



An Update from the Water  
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# Glycemic Index: a lesson in timing

## Carb-rich foods

### *High GI*

glucose  
sugar  
honey  
corn flakes  
baked potato w/o skin  
instant mashed potatoes  
sports drinks  
soft drinks  
white bread  
watermelon  
rice (low amylose, white)  
Gu  
Power Gel  
sucrose

### *Moderate GI*

fructose  
muesli cereal  
muffins  
rice (high amylose, basmati)  
ice cream  
ripe banana  
orange juice  
Power Bar, Cliff Bar

### *Low GI*

whole grains  
most vegetables  
whole-grain bread  
bagels  
All-Bran cereal  
milk  
flavored yogurt  
unripe banana  
apple  
wheat pasta  
brown rice  
beans  
lentils

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The need for carbohydrates to optimize sports performance is well-known, but what kinds of foods are best and when should we eat them? High intensity exercise requires pre-exercise storage, during-exercise availability and post-exercise restoration of muscle glucose energy. Carbohydrates have traditionally been divided into simple carbohydrates (so-called “bad” carbs) — foods causing large, rapid changes in blood sugar levels — and complex carbohydrates (“good” carbs) — more nutritious, fiber-containing foods yielding a sustained blood sugar level. But these categories can be misleading as some simple carbohydrates (fructose) produce a flattened blood sugar curve while other complex carbs (wheat bread) cause a rise in blood glucose.

A more useful way to define carbohydrate foods for enhanced sports performance is by their glycemic index (GI). The GI is a ranking of foods based on their blood sugar response compared to a reference food, glucose or white bread. This index more accurately reflects the rate of digestion and absorption which can be affected by such things as particle size, degree of food processing, fat or protein interactions and the presence of (lower GI) fructose or lactose. See the Glycemic Index Table (left) for a ranking of common foods and see why they are often hard to categorize.

We now know about GI — so what about timing? The following are recommendations for timing ingestion of GI-ranked carbohydrates to promote better utilization and greater energy potential, especially in prolonged moderate-intensity exercise.

**PRE-EXERCISE:** Eat low GI foods for sustained availability, especially important when serial events don't allow for re-fueling or when it is difficult to stop during an event to take in more energy.

Whole grain bagels, unripe bananas are ideal. Finish ingesting calories an hour before exercise to avoid spiking blood sugar and burning up the precious store of carbs before you start.

**DURING EXERCISE:** Take in moderate-to-high GI foods or drinks — ripe bananas, Gatorade, Cyto-max, sport drinks, sport gels (GU), Hammer Gel, Power Gel and e-Gel. And don't forget the water!

**POST-EXERCISE:** Eating carbohydrate-rich foods will help “super-saturate” muscles with glycogen for use in the next competition. High GI foods can be used as a “treat” (sports drinks, baked potato, candy bar), but low GI carbohydrates will burn fat longer and are better for overall health.

Consuming carbohydrate foods within 60 minutes of exercise can elevate blood insulin, suppress fat utilization and increase the using up of precious stored muscle glycogen. This response is transient and doesn't usually effect endurance, but becomes more symptomatic in short, high-intensity events. For the athlete who may experience exaggerated responses to blood sugar levels, timing and low GI foods could prove pivotal to performance.

Post-exercise, this insulin response can be a plus, stimulating increased glucose uptake in the muscle; the first 30 minutes following exercise is the optimum window. The amount of carbohydrate-rich foods is also critical — ideally 1/2 gram of carbohydrates per pound of body weight. This strategy works well for quick rebound during multiple events in the same day. Experiment with different GI foods and the timing of meals to see what program works best for you.

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