



**CALIFORNIA STATE SCIENCE FAIR
2015 PROJECT SUMMARY**

Name(s) Karen H. Cho	Project Number 35925
Project Title Synthetic vs. Natural Antibacterials on Inhibiting Bacteria Growth	
Objectives/Goals This project compared the effectiveness of two synthetic antibacterials, ethanol and iodine, to two natural antibacterials, vinegar and honey, in inhibiting the growth of bacteria. This project separates from traditional tests by not only measuring the amount of bacteria killed by the antibacterial but also the amount of bacteria that grew on top of the solution. Abstract This project compared the effectiveness of two synthetic antibacterials, ethanol and iodine, to two natural antibacterials, vinegar and honey, in inhibiting the growth of bacteria. This project separates from traditional tests by not only measuring the amount of bacteria killed by the antibacterial but also the amount of bacteria that grew on top of the solution. Methods/Materials I collected bacteria from the girls' bathroom floor; rather than focusing on one specific type of bacteria, this project better portrays the realistic scenario with a wide spectrum of bacteria in an environment where some bacteria may be potent in than others. I collected the bacteria using sterile Q tips, added the solutions with a 1 mm pipet, labeled the petri dish, then placed them in the incubator for 5 days at 33.2 degrees Celsius. To count the bacteria, I used an eCount bacterial colony counting pen from Carolina Biological (online). Results Iodine was the most effective antibacterial and maintained an average of 0 bacteria growth. Vinegar was the second most effective with an average of 25.4 bacteria colonies. Ethanol was third most effective with average 41.8 bacteria colonies. As an outlier, honey was the least effective with an average of 288.4 colonies. Conclusions/Discussion The conclusion is that (a) vinegar is a great natural alternative to synthetic antibacterials in schools or households where natural antibacterials may be preferred. (b) acetic acid may be added to vinegar or a strain of iodine to make it a stronger, more effective natural antibacterial. (c) in the future, I'd like to test the effectiveness of light or temperature on the effectiveness of an antibacterial in inhibiting bacteria growth. (d) some trials done by Kondo and his colleagues found that rats that consumed a standard diet with vinegar had significantly reduced systolic blood pressure and leukemia cancer cells. In the future, I strongly want to find scientific evidence if vinegar ingestion may help reduce high blood pressure and reduce growth of leukemia tumors in humans.	
Summary Statement This project compared the effectiveness of two synthetic antibacterials, ethanol and iodine, with two natural antibacterials, honey and vinegar, on inhibiting bacteria growth.	
Help Received School science teacher (Mrs. Julie Warren) supervised experiments; parents bought supplies and board; conducted in school lab	