



**CALIFORNIA STATE SCIENCE FAIR
2004 PROJECT SUMMARY**

Name(s) Janna E. Nikkel	Project Number J1323
--	---------------------------------------

Project Title
Staph Aureus: Resistant or Sensitive to H₂O₂?

Abstract

Objectives/Goals
The objective of this project was to observe if 3% hydrogen peroxide could kill the bacteria, staphylococcus aureus.

Methods/Materials
A brief procedure of the experiment is as follows:
Control - Mixed a .5 suspension of staphylococcus aureus and normal saline. Used a calibrated loop to spread the bacteria onto a blood agar plate, and incubated it for 24 hours. Next, mixed a 1:1 dilution of the .5 suspension of staphylococcus aureus and 3% hydrogen peroxide. Used a new calibrated loop to spread the bacteria onto a blood agar plate and incubated it for 24 hours. Repeated the test one more time. Collected the results for each test by observing the growth of the bacteria on the blood agar plates and counting the colonies. Calculated and recorded the results of the two trials. Repeated the above procedure for the serial dilutions of staphylococcus aureus and 3% hydrogen peroxide of 1:2, 1:4, 1:8, 1:16, 1:32, 1:64, 1:128, 1:256, and 1:512. Each time the experiment was done the amount of hydrogen peroxide was doubled, although the amount of staphylococcus aureus stayed the same. All these dilutions were tested two times for a total of 22 tests.

Results
The results do support my hypothesis that 3% hydrogen peroxide does kill staph aureus. The control and the dilutions of 1:1 to 1:64, the colonies were too numerous to count. Dilution 1:128, the average colony count was 62.5. Dilution 1:256, the average colony count was 30. Dilution 1:512, the average colony count was 1.5.

Conclusions/Discussion
Initially, the staph aureus was protected by the enzyme catalase produced by the staph aureus bacteria. It broke down the 3% hydrogen peroxide into water and oxygen, which is nontoxic to the staph. Eventually, with the higher dilution of 3% hydrogen peroxide there was not enough catalase produced to break it down. The 3% hydrogen peroxide is a reactive oxygen species, which kills the staph aureus bacteria by destroying its cell structure.

Since staph aureus seems to become resistant to antibiotics perhaps more studies should be done on the use of hydrogen peroxide as an alternative. However, it did take a high dilution of the hydrogen peroxide to kill the bacteria.

Summary Statement
I observed the effects of 3% hydrogen peroxide on the bacteria, staphylococcus aureus.

Help Received
Used Memorial Hospital lab under supervision of Tracy and Steve Langenfeld. Mom cut paper for board. Dr. Szick-Miranda helped understand conclusion.