CALIFORNIA STATE SCIENCE FAIR
2009 PROJECT SUMMARY

Name(s)
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Project Number
S1810

Project Title
Is Fructose Absorption in Humans Improved by the Addition of Glucose?

Abstract

Objectives/Goals
In past experiments, I found that 70 % of human subjects malabsorbed 50.0 g of fructose dissolved in 8 oz of water and that none of the same subjects malabsorbed 29 oz of 7up soda, which contains 50.0 g of fructose and 40.6 g of glucose. I want to prove that it is the glucose in the soda and not the other components in soda (sodium, citric acid, sodium bicarbonate and potassium citrate), that improves the absorption of the fructose in humans.

Methods/Materials
Healthy subjects (without gastrointestinal problems or diabetes) 10 years or older were used for this experiment. A solution containing 50 grams of fructose, 40.6 g glucose and dissolve in 240 ml (8 oz) of water (20% fructose solution) was made. Breath samples were collected from subjects before test begins then were given the test solution and sampled at 30, 60, 120, and 180 minutes. Breath samples were analyzed for hydrogen concentration using a gas chromatograph. A person is considered to malabsorb fructose if the rise in hydrogen exceeds 20 ppm 60 minutes or more after ingesting the given solution, compared to the lowest level of hydrogen in the first 59 minutes.

The materials used included breath collection apparatus, glucose, fructose, and a gas chromatograph

Results
Previous experiments showed that 70% of human subjects malabsorbed 50.0 g of fructose in 8 oz of water. In this study, 0% of the same subjects showed fructose malabsorption when given 8 oz of a solution containing 50 g fructose and 40.6 g glucose. This is consistent with last years experiment where 0 % of subjects showed fructose malabsorption when given 29 oz of 7 UP soda, which contains 50.0 g of fructose and 40.6 g of glucose.

Conclusions/Discussion
This experiment confirms the hypothesis that it is the glucose and not other components in the soda (sodium, citric acid, potassium citrate, sodium bicarbonate) that improves the absorption of fructose in humans. The addition of glucose could be used to improve the absorption of fructose in humans in high fructose containing foods and reduce symptoms of malabsorption (abdominal pain, gas, diarrhea, and bloating) from these foods.

Summary Statement
Fructose absorption in humans is improved by adding glucose.

Help Received
Used equipment at California Digestive Disease Center under the supervision of Dr. Judy Davis.