HYDRATE YOUR HORSE (POWER)

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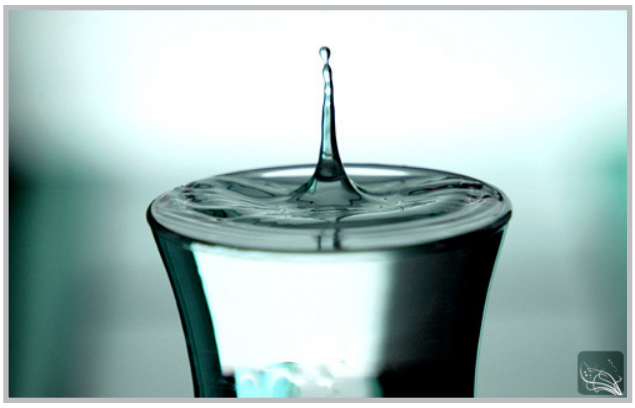
FAST FACTS

- Proper hydration is a powerful performance-enhancing aid.
- Being well hydrated before, during and after hard workouts improves performance and safeguards health.
- Decades of scientific research have confirmed the many physiological benefits of proper hydration during exercise, and recent research is beginning to highlight benefits for recovery as well.
- Rapid replacement of muscle glycogen – the primary muscle fuel during exercise – may depend in part on rapid re-hydration after exercise.

Introduction

You can lead a horse to water, but you can't make it drink. So goes the old saying intended to convey the futility of trying to get people to do things they are unmotivated to do. As it turns out, there is a fair amount of unintended science behind that time-worn idiom. As the saying infers, horses lack a sensitive thirst mechanism. This insensitivity makes dehydration and loss of appetite common among horses[5]. The thirst mechanism in humans is also not very sensitive to dehydration[2], resulting in what scientists refer to as "voluntary dehydration." In other words, during and following exercise, humans, like horses, are slow to replace their fluid losses, prolonging dehydration and its deleterious consequences. Yet recovery processes after exercise in horses and humans appear to benefit from



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well-hydrated muscles, indicating an additional reason for humans and horses to drink up after exercise.

Well-hydrated muscle cells favor anabolic (build-up) processes, while in dehydrated muscle, catabolic (tear-down) processes predominate. Rapid recovery after a workout relies upon anabolic processes to build and repair muscle tissue and to restore muscle glycogen – the internal carbohydrate fuel that is used during exercise. High-intensity as well as endurance workouts rapidly lower muscle glycogen stores because the carbohydrate (glucose) from these stores is the primary fuel for muscle during exercise. For athletes who train more than once a day, rapid restoration of muscle glycogen is essential to get the most out of a subsequent training session.

This short article deals with the recovery-related benefits of proper hydration, but in order that the many other benefits of hydration are not forgotten, here is a quick refresher:

Virtually every process in the body – at rest and during exercise – depends upon an ample supply of water. Adequate hydration is essential for the proper functioning of molecules such as enzymes, organs such as muscles, entire organ systems such as the cardiovascular system, and ultimately for the proper functioning of the entire body.

Sweaty, dehydrating exercise places a great strain on the body as the body strives to deliver blood to the heart and active skeletal muscles, while at the same time sending ample blood to the skin so that heat can be transferred from the heat-producing skeletal muscles to the skin

and then out to the environment. Failure to drink enough fluid (water or sports drinks) during exercise results in progressively increasing dehydration and progressively decreasing performance capacity[4].

Hydration And Horse Sense

When it comes to sweating – in other words, losing fluid and electrolytes – few animals can match horses. Most human athletes lose 1-2 liters (quarts) of sweat per hour of exercise; it's not unusual for horses to lose 8 or more liters of sweat per hour[5]. This is not surprising given how large horses are compared to humans, but new research shows that it seems to make good horse sense to quickly replace those losses after exercise for rapid and adequate recovery.

