Dynamic Chiropractic

NUTRITION / DETOXIFICATION

Essentials of Carbohydrate Replenishment During Exercise

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For many types of sports that rely upon carbohydrate metabolism as the primary fuel for muscle performance, 60-70 percent of an athlete's diet should be comprised of carbohydrate calories. This includes sports involving repeated bouts of all-out effort, as well as long-distance events. For these events, carbohydrate energy represents the predominant energy source for maximum sustained power. Carbohydrate depletion during these events is known to hasten the onset of fatigue and to hinder performance capabilities. As a result, athletes should be aware of effective carbohydrate repletion techniques as a means of optimizing their performance.

A carbohydrate-rich meal should be consumed three to four hours before the game or training session. Thirty minutes prior to exercise, 10-20 grams of fructose sugar mixed with 20-25 ounces of water can also maximize carbohydrate availability and utilization, enhancing performance.

Consuming carbohydrates during prolonged exercise events has also been shown to improve performance. Numerous studies have demonstrated increased time to fatigue and power output during exercise, and improved sprint performance following prolonged exercise, when carbohydrate is ingested during exercise. Carbohydrates ingested during intensive or prolonged exercise are able to maintain blood sugar more effectively, thereby providing an immediate source of carbohydrate energy to the exercising muscles. This prevents the rapid breakdown of liver carbohydrate, allowing it to provide blood sugar for a longer period of time during the event. Indeed, a recent report observed a 59 percent reduction in liver carbohydrate (glucose) production during prolonged exercise when carbohydrate was ingested. This strategy enables the liver to deliver carbohydrate through the bloodstream as blood sugar, so the exercising muscle uses up its own carbohydrate stores (glycogen) at a slower rate. Slowing the depletion rate of muscle carbohydrate stores allows the muscles to work at higher levels of power for a longer period of time; hence, performance improves.

During prolonged exercise, the muscle breaks down carbohydrates as a source of energy at a rate of 1.0-1.5 grams per minute. Based on a number of studies, it appears that athletes need to ingest carbohydrates at a rate that will supply the muscles with approximately 1 gram per minute. This can be achieved by the ingestion of 600-1,000 ml/hour of solutions (drinks) containing 6-10 percent carbohydrate. This simply means that for every 100 ml of water contained in a sports drink, there should be no more than 6-10 grams of carbohydrate. Any more carbohydrate than this will slow down the rate of gastric emptying and water absorption into the bloodstream. "Gastric emptying" means the rate at which carbohydrates and fluids pass through the stomach into the small intestine, where the maximum amount of absorption into the bloodstream occurs.

Soft drinks, for instance, contain at least 12 grams of carbohydrate per 100 ml of water; therefore, they are not good sports enhancement beverages. The popular sports enhancement drinks in the marketplace all meet the 6-10 percent carbohydrate criteria as outlined above.

As for the type of carbohydrate that is best to include in a sports enhancement drink during

competition, there is little difference between maltodextrins (glucose polymers), glucose and sucrose in their metabolic and performance effects during exercise. However, maltodex-trin solutions tend to be less sweet, and therefore more palatable, than solutions consisting only of simple sugars. In contrast, fructose ingestion during prolonged exercise does not improve performance. Fructose is the beverage of choice 30 minutes prior to, but not during exercise.

As a general guide as to how to practically apply this information, let me summarize with the following: During a strenuous exercise event that will last for more than 60 minutes, consider drinking 5-8 ounces of a carbohydrate-based sports enhancement drink (e.g., Gatorade) every 10-15 minutes. This will not only provide the right concentration and type of carbohydrates to stave off carbohydrate depletion in your liver, bloodstream and exercising muscles, but also provide an optimal strategy to prevent dehydration. Most of these drinks also provide sufficient sodium and/or potassium to prevent hyponatremia, which is a loss of sufficient sodium (from sweating) that results in a life-threatening conditioning involving brain swelling and other complications. As a rule, a minimum of three to four hours of continuous sweating is usually required to develop hyponatremia, but it remains a nutritional concern for certain types of sporting events.

In conclusion, the use of carbohydrate sports drinks is a proven method of enhancing athletic performance in events that last at least 60-90 minutes and require repeated bouts of explosive power, and in long-distance events in which maintaining optimal speed is critical. Consuming 5-8 ounces of these drinks every 10-15 minutes is the best way to deliver the optimal amount of carbohydrate to the exercising muscle during intense and prolonged activity. Some research suggests that colder fluids are absorbed faster than fluids at room temperature; thus, colder beverages may be a better choice for optimal carbohydrate and fluid replenishment.

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