Carbohydrate's Role in Fat Loss

by Cameron L. Martz, ACSM H/FI

If you believe what you see on the bookshelves these days, you'd think carbohydrates are the root of all nutrition evil. The Atkin's New Diet Revolution, Protein Power, Sugar Busters, and the Carbohydrate Addicts Diet are just a few examples of low carb/high protein diets claiming to burn fat through a change in the how you eat rather than how much you eat.

These diets share a premise centered on the insulin reflex, which is basically a rapid release of insulin by the pancreas in order to moderate a sudden rise in blood glucose levels. Insulin lowers blood sugar in part by inhibiting fat metabolism. Additionally, when blood sugar rises rapidly, the body often releases too much insulin, resulting in a rapid drop in blood sugar and hypoglycemia. This hypoglycemia can trigger appetite, especially for carbohydrates, even though enough calories are already available to the body in the form of fat.

To summarize the logic, carbohydrates cause the body to release insulin, which prevents the body from burning fat and causes carbohydrate cravings and overeating. While this insulin reflex is something we have all experienced, this does not mean that carbohydrates should be avoided. In fact, carbohydrates can be our best friend if we plan to burn fat through exercise instead of by sitting on our couches reading diet books.

The Mathematics of Fat Loss

Before we talk about fat loss, we must keep in mind that weight is a poor indicator of fitness- what we're really interested in is body composition. That is, how much of our body is made up of fat versus lean tissue.

Also, we all need a certain amount of fat stores to maintain normal hormonal and immune system function. This *essential fat* makes up about 4-7% of bodyweight in men and 9-16% bodyweight in women. Go below these figures for long and you will do more harm than good.

Reducing our body fat is not an easy thing for us to do. The process, by definition, requires our body to consume itself for energy, and we have significant defense mechanisms to prevent that from occurring for extended periods.

However, the mechanism of fat loss is actually extremely uncomplicated in a mathematical sense. Fat loss depends entirely upon the relationship between calories burned and calories earned, and it can be represented by the following formula:

Total Energy Expenditure = Heat Produced + External Work Done + Energy Stored

In this equation, "energy stored" can be positive or negative and equals the difference between the metabolic rate (heat + work) and the energy content of digested food.

So, before we say that doing "X" will help us burn fat, we must test it against the math. Given an equal amount of energy consumed, doing "X" will help us burn fat only if it:

1. increases the heat produced,
2. increases the work done, and/or
3. decreases the amount of consumed energy that is digested

"X" would refer most commonly to a form of exercise, diet, or pharmaceutical, but "X" can obviously be any variable one might manipulate in an attempt to accelerate fat burning.

We must also realize that energy is stored in two basic forms- fat and glycogen. We can look in the mirror to see where the fat goes, but glycogen storage is not something easily observed. Glycogen is glucose (a.k.a., carbohydrate) that has been converted for storage in the liver and in the muscles themselves, and it is the primary fuel for exercise lasting under 60-90 minutes. Glycogen is required for optimal exercise and fat burning, for without adequate glycogen, our workout intensity suffers.

How does insulin secretion affect these variables? Short term, it doesn't change total energy expenditure at all. It may change where calorie storage takes place by preventing glucose from getting to the muscles as glycogen and instead storing it as fat, however. This is no different, though, than eating the same total calories but fewer carbohydrates, which will similarly emphasize fat storage rather than glycogen storage of excess calories.

Long term, by inhibiting the storage of glucose as glycogen and instead, converting it into fat, insulin may decrease the effectiveness of future workouts, thus decreasing metabolic rate. This is thus a means by which what you eat determines your available workout intensity, which then determines how much fat you will burn. We will discuss this more in a later section.

