ABSTRACT and INTRODUCTION

Since the emergence of methicillin-resistant *Staphylococcus aureus* (MRSA) from hospital settings into public settings, it has caused major health problems worldwide ranging from skin and soft tissue infections (SSIs) to more severe infections such as pneumonia. Its interesting ability to become resistant to many powerful antibiotics has become a source of fascination and concern.

The *Staphylococcus aureus* bacterium has many mechanisms within itself to make it less susceptible and sometimes resistant to many different kinds of strong antimicrobials. One of these is fusidic acid, a potent, steroidial antibiotic that works by inhibiting elongation factor G (EF-G), which plays a crucial role in the translocation step for bacterial protein synthesis.

One mechanism involved in *S. aureus* resistance of fusidic acid involves genes that are stimulated with the presence of fusidic acid: *faiR, faiA* and *faiB*. *faiR* and *faiA* encode efflux pumps (which act like gateways for the cell) and become expressed with the presence of fusidic acid, clearing the cell of any toxic compounds (such as fusidic acid and many other commonly used antibiotics). It has also been observed that a protein produced by the *faiR* gene sits on a gap between *fai* and *faiA* when there is no fusidic acid.

The role of *fai* in fusidic acid resistance has not been completely defined. Defining its exact role could help contribute to a greater understanding of *S. aureus*’s drug-resistance mechanisms.

PURPOSE

This study investigates the role of the *faiR* gene in antimicrobial resistance of *S. aureus*. This *faiR* protein that sits on this gap is hypothesized to be suppressing the creation of efflux pumps. Its also hypothesized that when fusidic acid enters the cell, the protein binds to it, taking it off of the DNA and allowing the *fai* and *faiA* genes to be expressed, causing the production of efflux pumps and ridding the cell of any antimicrobial. In order to find out, the protein must be isolated and studied.

- What is the role of the *fai* gene in resistance mechanisms in *S. aureus* infection?
- What does the protein associated with this gene do when exposed to fusidic acid?
- Does the *fai* gene produce a protein that inhibits the *fai* and *faiA* genes?

RESULTS

The target gene has been amplified and multiplied as well as cleaned and is currently being put into a vector.

1% agarose gel showing the presence of PCR product and phenol-chloroform extraction measuring at 500 bp.

**GOING FORWARD**

The next step for this study is to collect the proteins coming off the gene and observe their behavior with fusidic acid.

REFERENCES