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Hydration Protocol

High school athletes train hard, play to win, and sweat through it all. