



RESEARCH PROGRESS REPORT SUMMARY

Grant 02597: Molecular Epidemiology of Methicillin-resistant *Staphylococcus pseudintermedius* in the United States

Principal Investigator: Stephen Kania, PhD
Research Institution: University of Tennessee
Grant Amount: \$47,082
Start Date: 5/1/2019 **End Date:** 10/31/2021
Progress Report: FINAL
Report Due: 10/31/2021 **Report Received:** 10/31/2021

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Original Project Description:

The bacterium *Staphylococcus pseudintermedius* is the most common cause of canine skin infections as well as other important canine diseases. Disfigurement caused by skin infections and treatment failures is an important problem. Resistance to antibiotics is becoming increasingly widespread with few or no antibiotic options left for some cases. Alternative therapeutic approaches being investigated include vaccines, small molecule virulence factor inhibitors and bacteriophage lytic enzymes. In order for new products to be effective against the broadest spectrum of wildtype bacterial strains as possible, it is important to determine which strains of *S. pseudintermedius* clinically predominate in the United States today. A genetic typing method for *S. pseudintermedius* was previously developed by the research team along with a survey of bacterial strains in the United States in which they sequenced the genomes of the most common strains. This analysis provided a snapshot of predominant strains and suggested a potential for emergence of new, highly antibiotic resistant organisms. Identifying the current strains in the US and sequencing their genomes will provide a basis for developing the next generation of treatments as well as important information about changes that occur in the bacterial population in response to selective pressures.

Publications:

Lufuno Phophi, Rebekah Jones, Mohamed Abouelkhair, Stephen A. Kania. Temporal changes in the population structure of methicillin resistant *Staphylococcus pseudintermedius* in the United States. In preparation.



Presentations:

None. The pandemic has limited meeting participation.

Report to Grant Sponsor from Investigator:

Staphylococcus pseudintermedius is a species of bacteria that causes serious medical problems in dogs including skin and systemic infections. Although once treated effectively with antibiotics the bacteria have become increasingly resistant. Methicillin resistance is associated with resistance to multiple classes of antibiotics and some strains do not respond to treatment with any of the antibiotics commonly used by veterinarians. In this study we had the unique opportunity to follow up on an AKC CHF funded study we conducted a decade ago. This allowed us to determine how the population of bacteria have changed throughout the United States. We found an overall higher level of resistance to most antibiotics. Our genetic typing analysis revealed a surprising finding, that the major strains of *S. pseudintermedius* circulating in the US a decade ago have been replaced primarily by highly resistant strains previously only identified on other continents. This information is key to the development of alternative methods to prevent or treat infections in dogs by targeting predominant strains which may be changing over time due to dogs' immune responses.