Title: Developing Novel Therapeutics for Bacterial Lung Infections

Background: Bacterial lung infections are leading causes of death worldwide. Unfortunately, increasing resistance to antibiotics and the inflammation often accompanying these infections are leading to poor outcomes despite antibiotic intervention. Complicating treatment further, the tree-like branching structure of the lung makes drug delivery to distal sites of infection difficult. Our research aims to address these challenges by developing new therapeutics and new tools to improve and assess drug delivery, bacterial killing and inflammation. Our therapy combines host defense peptides, which have been shown to kill antibiotic-resistant bacteria and down-regulate inflammation, with a pulmonary vehicle, exogenous surfactant, that can improve distribution in the lung.

Methods: We have developed the Wet Bridge Transfer system, a new tool which can rapidly assess drug transport, bacterial killing and anti-inflammatory properties of compounds as they spread across a surface.

Results: We anticipate that exogenous surfactant will not only increase the transport of host defense peptides, but that the mixture will effectively kill antibiotic-resistant bacteria and reduce inflammation as it spreads.

Discussion & Conclusion: Utilizing host defense peptides with a spreading agent represents a novel approach to treating bacterial lung infections. Additionally, the transfer system offers the ability to rapidly screen and examine the next generation of pulmonary therapies.

Interdisciplinary Reflection: This project requires interacting with clinicians treating patients with lung infections, biochemists improving the transfer system, and immunologists to understand the underlying mechanism of action for our new therapy. This interdisciplinary environment is essential to making our novel therapy a clinical reality.