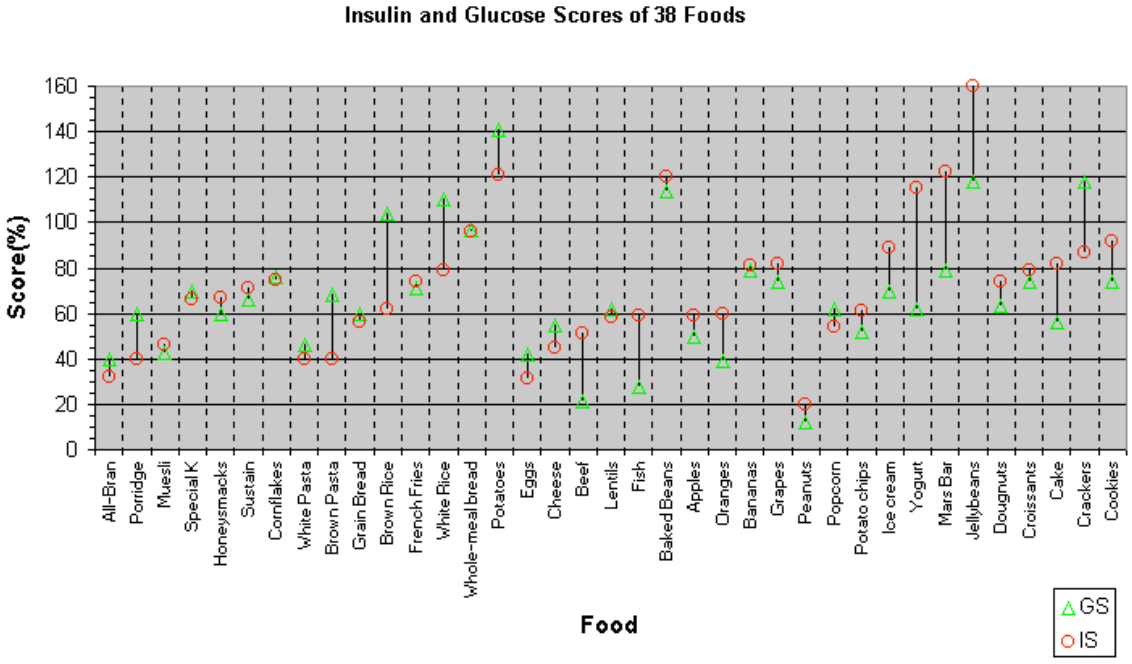
Glycemic Index and Insulin

Proponents of a low carbohydrate diet also emphasize choosing foods by their glycemic index. The glycemic index (GI) was developed to rank foods according to the extent to which they increase blood glucose concentrations. It was believed that foods with a low GI would stimulate less of an insulin response than foods with a high GI. However, GI may be a poor indicator of the ultimate insulin response.

Some researchers have recently presented an alternative method of ranking foods, based upon blood *insulin* levels rather than blood *glucose* levels. If insulin response is what you're trying to manipulate, why not measure it directly and score foods accordingly.

The chart below compares the GI and the insulin score (IS) of 38 common foods in comparison to the baseline food of white bread (GI and IS score of 100), revealing some surprises about our common assumptions. As you can see, protein rich foods such as beef and fish have much higher insulin scores than glucose scores. Carbohydrate rich foods such as brown and white rice, porridge, and brown pasta show much lower insulin scores than glucose scores. These differences are enough to call into doubt the logic of low carbohydrate diets, even if the insulin reflex were as much of a nutritional issue as they claim.

One of the most significant myths of these low carbohydrate diets is their claim that eating carbohydrates with protein and/or fat moderates the release of insulin. Wrong. Compared to eating carbohydrates alone, eating carbohydrates with protein can *increase* the amount of insulin released into the bloodstream without increasing blood glucose concentration. Furthermore, combining fat with carbohydrates *increases* insulin secretion even though blood glucose levels *decrease*.



Type of food is not the only thing that affects insulin response. Another study demonstrated that palatability has a significant impact on how much and how fast insulin is released into the bloodstream. This study fed two identical meals, however, one was blended together and colored with a blue dye. Subjects ranked the latter meal as less palatable and showed a slower and lower insulin response than the controls.

Stress, pre-ingestion blood glucose level, and food mixing also have significant affects on insulin response. In fact, the influence of these various factors can be so strong as to practically invalidate the GI and even potentially the IS. Even the researchers who developed the IS recommend that blood glucose be measured directly after any meal rather than relying upon a chart to predict insulin response.

Carbohydrates and Exercise Performance

The only way to optimize your exercise performance is to begin with abundant glycogen storage. A high protein/low carbohydrate diet defeats this by denying the body the very nutrient needed to synthesize glycogen. Someone who exercises while on a low carbohydrate diet will never burn as many calories as easily as someone ingesting a more appropriate level of carbohydrates.

Sustained exercise utilizes a combination of glycogen, fats, and protein for fuel. Glycogen makes up the greatest percentage of fuel burned, with fats also being a significant component. Except for extremely long duration exercise or when the body is starved of fuel, proteins contribute a very small portion to our energy utilization.

So, all the while our body is burning glycogen, our body is consuming its fat stores. When the glycogen stores run out, our ability to continue exercising goes kaput. For workouts lasting greater than about 60 minutes, we can ensure that we continue to burn fat by ingesting *additional* carbohydrates during the workout. Though the percentage of energy derived from fat may increase, our total fat calories burned will diminish with our workout intensity.

Just as important as ingesting carbohydrates is the timing of eating. Our bodies are primed to store carbohydrates as glycogen for a period of about two hours immediately following exercise. From there, our ability to replenish depleted glycogen stores drops off precipitously. Instead, calories that would've been stored as readily available glycogen are more likely end up stored as fat. Including some protein with post-workout carbohydrates has also been shown to increase the amount of carbohydrates stored as glycogen.

This does not mean that after this period carbohydrates are useless and will merely increase your fat stores compared to eating a low carbohydrate meal. Every excess calorie gets stored either as glycogen or fat, and only carbohydrates have a chance at being converted into glycogen. Substituting a carbohydrate calorie with a fat or protein calorie just means that a different type of calorie ends up as fat.

The best way to maximize your workouts and your use of the nutrition in the food you eat is to plan your workouts before a normal meal. That way, you get your carbohydrates and protein for recovery, and you get your fats for satiety. Your glycogen stores get

topped off and ready for your next workout, your muscles get what they need to repair the damage, and the least amount of calories will end up as fat. Again, if you substitute fat or protein for carbohydrates, then you won't help your glycogen stores and instead add to your fat stores.

Fat loss is a long term process best accomplished through a nutritious diet and exercise. If you plan your eating for your exercise, then the exercise can handle the rest.

Epilogue

So if carbohydrates are so great, then why do people lose weight on these low carbohydrate diets? Two reasons.

First, body *weight* is made up of more than fat, as I mentioned above. Low carbohydrate diets deplete glycogen stores before fat burning begins, and for every gram of glycogen lost, we lose an additional 2.4 grams of water. Thus, our scale weight rapidly drops without a significant impact on our total body fat.

Second, these diets depend upon a reduction in total calories consumed to establish the caloric deficit needed for fat loss. Every calorie of long term fat loss can be accounted for by this deficit, which can be established regardless of *what* you eat. Again, this is merely a matter of how much you eat versus how much you burn.

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