

# When Glucose Chemistry Disrupts Blood Vessels: Impact of Dicarbonyl Compounds on Vascular Endothelial Integrity

Record number : OPR-1401

## Overview

### RESEARCH DIRECTION

Michel Grandbois, Professeur - Department  
of Pharmacology-Physiology

### INFORMATION

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### ADMINISTRATIVE UNIT(S)

Faculté de médecine et des sciences de la  
santé  
Département de pharmacologie-  
physiologie

### LEVEL(S)

2e cycle  
3e cycle

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## Project Description

This project aims to understand how non-enzymatic post-translational modifications induced by dicarbonyl compounds (DiCs), whose formation is increased under hyperglycemic conditions, influence the mechanical properties and function of vascular endothelial cells. By targeting structural and cytoskeletal proteins, these modifications may alter cellular stiffness, endothelial permeability, and the ability of endothelial cells to respond to mechanical forces generated by blood flow.

The student will use advanced experimental approaches, including atomic force microscopy (AFM), to measure the mechanical properties of endothelial cells at both the cellular and subcellular levels. Functional analyses will also be performed to evaluate the impact of DiCs on endothelial barrier integrity, cellular dynamics, and mechanosensitive responses.

This project will contribute to a better understanding of the mechanisms linking hyperglycemia, metabolic stress, and vascular dysfunction, which are central processes in the development of cardiovascular complications associated with diabetes. It offers multidisciplinary training at the interface of biophysics, vascular biology, and advanced cellular analysis technologies.

### Desired Profile:

We are seeking a curious, independent, and rigorous individual with a strong interest in experimental research and data analysis. Candidates should possess an excellent academic record (B.Sc. and/or M.Sc.) in a relevant field such as biophysics, cell biology, biochemistry, biotechnology, or pharmacology. Interest in AFM and biophysical analyses is considered an asset.

### The Laboratory:

The laboratory of Michel Grandbois focuses on the development and application of advanced biophysical and analytical approaches aimed at better understanding the cellular mechanisms involved in various pathologies. The laboratory notably uses state-of-the-art technologies such as atomic force microscopy to study the mechanical and functional properties of cells. The laboratory is located at the Institut de pharmacologie de Sherbrooke of Université de Sherbrooke, a recognized interdisciplinary research environment offering high-level infrastructure and a dynamic, collaborative training setting.

Interested candidates are invited to contact Prof. Grandbois at: [Michel.Grandbois@usherbrooke.ca](mailto:Michel.Grandbois@usherbrooke.ca)

# Funding offered

Yes

The last update was on 13 May 2026. The University reserves the right to modify its projects without notice.