



**CALIFORNIA STATE SCIENCE FAIR
2012 PROJECT SUMMARY**

Name(s) Charulata Sinha	Project Number S1524
Project Title Development of Bacterial Cross-Resistance to Repeated Use of Mouthwash	
Abstract Objectives/Goals My objectives are to determine if oral bacteria will develop cross resistance to other mouthwashes and to antibiotics with repeated use of mouthwash and whether the resistant bacteria can be eliminated or reduced by discontinuing mouthwash use. Methods/Materials The Minimum Inhibitory Concentration (MIC) and the Minimum Bactericidal Concentration (MBC) of the oral bacteria <i>S. Gordonii</i> was determined for four mouthwashes and antibiotic: Listerine, Natural Dentist, Rite Aid, Periogard, and tetracycline (antibiotic). The bacteria were then passaged 18 times: grown in mouthwash at a concentration one less than the MIC value. Resistance was measured by MIC and MBC values of the passaged bacteria, and growth kinetics was determined from turbidimetry measurements. The first set of passages was followed by 18 passages in normal nutrient and the MIC of the double passaged bacteria was determined. Results Self-resistance and cross-resistance to mouthwash and antibiotic was seen in the bacteria grown in all the mouthwashes. The growth curves of the passaged bacteria showed the bacterial strain grown in chlorhexidine did not replicate as efficiently as other bacterial strains. Passages in the normal nutrient restored the antimicrobial sensitivity for bacteria grown in all the mouthwashes except for chlorhexidine. Conclusions/Discussion Repeated passages of mouthwash confer self and cross resistance in <i>S. Gordonii</i> . In three of the mouthwashes the sensitivity of the native <i>S. Gordonii</i> could be regained by repeated passage in normal nutrient.	
Summary Statement Study of bacterial self and cross resistance to anti-microbials and the fitness of the resistant bacteria.	
Help Received Used lab equipment in Professor Kelly Doran's lab at San Diego State University. Consulted with undergraduate and graduate students in Prof. Doran's lab.	