



RESEARCH PROGRESS REPORT SUMMARY

Grant 02829: Investigating the Potential of Phage Therapy to Tackle *Staphylococcus pseudintermedius* Infections in Dogs

Principal Investigator: Gavin Paterson, PhD
Research Institution: R(D)SVS and Roslin Institute, University of Edinburgh
Grant Amount: \$99,830
Start Date: 1/1/2021 **End Date:** 2/28/2022
Progress Report: Mid-Year 1
Report Due: 7/31/2021 **Report Received:** 7/26/2021

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Original Project Description:

The spread of antimicrobial resistance is a major threat to modern medicine, for both humans and animals. In the case of dogs, *Staphylococcus pseudintermedius* is an important cause of infections, especially pyoderma. Antimicrobial resistance in *S. pseudintermedius* is making infections more difficult to treat which is affecting dog welfare and might pose a threat to humans too. There is a need to explore alternative treatments to antibiotics with one approach being to use phage therapy. This therapy uses naturally-occurring viruses, called bacteriophages (phages) which infect and kill bacteria to treat bacterial infections. Phage therapy has a long history of safe and effective use in humans and has the advantages that it can target drug resistance bacteria with few side effects. This project has a team of veterinarians and scientists working together to isolate and characterize phages that *kill S. pseudintermedius* which may contribute to the development of new, exciting treatments to benefit dog health and wellbeing.

Publications: None at this time.

Presentations: None at this time.



Report to Grant Sponsor from Investigator:

Antimicrobials are widely used in canine medicine and bring significant benefits to animal health and well-being. However, similarly to human medicine, the spread of antimicrobial resistance (AMR) is a growing challenge to the continued success of these medicines in dogs. The spread of AMR and the prospect of restrictions in veterinary antimicrobial use would have a devastating impact on canine welfare. Morbidity and mortality to infections would increase hugely; even routine infections that are currently tractable could become life threatening. Without effective antibiotics much of modern veterinary healthcare (including critical care, orthopedic and complex surgeries, implants and oncology) would be rendered near impossible. Concomitant increases in veterinary costs could also deter owners from seeking treatment, leading to increased suffering, euthanasia and abandonment. It is therefore critical for dog welfare to tackle the problem of AMR. One strategy is to identify alternative or adjuvant therapies that could be used instead of antibiotics, either to help preserve them by limiting their use or to replace them entirely where they are no longer effective or available for use in dogs. In this AKC CHF-supported project we are investigating the potential of bacteriophages to treat canine bacterial infections, an approach called phage therapy. This work is targeting *S. pseudintermedius* (formerly designated *Staphylococcus intermedius*), the predominant organism associated with pyoderma, a common chronic debilitating illness which contributes significantly to the use of large amounts of antimicrobials in dogs. Amid the growing problem of AMR among *S. pseudintermedius* isolates, the development of new therapeutic options is an urgent need.

Bacteriophages (or phages) are viruses that specifically infect and kill bacteria. Phage therapy exploits these naturally-occurring viruses and has a number of attractive features such as the ability to kill multi-drug resistant bacteria, to have minimal effects on the microflora and an excellent safety profile. The support of the AKC Canine Health Foundation has allowed us to undertake a large screen of canine samples to find phages that can kill *S. pseudintermedius*. Four phages of interest have been found and these are being taken forward for further study while the search for other phages continues.

If successful, this project will be highly novel and open the possibility of a new approach to treating veterinary infections in the face of antimicrobial resistance. This is clearly significant given the huge threat that antimicrobial resistance poses, and the impact is applicable not just to canine atopic dermatitis and *S. pseudintermedius* infections but across all of canine and small animal veterinary medicine

Tackling this challenge would not be possible without the kind support provided by the AKC CHF and we look forward to updating you further in due course on the success of our work.