Proper Caloric Intake During Endurance Events

Back in the late 80's and early 90's when I competed in my first two Races Across America (RAAM) there wasn't much in the way of information...no, let me correct that, we competitors didn't have ANY seemingly reliable information regarding how to fuel the body properly. I can remember being told something to the effect of "with the amount of calories you'll be burning, you should eat as much as you can to avoid bonking or running out of fuel." And that's what I did. My support crew kept making me eat and eat and eat even when I was already full. It seemed to me that the trick was to eat as much as possible but not get sick and you'd have the best results. I remember being bloated for a good portion of the race and how my stomach just swelled to the point where I thought it would drape over the top tube. Sure, there were times when I just couldn't eat anymore and I demanded that my support crew stop feeding me. However, for the most part, we didn't know any better so we were under the belief, that said to eat as much as possible. Sometimes I wonder how I ever finished those two races! Oh, if I could go back and do those races again knowing what I know now.

Even if you never do anything remotely resembling RAAM, this article is an extremely important one. In it you'll read about what constitutes the proper fuel and how much you should be consuming. The answers may surprise you but I'll tell you truthfully, once I adopted and applied these fueling guidelines, my performances improved each and every year. You put so much effort into your training and equipment, make sure you put the right fuel, in the right amount, in your body. Your body will thank you and your performance will be proof.

Endurance and ultra-endurance athletes require all three forms of fuel the human body uses for energy: carbohydrate, protein, and fat. A major factor for optimal performance is using the right fuel, at the right time, in the right amount. As with all aspects of success in endurance events, proper nutrition also requires practice and training to reap the benefits on race day.

As all athletes know, "carbs are king" when it comes to fueling the body for any endurance exercise. That does not mean, however, that any carbohydrate at any time will keep you going. Carbohydrates can either help or hinder performance, depending on what kind, when, and how much you use. For example, far too many misinformed athletes continue to use energy products loaded with simple sugars, or they use complex carbs, a better choice, but at the wrong time and in the wrong amounts. These practices actually impair your performance.

Simple Sugars, Maltodextrin, And Osmality

Most dietary sugars are very simple molecules known as monosaccharides and disaccharides. The shorter the chain length a carbohydrate source is the higher it will raise a chemical measure known as osmolality. Simple sugars can only attain about 6-8%

concentration or they will sit undigested in your stomach, as the osmolality will be incompatible with the digestive juices. Products containing simple sugars (e.g., sucrose, fructose, or glucose) must be extremely diluted to match body fluid osmolality. This weak of a concentration will not allow enough calories, perhaps only as much as 100/hour, to be available to working muscles.

Molecules that contain many sugar units chained together are called polysaccharides. One of these, maltodextrin, allows a concentration of 18-24%, and very efficient passage from the digestive tract to the liver, because its osmolality matches that of the digestive system. The liver converts it to glycogen, which is the carbohydrate form your muscles use for energy. Therefore, the "gold standard" carbohydrate source for energy drinks, bars, and gels is polysaccharides such as maltodextrin, as you get far more energy calories across the gastric lining with much less stomach distress.

So we see that based on caloric delivery alone, complex carbohydrates, such as maltodextrin, are far superior to simple carbohydrates, such as sugars like fructose. But that's not all. Simple sugars, even in small amounts, can incite a condition known as "insulin spike." This sudden recruitment of insulin causes a subsequent dramatic drop in blood sugar, which can take blood sugar levels even below the fasting level! This results in your familiar "bonk." However, complex carbs, which enter the bloodstream at 18-24% solution, do not promote this wild fluctuation in blood sugar levels.

Simple Sugars = Ineffective Fuel

Simply put, simple sugars are a very inefficient fuel source. It's like trying to heat your house by burning newspapers in your stove. You get a fast heat, but it burns out quickly, and you have to continually feed the fire. Not good! That is why neither HAMMER GEL nor SUSTAINED ENERGY contain any added simple sugars.

Glycemic Index

A question people often ask is in regards to what is known as the Glycemic Index (GI) of various carbohydrates. GI rates the speed at which the body breaks down a carbohydrate in to glucose. The lower the GI, the slower the process, and therefore the more stable the energy release for sedentary health purposes. However, the numeric differences between high GI sugars and high GI maltodextrins (complex carbohydrates) are negligible. They are both high and raise insulin to balance and transport excess blood sugar. The advantage to long-chain high GI complex carbohydrates during exercise or immediately afterwards is their higher caloric value and easy absorption at body. This simply means that you can absorb a greater volume of calories for energy production or glycogen replenishment.

