

Macronutrients

Understanding carbohydrates

***F**oods which contain carbohydrates, or carbs, as they are affectionately known, provide us with energy. We can make energy from protein and fat, but this is not the most efficient way for our body to produce energy. The carb family consists of fruits, starchy vegetables, beans, and legumes.*

Simple and Complex Carbohydrates

There are two forms of carbohydrates: sugars and starches. Sugars in the form of monosaccharides or disaccharides are generally found in fruit and dairy products. Carbohydrates from sugars are called simple carbohydrates. Polysaccharides or starchy carbs are found in grains, starchy vegetables and legumes. Starchy foods are referred to as complex carbohydrates.

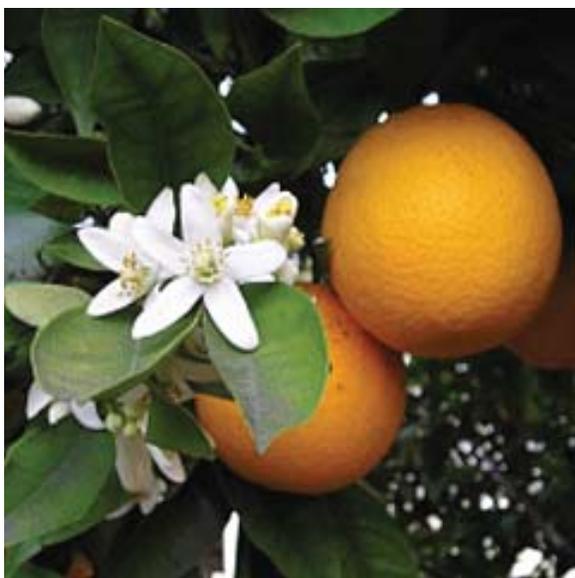
All of the carbohydrates, whether they come from fruit, dairy products, grains, starchy vegetables or legumes are converted into glucose in the gut. When glucose enters the bloodstream from the gut it is used as energy in the cells, stored as glycogen in the liver and muscles, or converted to fat for storage.

Glucose: Fuel for Life

Glucose is like gasoline for the body. Cars need gas to fuel the engine and the body needs glucose to fuel the cells. Cars need gasoline to be delivered efficiently to the engine where it combines with oxygen and is converted to energy for power. The same principle is true of our metabolism. We convert glucose and oxygen in our cells to produce energy.

The Glycemic Index

The Glycemic Index indicates how quickly the consumption of carbohydrates raise the blood sugar level in a period of two hours. While this is a simplistic way to measure reactions to carbohydrates it does point out some very important principles about blood sugar levels.



All of the carbohydrates on The Glycemic Index are measured against how quickly plain glucose, eaten as tablets, would raise the blood sugar in two hours. Glucose has the highest rating on The Glycemic Index. This means that glucose raises the blood sugar more quickly than any other food.

In 1981, David Jenkins, whose tests led to the publication of The Glycemic Index, discovered that starches had a high Glycemic Index. When a person ate a piece of bread the blood sugar rose quickly. Compared to glucose tablets a piece of bread caused the blood sugar to rise about two thirds as quickly as plain glucose. Jenkins found that many starches such as rice, potatoes and corn also caused quick rises in blood sugar.

When a person drank a glass of orange juice or ate certain fruits, like peaches or nectarines, the blood sugar rose at about half the rate as glucose tablets. What accounts for the slower rise in glucose in fruits compared to grains and starchy vegetables? Isn't orange juice full of sugar?

The power of fructose

Foods containing complex carbohydrates, such as corn, rice and wheat, convert very quickly to pure glucose in the gut and this glucose then enters the blood stream. Pure glucose causes a quick rise in blood sugar. In response the pancreas secretes large amounts of insulin to lower blood sugar levels. If there is too much insulin in circulation the blood sugar drops to below normal. The simple carbohydrate found in fruit, on the other hand, takes longer to convert its sugars into both glucose and fructose. This is a key factor in regulating blood sugar levels. Fructose has a very low Glycemic Index, and it has the ability to inhibit the rise of insulin in the blood. While we need some insulin to carry glucose into the cell and keep blood glucose normal too much insulin causes lowered blood glucose levels. Lowered blood sugar levels can cause a host of negative side effects including increased hunger, fatigue, and irritability.

Fruit also contains many valuable minerals that are required for glucose delivery into the cells. For example, potassium plays a vital role in the delivery of glucose into the cells without causing the drop in blood sugar levels that happens when insulin alone is used to perform this function. (Ray Peat, PhD, Glycemic, Starch and Sugar in Context, Ray Peat Newsletter, July 2003)

The key to maintaining normal blood sugar levels is the type of carbohydrate we eat. Because of the way its sugars are converted to energy in the body the sucrose found in fruit is much better than glucose found in starches in keeping blood sugar levels normal.

Carbohydrates & Protein— An essential combination

Balancing the amount of protein, carbohydrate and fat we eat contributes to the production of steady lasting energy. Carbohydrates raise blood glucose levels and cause the pancreas to secrete insulin to maintain homeostasis. Protein foods such as eggs, meat and fish contain no glucose. Protein stimulates the pancreas to secrete insulin because insulin is required to deliver protein to the cells. This is done without raising blood sugar levels.

It is a little known fact that insulin is required for the delivery of protein to the cells. The dramatic importance of this biochemical process is that eating protein alone may lower blood sugar levels. Lowered blood sugar brings on anxiety, irritability, fatigue and many other stress-related symptoms. These symptoms can be caused by the release of the stress hormone adrenalin when blood sugar is suppressed. It is important to eat carbohydrates with protein to offset the tendency of protein to lower blood sugar and raise adrenalin.

Many people try to lose weight on high protein regimes such as the Atkins Diet. These dieters often complain of fatigue and irritability while on the program. Their blood glucose levels may be quite low due to the large amounts of proteins they are eating without adequate carbohydrate to maintain steady blood sugar levels. Most of the books written about blood sugar and its effect on the body emphasize the fact that grains and starchy vegetables cause spikes and dips in blood sugar. It may come as a surprise to people following a high protein diet to find out that they are also riding the blood sugar roller coaster by not eating balanced meals.

The key to creating steady lasting energy is to eat protein, carbohydrate and fat at each meal. Fat slows down the entrance of protein and glucose into the bloodstream. Proteins and carbohydrates work synergistically to maintain balanced blood sugar.