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Beyond the Glycemic Index - The Glycemic Load

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Almost a year ago, we discussed the important of the glycemic index (GI) of foods. The entire discussion of glycemic index revolves around the need to maintain a normal insulin level in the body. Insulin - a hormone produced by the pancreas and which helps regulate your blood sugar - also has many negative side effects. (see The Examiner May 29, 2003 and June 5, 2003 for an in-depth discussion of the effects of insulin) The control of your insulin levels has important implications for the prevention and treatment of the major causes of morbidity and mortality in western countries, including Type II (non-insulin-dependent) diabetes, coronary heart disease, and obesity.

The principle source of "sugar" in your diet is carbohydrates. There is also some "sugar" which is produced by a process called "gluconeogenesis" (the "genesis" of "new" sugar from other food classes such as protein) Sugar is one of the major food sources of energy, along with fat in your diet. At least 55% of energy should be derived from carbohydrate and the bulk of those carbohydrate foods should be those rich in dietary fiber (non-starch polysaccharide and with a low glycemic index.

Let's review what the glycemic index (GI) is, and why has it become so important? The GI is a method used to classify foods according to their blood glucose-raising potential. The glycemic index compares the level of blood sugar after equal carbohydrate portions of foods are consumed. You may be surprised at what is a carbohydrate. The following foods are made up almost completely of carbohydrates: Pasta, Sweets, Fruits, and Vegetables. One way of thinking of what a carbohydrate is is the statement, "Carbohydrates grow in the ground and don't move around!" There are exceptions to this such as soy, peanuts and beans which have high protein content but generally it is true. And, of course, you could argue that many fruits grow on trees, but the trees are in the ground and do not move around.

At one time it was thought that all carbohydrates were equal in their effect on blood sugar but that was found to be wrong. Therefore, nutritionists developed the glycemic index concept to help us all know what effect the foods we eat will have on our health. Here are several principles which will help you understand more about carbohydrates:

1. Not all carbohydrates affect insulin secretion equally.

2. Complex carbohydrates must be broken down into simple sugars which eventually enter the bloodstream as glucose therefore they generally have a lower glycemic index because they enter the bloodstream slowly and affect the blood glucose level and the insulin response less than simple carbohydrates. Some complex carbohydrates, such as potatoes, have a relatively low glycemic index when eaten raw but have a very high glycemic index when cooked. Other vegetables such as black beans have the same result from slow and extended cooking in soups.
3. High levels of blood sugar trigger insulin secretion.
4. Fiber is a carbohydrate but cannot be broken down into simple sugars and therefore will have no impact on insulin.

When a food product lists the carbohydrate on the label, the Insulin-stimulating carbohydrate content equals the amount of carbohydrate a food source contains minus its fiber content. For instance:

1. Pasta (1 cup cooked) has 40 grams of carbohydrate but 2 grams of fiber -- the insulin-stimulating carbohydrate is 38
2. I medium apple has 20 grams of carbohydrate but 4 grams of fiber -- the insulin-stimulating carbohydrate is 16
3. I cup of broccoli has 7 grams of carbohydrate but 4 grams of fiber -- the insulin-stimulating carbohydrate is 3

You have to eat 12 times as much broccoli to have the same insulin stimulation affect as 1 cup of cooked pasta. This is why:

1. Starches and grains are considered high-density carbohydrates.
2. Fruits are medium-density carbohydrates
3. Vegetables are low-density carbohydrates

The "denser" the carbohydrate, the higher the glycemic index when eaten.

Glycemic Index

Simple and complex carbohydrates can be deceiving. Some simple carbohydrates such as fructose (the sugar in fruit) enter the bloodstream as glucose very slowly. Some complex carbohydrates such as potatoes entered the bloodstream faster than table sugar. There are three factors that affect the glycemic index of a particular carbohydrate:

1. The amount of fiber (especially soluble fiber) it contains
2. The amount of fat, the more fat consumed with the carbohydrate, the slower the rate of entry into the bloodstream
3. The composition of the complex carbohydrate itself.

The greater the amount of glucose it contains, the higher the glycemic index; the more fructose it contains, the lower the glycemic index.

The problem with the glycemic index is that to determine it, a person had to consume a sufficient amount of carbohydrates (usually 50 grams) to see a rise in blood sugar. For most vegetables, it is simply too difficult to consume this amount of carbohydrate. For steamed broccoli you would have to consume 16 cups. Therefore, nutritionist began looking at a concept called "Glycemic Load."

Glycemic Load

The glycemic load is the actual amount of an insulin-stimulating carbohydrate consumed multiplied by the glycemic index for that carbohydrate. A healthy diet is obtained through insulin moderation which can best be achieved by consuming primarily low-density carbohydrates that also have a low-glycemic index. Look at the following comparison.

1. Pasta -- 1 cup, glycemic index 59, glycemic load 3068.
2. Apple -- 1, glycemic index 54, glycemic load 972
3. Broccoli -- 2 cup, 50 (estimated), glycemic load 150

Even with a similar glycemic index, the pasta generates twenty times as much insulin response as a cup of broccoli.

Glycemic Load of common foods:

1. Apple, 1, 18 grams, Glycemic index 54, Glycemic load 972
2. Apple juice, 8 ounces, 29 grams, glycemic index 57, glycemic load 1,653
3. Banana, 1 3/4 cups, 32 grams, glycemic index 79, glycemic load 2,528
4. Orange, 1, 10 grams, glycemic index 63, glycemic load 630
5. Orange juice, 8 ounces, 26 grams, glycemic index 66, glycemic load 1,716
6. Raisins, 1 cup, 112 grams, glycemic index 91, glycemic load 10,192
7. Black bean (boiled) 1 cup, 41 gram, glycemic index 43, glycemic load 1,763
8. Black bean soup 1 cup, 38 grams, glycemic index 91, glycemic load 2,458
9. Linguine pasta (thin) 1 cup, 56 grams, glycemic index 79, glycemic load 4,424
10. Grape nuts 1 cup, 198 grams, glycemic index 96, glycemic load 10,368
11. Coca cola regular 1, 39 grams, glycemic index 90, glycemic load 3,510

The following are good rules of thumb about "glycemic load":

1. Keep your glycemic load below 3,000 in any one meal. You can see that if you have a Coca Cola with your hamburger, you have exceeded that glycemic load with your beverage.
2. The more processed a food, the higher the glycemic load. Boiled beans have a much lower glycemic load than the same volume of canned beans. And when you make any bean into a soup, the glycemic load skyrockets because the prolonged cooking breaks down the cell walls of the bean, making it easier for the body to digest it into simple sugars for absorption.

The glycemic load concept makes it clear why consuming most of your carbohydrates from high-quality vegetables is the key to maintaining insulin levels within the appropriate zone. The material on the concept of glycemic load is drawn from Dr. Barry Sears' books *The OmegaRx Zone* and *The Zone*. Reading these two books would give you an excellent idea of how to manage your eating habits to maximize your health.

Design your eating habits around managing your blood sugar levels and you will feel better, be better and function better for as long as you live.

Remember, it is your life and it is your health.