For foods consumed within three hours of exercise, GI becomes a critical issue. After exercise begins, however, sympathetic nervous system hormones inhibit GI impact on insulin release. Unless your caloric intake exceeds the maximum that the liver can return to the body in the form of glycogen (about 280 calories per hour), glycemic index is not a

major factor in choosing energy sources. During exercise, it's a nutritional error to value GI above saccharide profile.

How Much To Consume

So now you know what kind of carbohydrate to use, the next question is, "How much?" As noted above, the human body can only return (from the liver to the muscle tissue) about 4.1-4.6 carbohydrate calories per minute, or about 250-280 calories per hour. When an athlete consumes more than 280 calories per hour from carbohydrates during an event, the excess remains undigested in the stomach, or passes unused into the bowel. Yes, you may be burning 400-800 calories per hour, but your body cannot replace that amount during exercise. Trying to replenish calories at the same rate as depletion only causes problems. Instead of having more energy available, you'll have a bloated stomach, and perhaps even nausea and vomiting. You've seen it happen, but it's not a necessary aspect of intense competition; more likely it's the result of improper caloric intake.

Fatty Acids For Fuel

If we can't replace all the calories we expend, then how do we keep going hour after hour? Trained athletes can count on a reserve of up to 100,000 calories in the form of stored fatty acids. In fact, body fat stores are the fuel of choice when exercise goes beyond about two hours, providing about 60-65% of your caloric expenditure. Thus, a very important aspect of endurance performance is how well we utilize our fatty acid stores. One of the benefits of training is an increase in the efficiency of using these reserves.

Suggested Amounts To Consider

We still need nutritional support to provide the other 35-40% of our caloric needs during prolonged exercise. The chart below will give you a general idea of your maximum amount of ingested carbohydrate your body can process per hour. To give you a practical application of these numbers, we've "translated" the data into servings of HAMMER GEL and SUSTAINED ENERGY.

If you're between 110-120 pounds you could use either Hammer Gel @ 2 servings per hour OR Sustained Energy @ 2 scoops per hour.

If you're between 125-155 pounds - Hammer Gel @ around 2.5 - 3 servings per

hour OR Sustained Energy @ 2.25-2.75 scoops per hour.

If you're between 160-180 pounds - Hammer Gel @ 3 servings per hour OR

Sustained Energy @ 3-3.25 scoops per hour.

If you're over 185 pounds - Hammer Gel @ 3.5 servings per hour OR Sustained

Energy @ 3.5-4 scoops per hour.

Gluconeogenesis

When exercise goes beyond 90 minutes, you need to incorporate protein also into the fuel mix. After about 90 minutes, and until you stop your activity, about 10-15% of the calories you burn will come from protein. This process, called gluconeogenesis, is unavoidable, and if you don't supply protein in your fuel, your body will literally scavenge it from your own muscle tissue. This is called catabolism (muscle breakdown), known informally but quite accurately as "protein cannibalization." It can cause premature muscle fatigue (due to excess ammonia production from the protein breakdown process) as well as muscle depletion and post-exercise soreness. Protein cannibalization also compromises your immune system, leading to increased risk for colds, flu and other diseases.

The Benefits Of Soy Protein During Endurance Exercise

To avoid the negative effects of catabolism, we need some protein also during prolonged exercise. The preferred protein for use during exercise is soy, primarily because it does not readily produce ammonia when it is metabolized. Whey protein, with its high glutamine content, makes an excellent post-workout protein, but is not a good choice before or during exercise.

Soy protein has a couple other distinct advantages. First, it is an easily digestible protein. Secondly, it has an excellent amino acid profile, being particularly strong in branched chain amino acids, or BCAAs. During exercise, nitrogen is removed from BCAAs and recycled for the production of another amino acid, alanine (high amounts of which also occur naturally in soy protein). Alanine then gets transported to the liver, where it is converted into glucose, which in turn is sent to the muscles for energy. BCAAs and glutamic acid (another amino acid found in excellent amounts in soy protein) also aid in the replenishing of glutamine within the body without the risk of excess ammonia production caused by supplemental glutamine.

Also, soy has been observed to produce a higher degree of uric acid content than whey protein. Uric acid is reduced by excessive free radicals, which are produced during exercise. When uric acid levels are higher, that is an indication of less free radical release, which is due to the antioxidant influence of the naturally occurring phytochemicals known as isoflavones found in soy. The antioxidant benefit of soy's isoflavone content is another strong reason why soy may be the preferred protein during endurance exercise.

Summary

When considering your basic caloric needs, think complex carbohydrates such as a maltodextrin-based product, and supplemental protein for exercise over 90 minutes. No

matter what your sport or length of exercise, Hammer Nutrition can keep you going with HAMMER GEL AND SUSTAINED ENERGY, fuels that give your body exactly what it needs to operate at maximum efficiency