CALIFORNIA STATE SCIENCE FAIR
2012 PROJECT SUMMARY

Name(s)
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Project Number
S1734

Project Title
Investigating the Effects of Various Environmental Conditions on the Degradation of Antibiotics

Abstract

Objectives/Goals
The purpose of my project is to determine how well penicillin, amoxicillin, and septra work after being exposed to different environments. This is important because these antibiotics are widely presrcibed and if changes in environment affect their ability to kill bacteria consumers could unknowingly be contributing to the breeding of antibiotic resistant bacteria.

Methods/Materials
To create a measurable area of bacterial inhibition I've diluted the 3 test antibiotics with distilled water (6ml antibiotic to 60ml dis water)and seperated them into 4 bottles for each antibiotic for a control, incubator, freezer, and direct sun test. The control was stored as suggested by the pharmacy, the others were exposed to their environments for 8 hours and then tested. I swabbed a sterile petri dish with bacillus subtilus bacteria then placed a test dot that had been dipped in the test antibiotic on the petri dish. I repeated this 9 times for a total of 10 tests (2 tests dots per dish).
The petri dishes were then placed in the incubator. After 48 hours I measured the areas of bacterial inhibition.

Results
Control tests for all 3 antibiotics had maximum areas of bacterial inhibition. Amoxicillin exposed to the freezer had an average inhibition area of 13.3mm, the direct sun tests averaged 7.3mm and the incubator tests had no bacterial inhibition area ar all. Penicillin exposed to the freezer had an average inhibition area of 11.6mm, the direct sun and the incubater tests had no bacterial inhibition area at all. Septra exposed to the freezer had an average area of inhibition of 10.6mm, the direct sun tests averaged 9.3mm, and the incubator tests averaged 12.8mm.

Conclusions/Discussion
The exposures used were picked to replicate someone leaving their antibiotic in a car on a winter or summer day or laving it in a sunny location for the day. Clearly, the ability for all 3 test antibiotics to create an area of inhibition around the test dot is affected by the different environmental exposures. Septra appears to be the hardiest of the antibiotics but the exposures have still weakened its ability to inhibit bacteria growth. This is potentially dangerous because exposing bacteria to antibiotics that are incapable of inhibiting growth could contribute to the development of antibiotic resistant bacteria.

Summary Statement
Determining if even 8 hours of improper storage of antibiotics will affect their ability to inhibit bacterial growth.

Help Received
Mr. Whittington provided the incubator, petri dishes and bacteria. Mother photographed project