CALIFORNIA SCIENCE & ENGINEERING FAIR
2018 PROJECT SUMMARY

Name(s)

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Project Number

38571

Project Title

CRISPR Interference Knockdown of Ampicillin Resistance Gene in Escherichia coli

Abstract

Objectives/Goals

Synthesis of a CRISPRi plasmid to silence the ampicillin resistance gene in Escherichia Coli.

Methods/Materials

Constructed a gRNA scaffold inside the CRISPRi plasmid encoding for a 20bp sequence of the ampicillin resistance gene, transformed E. coli with the plasmid through heat shock, plated bacteria onto chloramphenicol LB agar plates (plasmid contained a chloramphenicol resistance gene), swabbed bacteria onto new LB agar plates and placed one ampicillin disc onto each plate, measured the zone of inhibition around each disc after a 24-hour growth period in incubator.

Results

The measurements of the zones of inhibition surrounding the ampicillin disc on the plate containing the transformed E. coli showed susceptibility to the antibiotic while there was no zone of inhibition on the E. coli not transformed with the CRISPRi plasmid which demonstrated resistance to the antibiotic.

Conclusions/Discussion

The constructed CRISPRi plasmid showed efficacy to the suppression of the ampicillin resistance gene in Escherichia Coli. This demonstrated then value of utilizing CRISPR or CRISPRi in the plasmid form to modify/regulate gene sequences and expressions in organisms, including the repression of antimicrobial resistance genes in bacteria which can help treat infectious diseases with more efficiency.

Summary Statement

I constructed a CRISPRi plasmid that suppressed the ampicillin resistance gene in Escherichia Coli.

Help Received

The backbone of my plasmid was provided by addgene and the gRNA scaffold was synthesized at GeneWiz with my instructions. My biology teacher helped understand the basic mechanism and function of CRISPR.