

# Glucose Monitoring and Homeostasis

## Objective:

To explain in words or with diagrams, the body's glucose response to consuming foods with varying glycemic indexes, at the level of 85% proficiency for each student.

In order to achieve this objective, you will need to be able to:

1. Examine changes in blood glucose in response to food with varying glycemic index.
2. Examine over time the body's response to consuming food with a high glycemic index and food with a low glycemic index.

## Materials:

### Group Materials:

- isopropyl alcohol
- cotton balls
- Paper cup
- Glucose monitor kit

### Lab Materials

- 1/2 qt orange juice
- 1 qt non-fat milk
- 1 package whole wheat bagels
- Sharps container
- Biohazard bag

## Background:

The **glycemic index** (GI) of a food is a measure of how much a given quantity of carbohydrates in that food raise a person's blood glucose level relative to the same quantity of glucose. A food with a high glycemic index will have a larger effect on blood glucose. The **glycemic load** (GL) of a food, in addition, takes into account the quantity of carbohydrates in a serving of that food.

You may find these links of interest:

<https://lpi.oregonstate.edu/mic/food-beverages/glycemic-index-glycemic-load>

<https://ndb.nal.usda.gov/ndb/nutrients/index>

## Methods:

We will work in groups of four with one or two subjects in each group measuring their blood glucose and consuming a designated food. Blood glucose is measured using a drop of blood from a finger prick and a blood glucose meter.

In this lab safety lancets are used to obtain blood samples.

- Students are permitted to handle only their own blood.
- “Finger-stick” devices (safety lancets) must be placed in the Sharps Container after use.
- Cotton balls, and items exposed to blood must be placed in the Biohazard Bag

Safety concerns are outlined here:

- U.S. Food and Drug Administration  
<https://www.fda.gov/MedicalDevices/ProductsandMedicalProcedures/HomeHealthandConsumer/ConsumerProducts/Sharps/default.htm>

Procedures for using safety lancets, obtaining blood samples, and using the glucose meters will be described in class.

Accepted procedures for handling “finger-stick” devices (including safety lancets) and using them to obtain blood samples are outlined in:

- Lab\_Appendix\_A from my website  
[https://www.dgward.com/pdf/physo101/Lab\\_Appendix\\_A\\_finger-stick.pdf](https://www.dgward.com/pdf/physo101/Lab_Appendix_A_finger-stick.pdf)

An Accu Chek Aviva blood glucose meter is used to measure blood glucose. Excerpts from the user’s manual are reproduced in:

- Lab\_Appendix\_B from my website  
[https://www.dgward.com/pdf/physo101/Lab\\_Accu\\_Chek\\_Aviva.pdf](https://www.dgward.com/pdf/physo101/Lab_Accu_Chek_Aviva.pdf)

Baseline (0 min) levels of blood glucose will be obtained for all subjects. Each subject will then consume a designated food, each measured to contain 20 grams of carbohydrates. Each subject will then measure blood glucose at 15 minutes, 30 minutes, and 60 minutes following consumption. Record the blood glucose levels at each time in Table 1, on the next page.

## Results

Table 1 – Glycemic Index and Blood Glucose

Foods with various Glycemic indexes	Serving size for 20 g carbohydrates		Time after consumption – Glucose in mg/dl			
			0 min	15 min	30 min	60 min
Orange Juice	28.7g / 245 mL = <b>171 mL</b>	S1				
		S2				
Non Fat Milk	12.5g / 245 mL = <b>392 mL</b>	S1				
		S2				
Wheat Bagel	48g / bagel (98g) = <b>0.4 bagel (40 g)</b>	S1				
		S2				

## Discussion

1. Determine the relative glycemic index of each of the foods consumed.
2. Explain the time course of the changes in blood glucose associated with each food.
3. Speculate how Insulin may be affecting the levels of blood glucose seen.