

# The Effects of Glycemic Index on Postprandial Blood Glucose

Department of Health and Human Performance The College of Idaho, Caldwell 83605

Emma Swindlehurst, Kabre C. Madrigal, & Matthew J. Laye



## Abstract:

The incidence of Type 2 diabetes (T2D) has increased over the years. Many studies show that exercise is important to the reduction of this disease. However, less is known regarding the potential to decrease post-prandial blood glucose, and the incidence of T2D with low glycemic meals. The objective of this study was to assess the effects of low glycemic index meals versus high glycemic index meals on post-prandial blood glucose. At baseline, subjects (n=7) were assessed for fasting blood glucose and then given either a high or low glycemic index meal. Blood glucose values were assessed every 10-15 minutes over 90 minutes. Comparison of low versus high glycemic meals were assessed using paired T-tests. The high glycemic index meal was associated with a higher post-prandial blood glucose response compared to the low glycemic index meal ( $p < 0.05$ ). In this pilot-level study it was determined that blood glucose levels can be modified by glycemic indexed meals. Consumption of a low glycemic index meal may be a helpful regulator of the glucose response, in particular for those at risk for T2D. Future research may consider the potential additive effect that glycemic index meals and exercise combined have on the glucose response.

## Background:

- Metabolic conditions such as diabetes are on the rise worldwide. Diabetes occurs when the pancreas are unable to produce insulin.
- Glycemic Index of a meal refers to the amount of carbohydrates in the food according to how the meal effects blood glucose levels, a glycemic index of glucose being 100.
- Meals with a lower GI are more slowly digested, absorbed, and metabolized.

## References:

Solomon, T., Eves, F., Laye, M. Targeting postprandial hyperglycemia with physical activity may reduce cardiovascular disease risk. But what should we do, and when is the right time to move? *Frontiers in Cardiovascular Medicine*. 5, 99

## Subjects:

- 19-22 years of age
- No known metabolic conditions
- Normal BMI
- General good health
- All participants signed a standardized consent form, were made aware of any possible risks associated, and were given contact information for the faculty advisor and Dean of Students.

## Methods:

- Subjects (n = 7)
- Two tests per high and low GI meal condition (Table 1)
- Exercise bout was thirty minutes walking at an intensity of their choosing. Intensity was kept constant.
- Post-exercise intervention, the subject was seated for the remainder of the test.
- The high GI meal consisted of white bread, Frosted Flakes™, margarine, & skim milk.
- The low GI meal consisted of All-Bran cereal & whole milk.
- A paired, two-tailed t-test of means was used to compare the effects of high glycemic and low glycemic meals of blood glucose.

**Table 1.** Composition of high glycemic and low glycemic meals, along with their amounts in grams, respective caloric values, and their glycemic index ranking relative to glucose.

Meal Condition	Total kcal	Fat Cal	Pro Cal	CHO Cal	GI of Meal
Breakfast A (LGM)	452.7	99.9	81.6	271.2	38
	% macronutrients	22%	18%	60%	
Breakfast B (HGM)	455.2	98.3	82.8	274.1	68
	% macronutrients	22%	18%	60%	

## Results:

- The average post prandial blood glucose was significantly different between the high glycemic and low glycemic meals (Paired t-test,  $p < 0.05$ ).

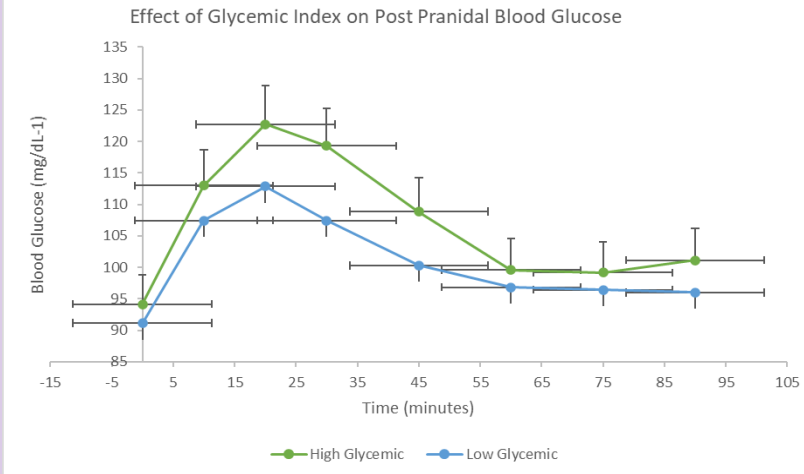


Figure 1: Represents the average blood glucose as a function of the two conditions. There was a significant difference between low glycemic index and high glycemic index ( $p < 0.05$ ,  $n=7$ ,  $t\text{-test}=0.001646$ ).

## Discussion:

- We fail to reject our null hypothesis that there is no significant difference between the effects of high and low glycemic index on blood glucose.
- Limitations include a small sample size and variability between the subjects. Therefore, further research is recommended.