times of *L. crispatus*. Initially the PDF will apply strategies based on fast gradient-echo-based T1 mapping and T1 weighted imaging. Other strategies will also be explored including susceptibility-weighted imaging, combining T1 and susceptibility-based contrast, and chemical shift saturation transfer (CEST) to detect hydrogen peroxide produced by this bacterial species.

Required Qualifications

Ph.D. in medical imaging, biophysics, bioengineering or related field with a thesis involving MRI
Proven written and oral communication skills
Proven skills in computer programming with Matlab

Preferred Additional Requirements

Familiarity with Siemens 3.0 T MRI systems
Experience in pulse programming in Siemens environment (IDEA)

Joint Supervisors:

Neil Gelman PhD (ngelman@lawsonimaging.ca), Department of Medical Biophysics, Western University and Lawson Health Research Institute

Gerald Moran PhD (gerald.moran@siemens-healthineers.com), Siemens Healthcare Limited

Lawson Health Research Institute and Siemens Healthcare Limited are committed to fostering a climate of equity, diversity, inclusion, and accessibility. This commitment is central to, and mutually supportive of, our research excellence mandate. We welcome and respect the diversity of all members of our community, and we support an inclusive culture for our clients, families, research scientists, staff, participants, trainees, volunteers, trustees, and partners. We welcome applications from Black individuals and other racialized persons, Indigenous Peoples, women, persons with disabilities, LGBTQ2SA+ persons, and others who may contribute to further diversification of ideas within our community. Lawson Health Research Institute and Siemens Healthcare Limited are committed to fair assessment of a candidate's abilities, and consideration for diversity of thought, method, and experience, including non-traditional career paths. Accommodation will be provided in all parts of the hiring process where needed. Please notify us of any accommodations that you require by contacting Neil Gelman. (ngelman@lawsonimaging.ca).