

FINAL REPORT



Structural Elucidation of a Small Molecule Chelator to Combat Bacterial Infections in Dogs

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RESULTS: Researchers find that extracts from the ocotillo plant (*F. splendens*) show promise as antimicrobials

SUMMARY: The research team were able to successfully obtain extracts of the ocotillo plant and then test the extracts' ability to disrupt iron metabolism in *E. coli* and *Klebsiella* cells, two bacteria commonly responsible for urinary tract infections in dogs.

THE PROBLEM: Urinary tract infections (UTIs) are common in pets. In some animals, these infections can evolve into a chronic problem, resulting in repeated rounds of veterinary visits, testing and antibiotic therapy. The treatment of recurrent UTIs with antibiotics has been implicated in the growth of multidrug-resistant bacteria. Finding a novel way to treat UTIs could not only address bacterial resistance but could possibly be a better strategy for addressing this common problem.

THE PROJECT: The team investigated a novel antimicrobial strategy for antibiotic-resistant bacterial urinary tract infections (UTIs) in pets. Studies show metals, including iron and zinc, are micronutrients (food) for bacteria. The researchers wanted to see if ocotillo plant extracts could disrupt iron metabolism in bacteria commonly associated with UTIs. If the extracts were able to inhibit this important pathway, the information could be leveraged to develop new therapies for UTIs.

PROJECT FINDINGS: The team started by successfully generating crude extracts from the ocotillo plant by grinding the flowers into a powder and extracting small molecule chemical compounds. The team then produced enriched fractions to enhance its action against bacteria.

The team generated and analyzed the chemical profile of the active compound derived from the ocotillo flowers to learn more about how it works and how best to use the product.

Lastly, they tested the enriched fraction's ability to inhibit growth and proliferation in *E. coli* and *Klebsiella* cells. The team determined a dose of extract in cell culture, and then did experiments that showed a delay and decrease in cell division when the extracts were added to the cells, in contrast to their control group.

POTENTIAL IMPACT: More work needs to be done but these results provide a solid foundation for further studies. This new information will help inform the development of novel UTI treatments that may provide veterinarians with alternative antimicrobial options for their patients.

In addition to the research outcomes, the study was instrumental in the training of 5 medical students. Several posters were presented at scientific conferences, and a publication was submitted and is under review.

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