



### [Position for a PhD student in Fetal Neuro-Immunology](#)

**Site :** Centre de recherche du CHU Ste-Justine, Département d'obstétrique-gynécologie  
Faculté de Médecine, Université de Montréal, Montreal City, Province of Quebec, Canada

**Laboratory of :** Dr Martin Frasch

**Web site:** <http://www.fraschlab.ca>

**Laboratory research theme:** Fetal neuro-immunology.

#### **Project description:**

The candidate will participate in a project studying brain's control of fetal innate immune response to an infection stimulus using methods from molecular biology. We use the chronically instrumented non-anesthetized fetal sheep as our animal model of human pregnancy. The immune system can cause inflammation that damages organs. The normal brain and the normal immune system 'talk' to each other and influence each other. By emitting 'cholinergic' signals, the brain limits the ability of the immune system to cause damaging inflammation.

When a foetus suffers from infection, the immune system's inflammatory response can damage his or her brain and make it more likely to develop chronic inflammatory diseases after birth. Lifelong disabilities can result. When doctors suspect such condition, they deliver the baby urgently, usually by Cesarean section. However, doctors cannot accurately predict which foetuses need urgent delivery and which pregnancies can be safely allowed to continue. My research team develops monitors that better detect which fetuses are truly distressed by measuring certain mathematical properties of the fetal heart beat directly controlled by 'cholinergic' brain signals. Now, we are learning how to improve cholinergic anti-inflammatory brain signalling using electric nerve stimulation as the first step to develop drug treatments. By harnessing the brain's power to reduce dangerous inflammation, we think we can protect the foetal brain, reduce unnecessary Cesarean sections, and decrease the number of babies born with increased risk to develop newborn or adult neurological diseases due to inflammatory brain damage.

#### **References :**

Prout AP, Frasch M, et al. Systemic and cerebral inflammatory response to umbilical cord occlusions with worsening acidosis in the ovine fetus. *Am J Obstet Gynecol* 2010;82.e1-9.

Frasch M, Müller T, et al. Nonlinear properties of vagal and sympathetic modulations of heart rate variability in ovine fetus near term. *Am J Physiol Regul Integr Comp Physiol* 2009; R702-707.

Frasch M, Müller T, et al. Heart rate variability analysis allows early asphyxia detection in ovine fetus. *Reprod Sci* 2009; 509-517.

Frasch M, Müller T, et al. Fetal body weight and the development of the control of the cardiovascular system in fetal sheep. *J Physiol-London* 2007; 893-907.

#### **Disciplines/ Qualifications:**

Candidates should have a formal training in biological sciences or a related discipline (Experience in biology, biomedical sciences, molecular biology and systems physiology), have excellent organizational, interpersonal, and communication skills, and have a strong interest in fetal neuroimmunology and inflammation.

- Note: the animal experiments take place in St-Hyacinthe Campus of the U de M.

Some commute to this campus during the animal experimental season is expected and required.

- Salary: While the first year salary is assured, the candidate is expected to apply for intra- and extramural funding.

I will provide all the necessary assistance.

#### **Contact:**

Applicants should submit a resume, university records, a short statement of research interests (I will discard impersonal letters as SPAM), TOEFL results and two letters of recommendation to Dr. Martin Frasch by email ([mg.frasch@umontreal.ca](mailto:mg.frasch@umontreal.ca)), if possible in one .pdf document.

**Collaboration:** Collaboration is possible with another researcher in that field. Please contact me.