CALIFORNIA STATE SCIENCE FAIR
2002 PROJECT SUMMARY

Name(s)
Lauren A. Baize

Project Number
S1402

Project Title
Can You "Catch" A Cavity? A Study of the Effect of Saliva pH and Oral Strep mutans Levels on Development of Cavities

Abstract

Objectives/Goals
This experiment shows how the ingestion of Coke, a surrogate sugar solution, affects saliva pH and oral Streptococcus mutans levels. Sugar is digested by Strep mutans when it enters the mouth, causing the release of acid. If acid released causes oral pH to drop below the #critical pH# of 5.5 for extended periods, a cavity may form.

Methods/Materials
Measure baseline Strep mutans and pH levels of 10 subjects before the ingestion of Coke, as a control. Then measure pH levels with pH strips immediately after the ingestion of Coke and every 10 minutes for 50 minutes. Measure Strep mutans levels with Dentocult# SM Strep mutans strips 5 minutes after the ingestion of Coke and every 10 minutes for 45 minutes; then incubate Strep mutans vials for 48 hours.

Results
The subjects# average saliva pH level was 7.0 before ingestion of Coke, fell to 4.2 immediately after ingestion of Coke, rose above the critical pH within 20 minutes, and returned to its normal level within 50 minutes. However, the average Strep mutans level did not change after ingestion of Coke, contrary to the hypothesis. People whose saliva pH dropped to 4.0 immediately after ingestion of Coke had, on average, a higher Strep mutans level than people whose saliva pH only dropped to 5.0 after ingestion of Coke. This experiment also showed that subjects# Strep mutans levels did not correlate with the number of cavities they had.

Conclusions/Discussion
The decrease in saliva pH is due to Strep mutans digesting sugar and then releasing lactic acid as a byproduct. My experiment shows no relationship between sugar ingested and Strep mutans levels. Also, because all subjects started with a saliva pH of 7.0, the fact that people with a higher Strep mutans level had a lower average saliva pH level after ingestion of Coke proves that the decrease in pH was not merely due to the slight acidity of Coke. It also proves that increased bacteria in the mouth causes more sugar to be digested, as shown by these subjects# lower pH levels. Lastly, there was no correlation between Strep mutans levels and number of cavities because, although a high Strep mutans level increases one#s vulnerability to cavities, taking preventive measures can reduce one#s risk. Interestingly, all three subjects with sealants had no cavities, even though they had high levels of Strep mutans in their mouths, showing the effectiveness of sealants.

Summary Statement
My project shows how the ingestion of Coke, a surrogate sugar solution, affects oral pH and Strep mutans levels and thus increases vulnerability to cavities.

Help Received
My parents helped buy materials, order Dentocult# SM Strep mutans strips from Finland, and design my display board.