Fueling During Performance - Background

Popularity of endurance events is on the rise, and without the proper nutrition, performance can suffer. However, nutrition can be the most confusing aspect of endurance performance and overwhelming for the beginner athlete. The most important nutrition aspects to focus on for these events are proper calories, fluid intake, carbohydrates, electrolytes, and osmolality. Osmolality and carbohydrate source are important aspects effecting performance and proper absorption.

Osmolality

Osmolality is used to describe the concentration of particles dissolved in a solute. The osmolality of a solution is affected by the nutritional components that go into your sports drink and can affect an athlete's performance. The osmolality of our own body's fluids is approximately 280mOsm/kg. Solutions with an osmolality around 280mOsm/kg are considered isotonic. Those with a lower or higher osmolality are referred to as hypotonic and hypertonic, respectively. Optimal absorption of fluids happens when your sports drink solution is isotonic. In addition, isotonic beverages result in rapid gastric emptying, decreasing gastrointestinal distress.[1] Research has shown that as the osmolality of your sports drink increases above 280mOsm/kg (hypertonic), efficient uptake from the gastrointestinal (GI) tract decreases and can cause gas, bloating, and cramping. GI complaints and issues during an endurance event can hinder performance. Rehrer et al. found that individuals consuming hypertonic solutions were likely to experience GI distress during a half Ironman event.[2] In addition, hypertonic solutions can actually draw fluid out of the body to dilute whatever is in the stomach. This delays rehydration, can cause dehydration, and can therefore reduce performance.[1]

Infinit Nutrition's patented Osmo-fit™ system automatically calculates the osmolality of a customized formula, guaranteeing that the solution is isotonic and easily digested.

Carbohydrates

Most of the sports drinks on the market currently use one type of carbohydrate source. A single carbohydrate source limits the absorption of these necessary calories. Carbohydrate oxidation of glucose is limited by intestinal absorption of carbohydrates and dependent on a transporter that becomes saturated at a carbohydrate intake rate of 60g/hr. When another carbohydrate source is ingested with glucose, oxidation rates went well above 60g/hr.[3] In fact, multiple carbohydrate sources resulted in up to 75% higher oxidation rates than glucose alone.[4] Other benefits of including multiple carbohydrate sources in your sports drink include increased fluid delivery and oxidation efficiency, decreasing the likelihood of experiencing GI distress, reduced fatigue, and improved exercise performance.[5]

Infinit Nutrition's products are formulated with three different sources of carbohydrates – maltodextrin, dextrose, and sucrose. This allows increased absorption and increased performance. *

1. Gisolfi, C.V., et al. Effect of beverage osmolality on intestinal fluid absorption during exercise. *J. Appl. Physiol.* 85(5): 1941-1948, 1998.
2. Rehrer, N.J. et al. Physiological changes and gastrointestinal symptoms as a result of ultra-endurance running. *Eur. J. Appl. Physiol.*
3. Jentigens, R.L., et al. Oxidation of combined ingestion of glucose and fructose during exercise. *J. Appl. Physiol.* 96: 1277-1284, 2004.
4. Jeukendrup, A.E. Nutrition for endurance sports: Marathon, triathlon, and road cycling. *J. Sports Sci.* 29(S1): S91-S99, 2011.
5. Jeukendrup, A.E. Carbohydrate and exercise performance: the role of multiple transportable carbohydrates. *Curr Opin Clin Nutr.* 13:452-457, 2010.

*These statements have not been evaluated by the Food and Drug Administration. This product is not intended to diagnose, treat, cure, or prevent any disease.

Recovery Nutrition – Background

Fueling your body during athletic performance is essential to ensure peak performance. However, how you fuel your body after performance is essential to ensure you are ready for that next athletic event. Exercise strips your body of glycogen and fluids. If they aren't fully replenished before your next workout, your body becomes weak and dehydrated and you will never reach peak performance. The body can replenish muscle glycogen in about 20-24 hours post-exercise because glycogen is replaced in the muscle at a rate of 5% per hour. Fifteen minutes after exercise the blood flow to muscles is still very high and the enzymes that produce glycogen are most active. Refueling, replenishing, and rehydrating should be done within those first 15 minutes after exercise when the muscles are most receptive[6]. Refueling with carbohydrates and protein are both important following endurance exercises. The carbohydrates refuel glycogen stores and delay the rate that protein breaks down. Protein intake provides essential amino acids and calories necessary to build and repair muscles, organs, and tissues in the body.[7]

Multiple Protein Sources

Strenuous exercise promotes muscle damage, resulting in decreased protein synthesis through increased branched-chain amino acid (BCAA) breakdown. These essential amino acids (leucine, isoleucine, and valine) are metabolized in the muscle and required for protein synthesis.[8] Absorption of these essential amino acids varies among different protein sources.[7] Whey protein is quickly absorbed, casein is slowly absorbed, and soy is intermediately absorbed.[9] Combining multiple sources of protein has an added benefit to support muscle growth and recovery because the availability of amino acids in the bloodstream is extended and absorption increases.[7] Phasing the release of amino acids into the bloodstream is associated with increased skeletal muscle protein synthesis and increased lean muscle mass.[9]

In addition to BCAA's, glutamine and arginine are also important in endurance recovery. These 2 amino acids are conditionally essential under certain conditions. During times of stress, including exercise, glutamine levels are significantly depleted. Arginine becomes essential during periods of growth. Glutamine plays a role in protein synthesis, and arginine can lead to increases in lean muscle mass. Soy protein is high in glutamine and arginine, but not the BCAA leucine. Casein is high in glutamine, and whey is high in the BCAA leucine.[9] A combination of the 3 protein sources will ensure you are consuming adequate amounts of the essential BCAA's, glutamine, and arginine.

Infinit's new :REPAIR and :NOCTURNE formulas are formulated with whey isolate, soy isolate, and casein protein, designed to provide essential amino acids important for muscle recovery, and allowing increased muscle protein synthesis and increased lean muscle mass.*

6. Bonci, L. Refueling the Tank. *Coaching Management*. 9.2, March 2001.
7. Diekman, C., Saullo, S. The role of soy in the performance of active and athletic Americans. *SCANNERS.* 4(1):1-3, 2012.
8. Swanson, A.K., Makowski, L. Physiologic and metabolic responses during vigorous exercise: why recovery nutrition is indispensable. *Pulse.* 31(2): 1-5, 2012.
9. Paul, G. The rationale for consuming protein blends in sports nutrition. *J Am Coll Nutr.* 28(S): S464-S472, 2009.