



CALIFORNIA STATE SCIENCE FAIR 2011 PROJECT SUMMARY

Name(s) Nicholas C. Wilbur	Project Number 31526
Project Title Which Carbohydrate Metabolizes the Quickest in a Type 1 Diabetic?	
Objectives/Goals I investigated how rapidly carbohydrates are metabolized in a Type 1 Diabetic. I chose this topic because my brother & I both have Type 1 Diabetes and suffer from low blood sugars daily. With this project I can see which carbohydrates raises my blood sugar the quickest and how long it takes for the increase to occur. This will help me understand how long it takes my body to recover from a low blood sugar and be able to return to normal activities. Abstract I investigated how rapidly carbohydrates are metabolized in a Type 1 Diabetic. I chose this topic because my brother & I both have Type 1 Diabetes and suffer from low blood sugars daily. With this project I can see which carbohydrates raises my blood sugar the quickest and how long it takes for the increase to occur. This will help me understand how long it takes my body to recover from a low blood sugar and be able to return to normal activities. Methods/Materials I tested 3 different carbs to determine which would metabolize into blood glucose the fastest. For each of the liquids, I used the following procedure: 1. Test blood sugar. If blood sugar is 150 or below, proceed with experiment. 2. Drink 15 grams of carbohydrate (Gatorade, Chocolate Milk, or Orange Juice) 3. Retest blood sugar after 10, 20, 30 and 40 minutes 4. Graph the change in blood glucose levels vs. time to determine which liquid raises blood glucose levels the fastest. I also used water as a control group to ensure that my basal insulin rate was set correctly and my blood sugar remained constant during the test periods. Results The tests with water confirmed that my basal rate was correct and my blood sugar remained constant. The tests with each of the carbohydrate liquids showed that there was a time lag between when I drank the liquid and when it metabolized into blood glucose. Of the three liquids I tested, Orange Juice caused my blood sugar to rise the quickest. Conclusions/Discussion In my tests, Orange Juice caused my blood glucose to rise the quickest. This was a surprise and contradicted my hypothesis that Gatorade would be the quickest. During my research, I investigated the Glycemic Index. This indicated that Gatorade should be metabolized the quickest. I'm not sure why my results failed to match the predictions in the Glycemic Index, except to say that there is always a lot of variability in how carbohydrates are metabolized in a Type 1 Diabetic. That's one of the reasons it is so hard to maintain good blood sugar control. The most surprising result was how long it took to metabolize the carbs. Observing this has made me understand that I have to test my blood sugar at least 20 minutes before I try and do any critical activities, like taking tests or playing sports, so that if I am low, I can drink some carbs and get my blood sugar back to normal before the event starts.	
Summary Statement This project analyses how rapidly various carbohydrates are metabolized by a Type 1 diabetic.	
Help Received My Endocrinologist helped me design the testing protocol & my parents helped me put together my board.	