CALIFORNIA STATE SCIENCE FAIR
2009 PROJECT SUMMARY

Name(s)

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Project Number

S1707

Project Title

How to Keep the Dentist Away

Abstract

Objectives/Goals

We hoped to determine the effects of various foods on the growth of oral bacteria, consisting primarily of Streptococcus Mutans, seeing which advanced their growth and which inhibited it providing a clear picture of bacterial nutrition and oral health.

Methods/Materials

In order to test oral bacterial growth, we began a starting culture with bacterial colonies from plaque. We put them into a flask full of liquid Luria broth which we then allowed to grow. After there was enough bacterial growth, we poured the culture in each Petri dish, added the chemical, and allowed it to grow in an incubator at 37C. After 24 hrs of growth, we measured the absorptance in a spectrophotometer. To make the results more accurate, we then subtracted the absorption of a blank with only Luria broth and the chemical added from the data we collected.

Results

The results were varied providing a picture of the diverse nutritional needs of the bacteria we tested. Acids and bases were agreed with our expectations, for the most part decreasing growth as we predicted. Carbohydrates, though, defied our beliefs: white sugar posted only moderate growth. Salts, too, decreased growth, iodized salt especially, due perhaps to the toxicity of iodine. Surprisingly, fats also led to a great decimation of population. This can be attributed to the complexity of triglycerides, especially saturated fats. These findings were echoed in proteins. Spices were more varied in their results, with only one posting a clear decrease: turmeric. Vitamins were a mixed bag as well. Vitamins A and C increased growth, B was neutral, and D and Calcium led to great death. Finally, we tested toothpaste as well. It led to zero growth at all three concentrations, validating its reputation. Our homemade toothpaste was not as successful, yielding moderate decreases at all three levels.

Conclusions/Discussion

As a result, we were able to see what foods were beneficial and detrimental for oral health as well as what nutrients Streptococcus primarily feeds on. We discovered Vitamins A and C, orange juice, etc. advanced bacterial growth, while some like proteins, fats and salts were damaging to the bacteria, and therefore advanced our health. Others were more neutral like cumin, black pepper, and Vitamin B having little effect. In conclusion, we were able to ascertain much information on Streptococcus' metabolism abilities.

Summary Statement

We tested the effects of different foods on oral bacteria and observed which chemicals impeded and encouraged bacterial growth, in order to determine the bacteria's metabolism and nutrional needs.

Help Received

Dr. Malhotra supervised all of our lab work as well as offered feedback on experimental ideas and processes; Dr. Osslund from Amgen and Dr. Jiang from Baxter provided us with Luria Broth; Mr. Hoag gave us equipment and taught us how to properly use it