

The Care and Feeding Of Energy Systems

Many members are keeping up with preparations for their “Mission Critical” event despite the frustrating lock-down/open-up phases. Some are doing 60K, others are looking forward to their first century ride – either metric or old school. As you approach rides lasting 2 hours and longer, it is essential that you keep the calories coming in to avoid the dreaded “bonk”. So, how much and what works best?

First of all, it is very difficult replace every calorie that you are expending - the body quite simply cannot process food quickly enough. Second, every individual is different in terms of what works best for them. It's important that you have your food and hydration dialed-in long before your big event. What tastes good off the bike may not be so appetizing when your body is under exercise stress. You are feeding and hydrating to maintain 3 distinct energy systems, they are the **Aerobic System**, the **Anaerobic System**, and the **ATP (Adenosine Triphosphate) / CP (Creatine Phosphate) system**.

Characteristics of the Aerobic System include:

1. Provides fuel (glucose to the cells through the synthesis of glycogen, carbohydrate, fat and protein.
2. Synthesis takes place in presence of oxygen with only carbon dioxide and water as by-products.
3. There is a minimum of lactate and hydrogen ions (believed to cause “the burn”).
4. Energy production can continue indefinitely with proper hydration and feeding while keeping workloads moderate.

Characteristics of the Anaerobic System include:

1. Can provide fuel to the cells when there is an oxygen deficit.
2. In a trained individual it allows an athlete to maintain high workloads for 1 – 1.5 hours.
3. Responds to high workloads (wind/hills) more quickly than the Aerobic System.
4. Due to the limited amount of oxygen glycolysis takes place - but it is catabolic (destructive) to the muscle cells.
5. It is limited to about 1 to 1.5 hours in a trained athlete (think time trial)

Characteristics of the ATP/CP Energy System

1. As part of our “fight or flight” instinct this system can provide energy for a very brief amount of time (8 to 10 seconds – think sprinting).
2. Glycolysis is not involved, and the process is not catabolic.
3. It can be accessed a number of times, but this built-in energy source is time limited and will become exhausted.
4. It requires 24 to 48 hours to rebuild this reserve.

So how do we train and feed these systems to do our bidding? First of all, make use of these energy systems – even on your training rides. For example, you may be out on an endurance ride (aerobic) but do a few 2 – 3 minute intervals at 80 to 90 percent of your maximum heart rate (anaerobic). Attack some hills in a sprint (90+ percent of your maximum heart rate) **** It is important, however, that you consult with your physician before taking on maximal efforts. ****

Now to the feeding. Many people prefer natural foods as fuel – fruits, nuts, cookies, muffins etc. The chief disadvantage is the convenience factor. Peeling bananas, juggling raisins and peanuts, unwrapping and handling muffins while on the bike can be a recipe for a crash. Also, getting the right balance of carbohydrates, protein and healthy fats can be a challenge. Your event may have rest stops where you can stop and eat your natural foods – be sure to check how much support is provided prior to the event day.

On the other hand, using prepared products means someone has hopefully formulated a nutritionally balanced product that is quick and convenient for on-bike feeding. I personally rode the Banff Gran Fondo (151K with 1550 metres elevation gain) on a 100% liquid diet. The chief disadvantage to these products is their expense.

Here is a fueling and hydration strategy that has been scientifically tested and has worked well for a great number of endurance athletes. Again, this will need to be tested by you ahead of time to make sure it works for your body. Amounts will vary with age, body weight, air temperature and your level of fitness.

1. Replenishment instead of replacement. It is very difficult to replace the calories that you are expending. Replacement strategies overlook the fact that your body can only process about 1/3 of what you are expending. That sounds a little frightening until you consider what a storehouse our bodies are. Our bodies continually pull calories from our body and blend them with what we are taking in. Over consumption of fuel often leads to gastrointestinal upset. Even the leanest athlete has a huge storehouse of calories as an energy source.
2. Fluids – Aim for 340 ml to 1.1 litres per hour with many athletes reporting using less than 850 ml.
3. Electrolytes – 300 to 600 mg per hour.
4. Fuel – 240 to 280 calories per hour.

A few other points:

- Dehydration severely affects performance – as little as a 2% reduction in body weight through perspiration/respiration/urination hinders performance. At 4%, performance is cut by 20 – 30 percent.
- Over-hydration with plain water can be harmful. A condition called *hyponatremia* (low blood sodium) can occur. In rides exceeding 1.5 hours an electrolyte drink is recommended.
- Be sure to start your hydration and fueling in the days and hours **before** your event. Drink 500 ml about 2 hours before any training rides. Drink 2.4 to 3 litres in the 4 hours before you toe the start-line - stopping in the 20 minutes just before the start to allow for stomach emptying.
- Carbo loading has now pretty much been disproven. Simply eat a balanced diet leading up to your event day. On the morning of the event concentrate on eating generous amounts of easily tolerated foods. Avoid heavy foods – so yes, no bacon, ham, sausage and egg platters the morning of. Stick to breads, cereals, rice, pasta, fruit and nuts.
- In energy/electrolyte drinks, gels and chews look for products that use *Maltodextrin* as their main source of carbohydrates and avoid products that use Glucose, Fructose, Dextrose and Sucrose as their main source of carbohydrates. *Maltodextrin* metabolizes in a smoother way without any nasty spikes or crashes.
- In rides that exceed 3 hours consider using a liquid fuel that will take care of hydration fueling and electrolytes all at once. This can be mixed up as a concentrate in one water bottle and plain water in your other bottle. A 620 ml bottle can carry approximately 4 hours' worth of fuel and electrolytes.
- Cold fluids absorb better than warm. A good strategy is to fill and freeze one bottle with your drink of choice and fill your other bottle with cold drink. Drink from your liquid bottle first and by the time that you have finished that, your other bottle will have thawed.
- Avoid caffeinated beverages as it is a diuretic (increases urination). However, some people do use caffeine in the closing stages of an event to give a little energy boost.

I can't stress this enough – **do your experimentation well before your event in your training rides. Nothing is worse than being under exercise stress, needing additional calories and finding that the drink and food that you have chosen (last minute or at a rest stop) is unappetizing, or worse causes nausea and vomiting.**

Good luck with your event – you've worked hard all spring and early summer to get to this point -
ALLEZ ALLEZ ALLEZ!