
The Glycemic Index and Athletes

What Is the Glycemic Index?

The glycemic index (GI) was developed by David Jenkins and colleagues in the early 1980s as a way of classifying and ranking the effects of specific carbohydrate foods on blood glucose response. The GI was a departure from the classification of carbohydrates into just two groups: simple vs complex. Today, the GI is the basis of several popular diets and the source of much controversy in the nutrition world.

To determine the GI for a specific food, a fasting subject is given a 50-g dose of that food, then the blood glucose response (the area under the blood glucose curve) is measured and compared with the area under the curve for the reference food (white bread or glucose). Thus, the GI reflects the rate of digestion and absorption of carbohydrate-containing foods (1).

On the glycemic index, foods are generally divided into three categories:

- High GI (≥ 70)
- Medium GI (56-69)
- Low GI (≤ 55)

Pros and Cons of Using the Glycemic Index With Athletes

The glycemic index can be used as a tool to help athletes select appropriate foods for specific types of activity (1).

Advantages of Using the GI

- Research suggests that endurance athletes may benefit from eating low-GI foods before exercise because these foods release glucose slowly into the bloodstream, which sustains blood glucose levels (2,3).
- During prolonged exercise, consuming foods or fluids with a medium or high GI may promote carbohydrate oxidation, thereby sustaining blood glucose levels.
- After exercise, consuming foods and fluids with a high GI may promote rapid glycogen repletion.

Disadvantages of Using the GI

The drawbacks of using the GI with athletes include the following:

- The glycemic index is a simple classification system of food portions with 50 g carbohydrates. It is not always a valid way to select foods. For example, carrots have a high GI, but to get 50 g of carbohydrate from carrots, a person would have to eat 1½ pounds—hardly a realistic portion size!

- The GI measures blood glucose response to individual foods. However, mixing foods, as people will do in a typical meal, may blunt the glucose response to high- or low-GI foods.
- Even within a specific food category (eg, energy bars), the GI varies from product to product. The form of the food, the degree of food processing, and the presence of a variety of sugars all affect the GI (1).
- The GI has not been established for all foods. The GI is not known for many foods that athletes are likely to consume (eg, energy bars, gels, and drinks).

Practical Applications

- Use the GI as a tool to help an athlete select foods to try in training (eg, low-GI foods before exercise and high-GI foods for recovery after exercise). It is important to find out what works best for an individual athlete.
- Help athletes look beyond the GI when choosing foods. Encourage carbohydrate choices that are nutrient-dense, taste good, are portable and affordable, do not cause gastrointestinal upset, and are easy to prepare (1).
- Stay current on the sports nutrition research on GI. Don't rely on the advice given in popular diet books. Read the studies that use athletes as subjects, and apply that research to your practice.

The Glycemic Load

The glycemic load may be a more useful tool than GI. The glycemic load provides a measure of the total glycemic response to a meal, using portions that the individual actually eats, not amounts with 50 g carbohydrate.

To calculate the glycemic load use the formula (2):

$$\text{GI (\%)} \times \text{g carbohydrate per serving}$$

A low glycemic load is ≤ 10 ; a medium glycemic load is 11 to 19; and a high glycemic load is ≥ 20 (3).

Glycemic Index Values for Selected Foods and Drinks

High GI (GI > 70)*	Medium GI (GI 56-69)*	Low GI (GI ≤ 55)*
Angel food cake	Apple juice	Apples
Bagels	Ensure	Apricots
Bananas (ripe)	Green peas	Cashews
Corn	Ice cream	Cherries
Corn chips	Linguine (thick)	High-fiber breakfast cereals (100% wheat bran)
Cranberry juice cocktail	Macaroni	Hummus
Doughnuts	Milk (whole, 2%, or nonfat)	Grapefruit
English muffins	Oranges	Ironman PR bar
Fruit roll ups	Parboiled or converted rice	Peanuts
Honey	Pineapple juice	Peanut M&Ms
Jelly beans	Rye bread	Yogurt (nonfat)
Linguine (thin)	Soy milk	Yogurt (sugar-free)
Most ready-to-eat breakfast cereals	Spaghetti	
Pita bread		
Popcorn		
Potatoes		
Power bars		
Pretzels		
Rice (basmati, long grain)		
Soft drinks (sugar-sweetened)		
Sport drinks		
Vanilla wafers		
Waffles		
Wheat bread		

*Using white bread as the reference food

Source: Data are from references 4 through 6.

References

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