



uOttawa

**University of Ottawa – Project U07**

**Title:** Positron emission tomography radiotracer development for inflammatory enzymes

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**Keywords:** radiotracer, positron emission tomography, radiochemistry, enzyme, in vivo imaging, cardiovascular

**Duration:** 2-3 months

**Project context:**

The Molecular Imaging Probes and Radiochemistry Laboratory at University of Ottawa Heart Institute specializes in all research areas relevant to the development of radiotracers for cardiovascular and other diseases. The major themes of our research include discovery of new methods for incorporation of short-lived positron-emitting isotopes into small molecules and bioconjugates, as well as in vitro and preclinical development of targeted probes for molecular imaging.

Inflammatory responses to tissue injury in vascular disease can exacerbate disease progression and complicate recovery. Understanding the biochemical mechanisms at work in inflammation is key to developing new therapeutic strategies, as well as enabling more precise diagnoses and personalized treatment. In this project, we are developing probes for positron emission tomography (PET) molecular imaging of specific markers of inflammation to better characterize risk and opportunities for treatment of cardiovascular diseases. PET imaging probes are targeted small molecules or bioconjugates that are radiolabeled with isotopes such as carbon-11 and fluorine-18, which have short half-lives and excellent properties for high sensitivity imaging of in vivo targets. Development of effective imaging probes involves discovery and refinement of molecules with high affinity, selectivity, and in vivo specificity for the target, as well as appropriate pharmacokinetics and metabolic stability. In our lab, we use medicinal chemistry approaches to identify and refine molecular scaffolds that will serve well for radiotracer development. Evaluation of radiotracers for their potential to characterize disease markers in humans and animal models includes tissue staining and autoradiography, as well as small animal in vivo imaging.

## Stages d'été en recherche à l'international pour étudiants du premier cycle (SÉRI) Summer Undergraduate International Research Internships (SIRI)

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### **Project objectives:**

In this project, the student will be responsible for preparing new synthetic intermediates and analytical standards to support isotopic labeling and cardiovascular imaging. The student will gain extensive training in synthetic, medicinal, and radiochemistry, including experimental design and setup, safe handling techniques, and analytical interpretation of results. The student will also gain hands-on experience conducting experiments with radiotracer distribution in tissue and animal models using a variety of imaging and radioactivity counting methods. Our lab is an interdisciplinary environment within a hospital setting, and trainees will have the opportunity to interact and work with chemists, radiochemists, molecular biologists, engineers, imaging physicists, materials scientists, and clinicians.

**Requirements:** Familiarity with basic concepts of biochemistry and organic chemistry are required. Experience with any of enzyme activity assays, synthetic chemistry, imaging, or small animal experiments are a plus.