

[IMAGE]

## Keep Your Body Energized

### By understanding how the foods you eat affect how your body functions

By Peter W. Crownfield

Obesity is rapidly becoming a national epidemic. If you can't tell just by looking around, consider these ominous statistics from the Centers for Disease Control and Prevention (CDC). In 1995, no U.S. state had an obesity rate *higher* than 20 percent, while a mere 10 years later, only four states had obesity rates *lower* than 20 percent. In short, more Americans are getting fatter - a disturbing trend, to say the least, particularly when one considers the potential health consequences, such as diabetes, cardiovascular disease and some forms of cancer.

Are there secrets to avoiding obesity? Exercise certainly plays an important role; however, there's no doubt sound nutrition is the logical place to start. Diet plans are a proverbial dime a dozen, with limited success rates in the long term. Maintaining a safe weight begins not by jumping on the latest diet craze (and then the next one), but by understanding *how the food you eat affects your body*.

An energetic man and woman flinging their arms in the air. - Copyright © Stock Photo / Register Mark Food is composed of three basic nutrients: carbohydrate, protein and fat. The body needs all three in moderate amounts to function properly. For the purpose of this discussion, let's focus on carbohydrates and delve first into a concept many have heard about, but few have a complete understanding of: the glycemic index.

#### What Is the Glycemic Index?

A tall stack of begals. - Copyright © Stock Photo / Register Mark The glycemic index (GI) is a ranking of carbohydrates based on their immediate effect on glucose (blood sugar) levels. Glucose is assigned a value of 100, while other carbohydrates are ranked relative to glucose. Essentially, carbohydrates that break down rapidly during the digestive process have the highest GI values. The blood glucose response is fast. On the other hand, carbohydrates that break down slowly and release glucose gradually into the bloodstream have low GI values.

The standard method of calculating the GI value of a particular food is to measure blood sugar while fasting (not eating for at least eight hours), and then two to three hours after consuming the food.

### **The Bigger Picture**

Your body requires glucose for energy. When a food is being digested, enzymes in your stomach break down carbohydrates into glucose, which is then absorbed into your bloodstream. Your pancreas responds to the glucose surge by releasing insulin, which allows glucose to travel to the liver, where it is distributed to our body's cells for energy. Excess glucose is stored as glycogen and reconverted to glucose if blood sugar levels fall and more energy is required.

In general, this is the normal, healthy picture of the blood glucose response. The body breaks down carbohydrate slowly, insulin is released slowly, and the liver delivers sustained energy for your daily activities. It also means you shouldn't get hungry too soon after eating.

However, consider what happens if you consume too much carbohydrate, especially carbohydrate with a high GI value. The body breaks the carbohydrate down rapidly, flooding the bloodstream with glucose, which triggers a rush of insulin - too much insulin. The insulin disperses not just the glucose from the food you've just eaten, but much more, which causes blood sugar to drop lower than it should. As a result, those hunger pangs arrive sooner than they should. Not to mention that if you consume too much carbohydrate (excess energy), the body could store it as fat.

A healthy body maintains a blood glucose level somewhere in the range of 60-120 mg/dl at all times. Of course, levels are generally higher immediately after eating, and lower first thing in the morning.

### **GI Values of Common Foods**

- Low-GI foods (55 or less). Examples: most fruits and vegetables (except root vegetables), oats, buckwheat, whole barley.
- Medium-GI foods (56-69). Examples: candy, croissants, brown rice.
- High-GI foods (70 or higher). Examples: corn flakes, white bread, white rice.

It's important to note that the impact a food has on blood sugar may depend on not just the food, but also factors such as ripeness, cooking time, time of day consumed, blood insulin levels and recent physical activity. Take the potato as an example. In a recent study (*Journal of the American Dietetic Association*,

2005), researchers tested seven different potato-based meals, each providing 50 grams of available carbohydrate. GI values differed markedly based on the type of potato and method of preparation:

- Russet potatoes cooked in a microwave: GI of 76.
- Instant mashed potatoes: GI of 87.7.
- White potatoes, cubed and oven roasted: GI of 73.
- White potatoes cooked in a microwave: GI of 72.
- Red potatoes, cubed and boiled: GI of 89.
- Red potatoes, cubed, boiled, refrigerated 18 or more hours, and then eaten cold: GI of 56.
- Frozen French fries baked in a conventional oven: GI of 63.

### **Another Consideration - Glycemic Load**

Glycemic load (GL) takes the GI into account, but rather than merely indicating how rapidly a particular carbohydrate turns into sugar, GL also factors in how much of that carbohydrate exists in an average serving of food. For example, while dates are at the upper end of the GI spectrum (103), they don't contain very much carbohydrate. Thus, the per-serving GL for dates is only 42. And while peanuts have one of the lowest GI values (14), they contain so little carbohydrate (peanuts are mostly protein and fat) that their GL per serving is only 1.

