Thesis Defense Announcement
To: The George Mason University Community

Candidate: Ashley Carpenter
Program: MS in Biology

Date: November 11, 2022
Time: 11:00 AM Eastern Time

Zoom Link: https://gmu.zoom.us/j/91000553701?
pwd=a0hydmZhS25USWc0aW5KYIdlc0NlQT09&from=addon

Title: Determining the Safety of Wound-Healing Antimicrobial Peptides, GATR3 and Drgn1, Against Host Cells and Red Blood Cells

Committee Chair: Dr. Monique van Hoek
Committee Members: Dr. Iosif Vaisman, Dr. Barney Bishop

All are invited to attend the defense.

ABSTRACT: Up to half of all combat injured patients suffer from infectious complications, predominately with biofilm-forming, multidrug-resistant (MDR) bacteria. Biofilm management of chronic wounds is an increasingly recognized factor in the healing of these injured patients. Coupled with the lack of new antibiotics and the emerging antibiotic resistance crisis there exists an urgent need for new therapeutics. Antimicrobial peptides (AMPs) have shown potential as antibacterial and antibiofilm; therefore, AMPs are an attractive candidate for clinical development. The synthetic peptides DRGN1 and GATR3 are being studied, and have been shown to have antimicrobial and/or antibiofilm activity against medically relevant bacteria including Staphylococcus aureus and Pseudomonas aeruginosa. This study aims to test the safety of these lead peptides, DRGN1 and GATR3, and their wound healing properties against host cells. To evaluate the cytotoxicity of the lead peptides, cell cytotoxicity and hemolysis assays will be performed using human epidermal keratinocytes, human red blood cells and a human liver cancer cell line, HepG2 cells. To quantitate the wound healing of HEKa cells, a scratch assay will be performed and measured. The cytotoxicity, hemolysis, and scratch assays will be compared with the control peptides, LL-37 and IDR-1018. The therapeutic index is the ratio between the concentration at which a drug is toxic versus the concentration at which a drug is effective. While the exact therapeutic index cannot yet be measured, some estimation of it will be made for the peptides. The proposed study will test the safety of these antimicrobial peptides and help identify whether DRGN1 and GATR3 advance through the pre-clinical in vivo studies.