

Food for Fuel

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Whether your goal is to complete a triathlon, ride your first century, or exercise to improve overall health and fitness, proper nutrition is critical for maximal performance. It forms the foundation for physical activity and provides the fuel necessary for biologic work to take place.

Carbohydrate, fat, and protein are the nutrients that supply that fuel. During exercise all three of these 'macronutrients' are used, at different levels depending on the physiological circumstances (i.e., intensity and duration of exercise, total calorie intake).

- **Carbohydrates:** 'Carbs', commonly known as sugars and starches, are the preferred fuel for high intensity exercise. As such, they exhibit the most dramatic use and depletion during intense exercise and heavy training, compared to fat and protein.
- **Fat:** Fat performs several important functions in the body. As a source of fuel it is a powerhouse, providing more than twice the calories per gram as carbohydrate and protein. Relative to carbohydrate, fat utilization is maximal at lower exercise intensities.
- **Protein:** Protein is not a preferred source of fuel for the body, however can serve as an alternative fuel during intense exercise if carbohydrate stores become depleted, or if total calorie intake is inadequate to meet the body's needs.

Under normal circumstances these nutrients are digested, absorbed, and transported to the muscles and tissues where they're needed. However, there are situations where this process is interrupted by the consumption of substances that interfere with absorption, making them unavailable to the body.

Research has shown that some medications interfere with nutrient digestion and absorption by causing mouth irritations, dental caries, and irritation to the esophagus and stomach. This can lead to loss of appetite and subsequent deficiency of several vitamins and minerals that play a key role in the biochemical reactions that provide energy.

Research has also shown that alcohol, if consumed in excess, inhibits the normal metabolism of vitamins and minerals, thereby directly impacting the availability of energy from carbohydrate, fat, and protein. Alcohol is a toxin, and regular high intakes have been linked to cancers of the liver, mouth, throat, and stomach as well as cirrhosis of the liver. As an irritant to the lining of the intestinal tract it increases urinary excretion of calcium and magnesium. Calcium is a required mineral for muscle contraction, and magnesium is directly involved in energy metabolism. The result is an increase in muscle cramps, weakness, and abnormal heart rate. These are just a few of the ways alcohol consumption can interfere with athletic performance. Many more have been documented in the literature.

Physical activity increases the need for fuel, and for the metabolic processes involved in its utilization. Anything that limits its availability or alters its metabolism can have a profound impact on performance.