Introduction

- Diseases caused by drug resistant bacteria are a pressing public health threat.
- This is due to a lack of new antibiotics and the evolution of multidrug resistance.
- Drug resistance is caused by mutant or novel genes known as resistance genes.
- CRISPR-Cas9 gene editing has been shown to edit resistance genes and increase susceptibility to antibiotics.

Research Problem

- Drug resistance disproportionately affects minorities and people of lower socioeconomic status (1).
- Antibiotic resistant infections are more expensive to treat, further burdening disadvantaged populations (2).
- We are studying a common nalidixic acid resistance mutation in the gyrase A gene ($gyrA$) in $E. coli$.
- Single nucleotide substitution at codon 87 in the gyrase A gene.
- Ideal for targeting with CRISPR-Cas9 and homology directed repair (3).
- Urinary Tract Infections (UTIs) caused by $E. coli$ are the most common type of bacterial infection in females (4).
- UTIs are rapidly becoming nalidixic acid resistant.
- Colistin, a harsher antibiotic, is the only current alternative treatment.

Research Question

Can we efficiently deliver a CRISPR-Cas9 gene editing system into nalidixic acid resistant $E. coli$ in order to edit a single nucleotide substitution in $gyrA$ and resensitize it to nalidixic acid?