Name(s)

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Project Number

J1601

Project Title

The Development of Antibiotic Resistance in Escherichia coli

Abstract

Objectives/Goals

Antibiotic resistance is a major health issue. My goal in this project was to understand how common bacteria like Escherichia coli develop resistance to antibiotics. Question 1: Do bacteria become resistant to antibiotics as a result of exposure to inadequate drug concentrations? Question 2: If E. coli bacteria become resistant to one antibiotic like Neomycin, will they also become resistant to another antibiotic like Ampicillin?

Methods/Materials

Human stool was inoculated into 2 mLs of Luria Broth (LB) and grown overnight at 37C. After identifying the resulting bacterial growth as E. coli, the bacteria were inoculated into tubes containing different concentrations of Neomycin and growth was assessed. Using the bacteria that grew in the highest concentration of Neomycin, the process was repeated until growth was observed in all concentrations of Neomycin. E. coli that grew in the highest concentration of Neomycin (10ug/mL) was then exposed to either Neomycin or Ampicillin at 10ug/mL, along with appropriate controls.

Results

I observed that by exposing E. coli to sub-optimal concentrations of the antibiotic Neomycin, I could select for Neomycin-resistant bacteria that would be able to grow even in Neomycin at 10ug/mL. However, these bacteria could not grow in Ampicillin at 10ug/mL.

Conclusions/Discussion

These data suggest that exposure of E. coli to inadequate levels of antibiotics could lead to drug resistance by selecting for bacteria that have the ability to grow in the presence of the drug. However, using a different antibiotic can inhibit these resistant bacteria.

Summary Statement

I wanted to show that antibiotic resistance can be easily created and pose major medical problems in the world.

Help Received

Parents helped acquire supplies. Father got pipetmen and tips from his lab and clearence for a MicroScan machine.