CALIFORNIA STATE SCIENCE FAIR
2007 PROJECT SUMMARY

Name(s)
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Project Number
S1422

Project Title
A Study on the Effects of Green Tea Extract in Regulating the Formation of Dental Biofilm

Abstract

Objectives/Goals
The objective is to determine the efficacy of herbal green tea extract in regulating dental biofilm in a simulated environment.

Methods/Materials
Consent was given to work in the microbiology laboratories of Dr. Wenyuan Shi at UCLA. Saliva was collected from my mouth and was diluted with Brain Heart Infusion (BHI) media. The oral bacteria was isolated using a centrifuge and was subjected to diluted green tea extract for five minutes. The mean number of bacterial cells observed through a Nikon phase contrast microscope was compared between the controlled bacteria and the treated bacteria.

Results
Over a time span of ten hours, the mean number of bacterial cells observed increased at an exponential rate. After ten hours, the untreated bacterial biofilm reached a mass in which individual bacterial cells were indistinguishable, while the treated bacteria yielded a biofilm with an estimated 90% less mass than the control.

Conclusions/Discussion
Green tea contains high amounts of polyphenols, chemicals with potent antioxidant properties. This widely consumed tea has the potential to be used for a multitude of medical purposes. In administering the diluted green tea extract to the bacteria, an interaction occurred. Almost instantly, the pellet of bacteria within the 2mL test tube had become a dark brown color. Re-suspending the treated bacteria into the BHI media also proved an interaction between the extract and the bacteria occurred because the bacterial pellet became a strongly bonded clump. A time-lapse video ten hours in length also displayed that the green tea extract decreased the individual bacteria cells# ability to stick to one another. These data suggest that green tea has powerful properties in regulating biofilm growth and it is beneficial because it hinders oral bacteria from forming sticky bonds to you teeth and becoming dental plaque.

Summary Statement
My project is an observational study on how dental biofilms form and how the formation of these biofilms can be regulated using diluted Camellia sinensis (green tea) extract.

Help Received
Used laboratory equipment at the UCLA School of Dentistry under the supervision of Dr. Wenyuan Shi and Dr. Renate Lux; Mother helped assemle display board; Father helped conduct lab experiments.