



**CALIFORNIA STATE SCIENCE FAIR
2009 PROJECT SUMMARY**

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Project Title Acid vs. Teeth	
<p style="text-align: center;">Abstract</p> <p>Objectives/Goals Acid is a highly corrosive substance that is in all batteries, many chemicals, and industrial wastes. Surprisingly, it is also on many people's teeth! According to the Mereck Manual of Medical Information, carbohydrates and sugars are the biggest culprits of tooth decay. It states that "all simple sugars including table sugar (sucrose) and sugars in honey (levulose and dextrose), fruit (fructose), and milk (lactose) have the same effect on the teeth. Whenever sugar comes in contact with plaque, streptococcus mutans bacteria in the plaque produce acid." Interestingly, the bacteria and the sugar do not directly cause the tooth decay. It is really the acid, the byproduct resulting from the bacteria consuming the sugars, that causes tooth decay. Acid demineralizes or dissolves teeth and cause tooth decay. Thus, a tooth with decay should weigh less than a tooth without decay.</p> <p>Methods/Materials The process of this experiment is as follows. 80 teeth were gathered and cleaned of all stains, plaque, and debris by special tools such as hand scalers, EMS (electro-magnetic scalers), and polishers. The teeth were blotted dry with lint-free Kim-Wipes tissue and weighed on a Sartorius scale to 0.0001 gram. They were then placed in 10 individual vials in 8 categories and labeled from control (pH7), pH2, pH3, pH4, pH5, pH6, Neutral Sodium Fluoride, and Acidulated Phosphate Fluoride. The teeth were allowed to decay for about 2 months before reweighing them on the same Sartorius scale in the exact same manner.</p> <p>Results According to Dentistry Today (November 2005), "acid pH levels cause tooth surfaces to lose calcium and phosphorous ions" which leads to decay. Acid is able to start to damage teeth once the pH drops below a 5. Acid essentially chelates and dissolves the teeth. The teeth in solutions with pH4, pH5, and pH6 had very little change. But, when the pH level dropped below pH4, the demineralization process occurred at a much faster rate. In fact, there is a 4 fold difference between pH2 and pH6. Our study shows that there is a dramatic increase in demineralization at pH under 4.</p> <p>Conclusions/Discussion In summary, acid does affect the decay of teeth. The more acid there is in the solution, the greater is the amount of decay. The greatest destruction occurs when the pH level drops below 4. Fluoride definitely helps in reversing or minimizing the damaging effect of tooth decay!</p>	
Summary Statement This project examines how various levels of acidity affect the decay or demineralization of teeth.	
Help Received My parents helped me gather the teeth. I borrowed the microgram scale at a lab at UCSF.	