

# Loading, Fueling, and Replenishing Carbohydrate for the Endurance Athlete

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## **Pre-event Carbohydrate Loading**

It's the night before your big event and you've been looking forward to a big spaghetti meal with garlic bread. You've been contemplating marinara or alfredo sauce all day. You even skip the wine and go for the beer because you know beer has more carbohydrates. You're carbohydrate loading and this ritual, as an athlete, is just as important to you as your daily workouts.

Carbohydrate loading or "supercompensation" has become a popular night before the event custom for many endurance athletes. But research suggests this may be too late to make a significant difference in event day performance.

The major reservoir of carbohydrate in the body is in our muscles and liver, in the form of glycogen. The body stores approximately 450-550 grams of glycogen within the muscles and liver for use during exercise. But these stores are quickly depleted with a high intensity (>65-75% VO<sub>2</sub>max) and/or longer than 90 minute exercise bout. Because our glycogen stores can become depleted so quickly, the concentration of muscle and liver glycogen prior to exercise plays an important role in endurance events. If an athlete can increase or supercompensate their glycogen stores before their event they may postpone fatigue and increase their performance on event day. Current research suggests that if an athlete, after depleting glycogen reserves, consumes a diet high in carbohydrate up to 7 days prior to an athletic event, there will in fact be higher glycogen reserves in the muscles, than if the athlete had eaten only one carbohydrate loading meal the night prior to their event.

The original or classic carbohydrate loading technique involved two stages: depletion of carbohydrate stores, either through intense exercise or deprivation of dietary carbohydrate, followed by a carbohydrate loading stage. The deprivation stage of eliminating carbohydrates from one's diet can have a deteriorating effect on training. The lack of carbohydrates and intense training can elicit weakness, lethargy, and irritability in many athletes. This classic loading technique will leave the athlete mentally unprepared and insecure in the week leading up to the big event. Although this technique is still widely used, current research suggests a less strict routine will produce superior results.

For example, in trained athletes, research supports that changing to a **very high**-carbohydrate diet, combined with 1 or 2 days of complete rest, will effectively increase muscle and liver glycogen levels. Furthermore it was found that continuing to train at high-intensities in the two weeks leading up to an event will help maintain high glycogen synthesis enzyme levels. These muscle enzymes facilitate glucose to glycogen and therefore increase muscle and liver glycogen storages. It is only possible to maintain high-intensity training with adequate amounts of glycogen levels. So how much carbohydrate is enough?

The current ACSM recommendation for endurance athletes is to consume a high carbohydrate diet equaling 60% of their total diet. A more functional and relative equation is to consume 5-7 grams of carbohydrate/kg of body weight. For example, an athlete that weighs 150 lbs will need to consume 340-476 grams of carbohydrates daily. This equals 1360-1904 kcal of carbohydrate. Then what is a **very high**-carbohydrate diet?

Current research suggests increasing your consumption of carbohydrate in the week prior to your event to 70-80% of your daily diet or 7-10 grams of carbohydrate/kg of body weight. This will

insure an increase in glycogen stores to optimal levels pre-event. For example, an athlete that weighs 150lbs will need to consume 476-680 grams of carbohydrate daily in the week prior to the event. This increase in daily carbohydrate will insure muscle and liver glycogen has been super compensated. The second step is to taper your training in the week leading up to the event. Along with one or two high-end workouts early in the week to keep your legs fresh, REST is the final key point in carbohydrate loading. This is not an easy task for those of us that are adrenaline junkies. But resting 1-2 days prior to your big event is the only way to assure that glycogen levels stay elevated.

How do you know if you've topped off your levels? Since one gram of carbohydrate is bound to three grams of water, if you gain 2-4 lbs you'll know you've increased your glycogen stores by 300-400 grams of carbohydrates. No need to worry about a little water weight, for endurance athletes this extra water may be of benefit for proper body temperature regulation in the later stages of a race.

Through a proper very-high carbohydrate diet an athlete can increase liver and muscle glycogen stores leading to stored energy and greater endurance. Carbohydrate loading may be an effective way to get that extra edge you need during your endurance event.