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Sports Health and the Glycaemic Index

From research initially conducted in the area of diabetes in 1981, information is emerging that has applications in a number of other markets, particularly sports and health.

The subject is “glycaemic index” (GI) and its relevance to carbohydrate intake during different phases of sporting activity. The following information refers to its importance in the post exercise recovery period only, but it is likely that GI will have commercial implications in the future with many types of sports drinks and foods.

We have concentrated on the post exercise drink to date because this market segment has been largely ignored and it is an ideal product category to emphasize GI. To help understand the importance of muscle glycogen and its association with GI we have prepared the following information:

Energy is mainly available from either fat or carbohydrate and it depends on an individual’s state of rest or activity as to where the energy originates. Fat produces free fatty acids from lipolysis of adipose tissue. Carbohydrate is the energy source for muscle glycogen and blood glucose.

During rest and low intensity exercise the body is fuelled almost entirely aerobically and energy is mainly derived from release of free fatty acids. As exercise increases there is a shift in fuel usage from fat to muscle glycogen and at 70 - 75% of maximal oxygen uptakes nearly all energy is derived from muscle glycogen, with only a small proportion from blood glucose and free fatty acids.

Within ½ to 1 hour at this intensity muscle glycogen is nearly depleted and the rate of depletion decreases as fitness level increases. At moderate to low work intensities muscle glycogen levels can still be 50 - 60% of initial values after 1 - 3 hours exercise. As exercising continues muscle glycogen stores become progressively lower until high intensity exercise cannot be maintained. Glycogen depletion may also be a gradual process, occurring over repeated days of heavy training in which muscle glycogen breakdown exceeds its replacement.

Complete replenishment of glycogen stores post exercise may take between 24 - 48 hours. The rate of glycogen synthesis is most rapid immediately following termination of exercise and glycogen replenishment is much slower if carbohydrate intake is delayed for 2 hours.

Until recently it was believed that the type of carbohydrate had little or no bearing on muscle glycogen replenishment post exercise. However, recent research suggests that carbohydrate with a high GI may be more effective at stimulating glycogen synthesis than carbohydrate with a low GI. Carbohydrate intake at 15 minute intervals may help promote rapid muscle glycogen repletion due to maintaining an elevated insulin level. In the immediate post exercise period the blood flow to the muscles is much greater and the muscle cell is more likely to take up glucose.

Athletes therefore should consume carbohydrates immediately after exercise. Delaying carbohydrate intake for too long will reduce muscle glycogen storage and impair recovery. Most athletes are not hungry after exercising and consumption of a high carbohydrate drink has the dual benefit of quenching thirst and replenishing muscle glycogen.

At Steggall Nutrition we have formulated a Citrus Flavoured Recovery Drink using a high level of dextrose so as to achieve a high GI. Dextrose (glucose) has a GI of 100 and is the highest of all the sugars. Table sugar (sucrose) has a GI of 56. The total carbohydrate level in this drink is 38gms/200ml serve, compared with approximately 15gms for an isotonic drink.

Available evidence suggests consuming 100gms carbohydrate within 15 - 30 minutes of exercise to maximise repletion of muscle glycogen stores. This is equivalent to approximately 500mls of Recovery Drink.