



Internship proposition
One page max
M2 OHNU 2025-26



Lab: Signaling and Cell Growth

Team: Sylvain Meloche

Name and position of the supervisor: Sylvain Meloche, PI and Professor of Pharmacology

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Candidate:

Title of the internship: Regulation of the MAP kinase ERK3 in cancer

Summary of the internship proposal:

ERK3 (*MAPK6* gene) along with its paralog ERK4 (*MAPK4*) define a distinct subfamily of atypical MAP kinases (MAPKs). While the regulation and biological functions of classical MAPKs like ERK1/2 have been extensively studied, there is limited knowledge regarding the signaling pathways of ERK3/4, their physiological roles, and their involvement in disease. Unlike the majority of protein kinases, ERK3 is a short-lived protein that is constitutively degraded by the ubiquitin-proteasome system (UPS) in proliferating cells. Interestingly, we found that ERK3 is regulated by the intracellular pH and oxygen concentration. ERK3 accumulates at acidic pH and hypoxic conditions, which has broad implications in human diseases including cancer. Growing evidence supports a role of ERK3 signaling in cancer development and progression. Notably, recent work from our laboratory has unveiled a novel role of the atypical MAP kinase ERK3 in promoting the growth of triple-negative breast cancer (TNBC). We found that genetic disruption or inactivation of ERK3 restrains mammary tumor growth in clinically relevant models of TNBC and extends overall survival. The objectives of the project are:

- 1) To define the role of ubiquitination and sumoylation in regulating the stability and function of ERK3 in breast cancer
- 2) To identify the network of UPS enzymes regulating the expression of ERK3 in normal and cancer cells
- 3) To translate these findings to human cancer biology



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Option(s) linked to the project:

- ☐ Hematology
- ☐ Immunology-Cancerology

- ☐ Oncology
- ☐ Nuclear Medicine

Option(s) linked to the profile:

- ☐ Clinical Research Profile
- ☒ Experimental Biology Profile

- ☐ Data Analyst Profile