



COLLEGE of
BIOLOGICAL SCIENCE

DEPARTMENT OF MOLECULAR
AND CELLULAR BIOLOGY

Announcement:

All interested members of the university community are invited to attend
the Final Oral Examination for the degree of **Master of Science** of

TIA RIZAKOS

On Wednesday, September 6, 2023 at 1:30 p.m. (SSC 1511)

Thesis Title: Proteomic analysis of the interactions between *Pseudomonas aeruginosa* and neutrophils in cystic fibrosis

Examination Committee:

Dr. Joseph Yankulov, Dept. of Molecular and Cellular Biology (Exam Chair)

Dr. Jennifer Geddes-McAlister, Dept. of Molecular and Cellular Biology

Dr. Cezar Khursigara, Dept. of Molecular and Cellular Biology

Dr. Priyanka Pundir, Dept. of Molecular and Cellular Biology

Advisory Committee:

Dr. Jennifer Geddes-McAlister (Advisor)

Dr. Cezar Khursigara

Abstract: Cystic fibrosis (CF) is characterized by chronic inflammation and persistent microbial infections. As a first line of defense against infections, the host's immune system will recruit neutrophils; however, in CF patients, mutations within the cystic fibrosis transmembrane receptor (e.g., $\Delta F508$) render neutrophils ineffective at clearing infections. Notably, CF-associated neutrophils demonstrate impaired effector function compared to wild-type (WT) neutrophils, causing altered antimicrobial protein/enzyme production. To identify key drivers of neutrophilic differences, I assessed biofilm disruption and microbial survival between the cell lines. Additionally, to define protein level differences in CF vs WT neutrophils, this study used quantitative proteomics to identify core and unique proteome signatures between the cell lines and infection models. Here, we identified many neutrophil proteins with significantly altered abundance across the conditions, including bactericidal permeability-increasing protein and cathepsin G, elevated in *P. aeruginosa*-exposed WT neutrophils. Together, this work will enhance our understanding of CF-associated neutrophil regulatory mechanisms during *P. aeruginosa* biofilm infection, supporting the putative discovery of novel therapeutic strategies to clear bacterial infections.

Curriculum Vitae: Tia completed her Bachelor of Science (Hons.) in Molecular Biology and Genetics with Distinction at the University of Guelph in April 2021. She began her Master of Science program in Molecular and Cellular Biology in Dr. Geddes-McAlister's lab in September 2021.

Awards: Cystic Fibrosis Canada Trainee Travel Grant (2023); Graduate Student Award for Best Oral Presentation - Canadian National Proteomics Network (2023).

Publications: Geddes-McAlister, J.*, **Rizakos, T.**, Muselius, B. (*In Press*) Mass spectrometry-based proteomics of eukaryotes. *Detection and Analysis of Microorganisms by Mass Spectrometry* (Book; Royal Society of Chemistry).

Rizakos, T., Geddes-McAlister, J.* (*In Press*) Neutrophil Protein Isolation and Digestion. *Journal of Visualized Experiments*.

Rizakos, T., Geddes-McAlister, J.* (*In Press*) Purification and Desalting of Peptides through STAGE Tip Procedure for Proteomic Profiling. *Journal of Visualized Experiments*.