In general, foods with a GL above 20 are considered high-GL foods; a value of 11 to 19 is considered medium, and 10 or less is considered low. Foods with a low GL almost always have a low GI. However, foods with an intermediate to high GL may have a very low or very high GI, or somewhere in between.

### **Diabetes - Glucose Metabolism Gone Bad**

Three apples stacked up with a pear on the top. - Copyright © Stock Photo / Register Mark According to the American Diabetes Association, nearly 21 million U.S. adults and children suffer from diabetes, a disease characterized by inadequate glucose metabolism. With type 1 diabetes, the pancreas doesn't secrete insulin at all. As a result, glucose has no way of getting into the body's cells to be used as energy, and blood sugar levels stay high. With type 2 diabetes, the pancreas can secrete insulin, but not enough to meet your body's needs. In both cases, glucose builds up in your bloodstream, rather than reaching the body's cells.

While normal blood glucose levels range between 60-120 mg/dl, levels generally are much higher in diabetics. A diabetic's fasting blood glucose level - the amount of blood glucose that remains in the bloodstream even after not eating for eight-plus hours) - is 126 mg/dl or higher, and their two-hour blood glucose level - the amount of glucose in the bloodstream two hours after consuming a carbohydrate-rich beverage - is 200 mg/dl or higher.

Because glucose stays in the bloodstream, rather than being made available to cells, diabetics can suffer a variety of health problems, including poor circulation and blood flow. Among the worst potential complications are nerve damage, blindness, cardiovascular disease and stroke.

### **What It All Means**

All in all, the GI index is considered important for a number of reasons, particularly with respect to the benefits of consuming low-GI foods:

- Low-GI foods keep you fuller for longer.
- Low-GI foods cause a smaller rise in blood glucose levels following meals.
- Low-GI diets can help you lose weight.
- Low-GI diets can improve the body's sensitivity to insulin.

And according to the authors of a 2002 study published in the *American Journal of Clinical Nutrition*, "sufficient, positive findings have emerged to suggest that the dietary glycemic index is of potential importance in the treatment and prevention of chronic diseases."

However, bear in mind that carbohydrates are the body's primary source of fuel. That's undeniable. Sometimes, you need a rush of energy - in the form of a high-GI food - to give you that extra boost. Think of the athlete who requires not only sustained, low-GI-derived energy to compete, but also the occasional high-GI burst of energy (energy bar, sports drink, etc.). During a performance activity, low-GI foods won't break down quickly enough to provide immediate energy to hard-working muscles.

**The Bottom Line:** Healthy eating requires consideration of much more than just high- and low-GI/GL foods - but the underlying premise is important: providing balanced, sustained nutrition that the body can utilize effectively to generate energy, build muscle, repair tissue, fight infection and perform a host of other vital functions.

<b>GI Values for Selected Foods Relative to Glucose</b>			
<b>FOOD</b>	<b>GLYCEMIC INDEX (Glucose=100)</b>	<b>SERVING SIZE</b>	<b>CARBOHYDRATE per serving (g)</b>
Dates, dried	103	2 oz.	40
Cornflakes	81	1 cup	26
Jelly beans	78	1 oz.	28
Puffed rice cakes	78	3 cakes	21
Russet potato (baked)	76	1 medium	30

<b>FOOD</b>	<b>GLYCEMIC INDEX (Glucose=100)</b>	<b>SERVING SIZE</b>	<b>CARBOHYDRATE per serving (g)</b>
Doughnut	76	1 medium	23
Soda crackers	74	4 crackers	17
White bread	73	1 large slice	14
Table sugar (sucrose)	68	2 tsp.	10
Pancake	67	6" diameter	58
White rice (boiled)	64	1 cup	36
Brown rice (boiled)	55	1 cup	33
Spaghetti, white; boiled 10-15 min	44	1 cup	40
Spaghetti, white; boiled 5 min	38	1 cup	40
Spaghetti, whole wheat; boiled	37	1 cup	37
Rye, pumpernickel bread	41	1 large slice	12
Oranges, raw	42	1 medium	11
Pears, raw	38	1 medium	11
Apples, raw	38	1 medium	15
Skim milk	32	8 fluid oz.	13
Lentils, dried; boiled	29	1 cup	18
Kidney beans, dried; boiled	28	1 cup	25
Cashew nuts	22	1 oz.	9
Peanuts	14	1 oz.	6

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