Once exercise is finished, lingering dehydration slows recovery, in part because repair and restoration processes in muscle cells are slowed by dehydration. New research indicates that recovery in horses can be further accelerated by quickly replacing the fluid as well as the electrolytes lost during exercise. This point is underscored by a study published in a 2009 volume of the Journal of Applied Physiology. Canadian researchers reported that horses replaced their muscle glycogen nearly three times faster after exercise when they were hydrated with a carbohydrate-electrolyte solution than when they drank only plain water along with their oats and hay[5]. Compared to humans, horses are slow to replenish their muscle glycogen stores, so researchers have been looking for ways to speed up the process.

Glycogen Basics

Whenever you finish a hard workout, your muscles contain less glycogen than when you started. Glycogen, along with glucose and fats delivered by the bloodstream, is what fuels active muscles. During exercise, glycogen is quickly broken down inside muscle cells into its individual glucose units and this simple carbohydrate is further broken down to produce the ATP required for muscle contraction. The amount of glycogen that is used during exercise depends largely upon the intensity and duration of the exercise. Long, hard workouts demand a lot of glycogen and restoring that glycogen is important to feeling good and working hard in subsequent workouts, whether that same day or the next day.

Lost muscle glycogen is replaced in the hours after exercise when adequate carbohydrate is ingested. Severely depleted muscles may require up to 24 hours to fully replace muscle glycogen stores. Research shows that glycogen replacement occurs most rapidly whenever an ample amount of simple sugars are ingested soon after exercise. Simple sugars such as glucose, sucrose, fructose, and high-fructose corn syrup are quickly absorbed and the glucose they provide is rapidly delivered to muscle cells that are hungry to convert that glucose back into glycogen. Foods and beverages that provide 50 – 100 grams (200 – 400 calories) of carbohydrate are recommended for rapid glycogen replacement[3]. Consuming that carbohydrate within 30 minutes of completing exercise provides a beneficial nutritional bridge to the next meal and allows muscles to begin replacing glycogen immediately.

Conclusion And Recommendations

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- **Before exercise:** 0.08 – 0.1 oz. of fluid per pound of body weight four hours before exercise and an additional 0.05 – 0.08 oz. per pound within two hours prior to exercise. For example, a 160-lb athlete would consume about 12 – 16 oz. four hours before exercise and an other 8 – 12 oz. two hours before exercise. These easy-to- consume volumes help ensure proper hydration and allow enough time for the body to excrete any excess as urine. Water, sports drinks, milk, soft drinks, and fruit juices are all acceptable fluids for this occasion.

- **During exercise:** Drink to minimize weight loss, but

do not over-drink. Everyone sweats at a different rate during exercise, so some athletes will require a lot of fluid to stay well hydrated, while others will require very little. Athletes are encouraged to weigh themselves before and after exercise to gain a feel for how much fluid they need to ingest to minimize loss of body weight. The goal is to drink enough during exercise to keep body weight loss at less than 2% of body weight. For example, a 200-lb athlete should drink enough so that after exercise, he weighs no less than 196 pounds (a 4-lb weight loss is 2% of 200 pounds). Weight gain during exercise is a sure sign of drinking too much and should be viewed as a caution to drink less in future workouts.

- **After exercise:** If athletes drink adequate amounts of fluid during exercise, re-hydrating after exercise is not a critical concern, especially if the next workout is at least eight hours away. It is important to be fully re-hydrated before the next workout, not only to speed recovery between workouts, but also to ensure that chronic dehydration does not impair performance. On those occasions when you do not get enough to drink during exercise and finish dehydrated, plan to drink 150% of your weight loss before the next workout. For example, an athlete who finishes a workout with a 4-lb weight deficit should plan to drink 6 pounds of fluid before the next workout. (The extra fluid is needed to account for ongoing urine production.) In this example, 6 pounds of fluid is 96 oz., a volume goal that can be met by ingesting a variety of fluids as described above.

References

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