



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

**CARLIE GOODALL**

**On Tuesday, May 10, 2022 at 9:30 a.m.** (online)

**Thesis Title:** Investigating the proteomic responses of Gram-negative and Gram-positive bacteria to a novel non-traditional silver-based antimicrobial

**Examination Committee:**

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

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

Dr. Rebecca Shapiro, Dept. of Molecular and Cellular Biology

Dr. Matthew Sorbara, Dept. of Molecular and Cellular Biology

**Advisory Committee:**

Dr. Cezar Khursigara (Advisor)

Dr. Rebecca Shapiro

**Abstract:** Recently, the World Health Organization (WHO) has declared a global shortage of innovative antimicrobials that address antimicrobial resistance and emphasized the devastating toll antimicrobial resistance is taking on our healthcare systems. Due to their proposed multi-targeted mechanisms and lower incidence of resistance, silver-based compounds are ideal candidates for further research and development. To investigate the utility of a newly developed silver-based antimicrobial, EPC-373K, against common wound pathogens we employed antimicrobial susceptibility and label-free quantitative (LFQ) proteomic techniques. Exploration of the global proteomic shifts and identification of several pathways and processes disrupted in *Pseudomonas aeruginosa* PAO1 and *Staphylococcus aureus* TCH959 has furthered our understanding of the biological processes impacted by EPC-373K. Distinct profiles characterized by unique physiological changes were observed for each strain highlighting differences in the responses of Gram-negative and Gram-positive species to EPC-373K. Characterization of the impact of EPC-373K on wound pathogens assists in defining the utility of this novel antimicrobial within the current field of therapies targeting topical infections.

**Curriculum Vitae:** Carlie completed her B.Sc. (Hons.) in Biochemistry (Co-op) at the University of Guelph in Fall 2019. She began her M.Sc. of Molecular and Cellular Biology in the lab of Dr. Cezar Khursigara in Winter 2020. Carlie received a Mitacs Accelerate Internship and funding from BioTalent during her graduate studies.

**Publications:** Spina, C.J., Notarandrea-Alfonzo, J.E., Guerra, E.D., Goodall, C., Bohle, D.S., and Precht, R. 2021. Synthesis and Structural and Spectroscopic Studies of a pH-Neutral Argentic Chelate Complex: Tribasic Silver (III) Bisperiodate. ACS Omega **6**(41): 27017–27025.  
doi:10.1021/acsomega.1c03523.

Spina, C.J., Ladhani, R., **Goodall, C.**, Hay, M., and Precht, R. 2019. Directed silica co-deposition by highly oxidized silver: Enhanced stability and versatility of silver oxynitrate. *Appl. Sci.* **9**(23). doi:10.3390/app9235236.