



**CALIFORNIA STATE SCIENCE FAIR
2015 PROJECT SUMMARY**

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| Name(s) Dylan K. Nishimine | Project Number 35052 |
| Project Title Brushing with Bacteria? | |
| Objectives/Goals This study was designed to determine whether 1) if the bacterial load on toothbrush bristles was greater with prolonged usage and 2) what would be the most effective way to clean toothbrushes after usage. Abstract Methods/Materials Oral hygiene instructions were given and toothbrushes were distributed to four subjects. Subjects were instructed to use the toothbrush twice a day for one week and then the toothbrushes were collected for analysis. The same subjects were each given a new toothbrush to use twice a day for a two week period of time and the toothbrushes were again collected and prepared for SEM (Scanning Electron Microscopy) analysis in which each specimen was scanned for bacterial presence and load. For the second objective of the project, the four subjects were given new toothbrushes and asked to brush twice a day for two weeks. The toothbrushes were then collected for analysis. Each toothbrush was cut into 3 or 4 sections and placed into a preparation of hydrogen peroxide, salt water or baking soda water mixtures or received no treatment (control). Bristles from the toothbrushes were extracted and placed onto homemade agar plates to observe bacterial growth. Results SEM micrographs showed a marked increase of bacteria on two week bristles in comparison to one week or new toothbrush bristles. It was then decided to continue to the second phase of the project in which the most effective way to clean toothbrushes were studied. Both baking soda water and hydrogen peroxide were found to have delayed growth and were more effective than the salt water solution. The salt water solution was found to be more effective than the control of no treatment. Conclusions/Discussion The study supports the hypothesis that the more often a toothbrush is used, the more bacteria will accumulate. I concluded that hydrogen peroxide and baking soda are equally effective as supplemental cleaning agents for toothbrushes, while salt water is less effective. This experiment demonstrates how quickly bacteria can be harbored on toothbrush bristles under standard cleaning conditions. It can also be concluded that usage of a cleaning solution on toothbrushes will minimize bacterial growth. | |
| Summary Statement The project evaluated the bacterial load on toothbrush bristles and the efficacy of toothbrush disinfection with common household cleansers. | |
| Help Received Dr Michael Tseng provided guidance at the University of Louisville School of Medicine and Mr. Michael Eisenback supervised SEM processing and imaging. | |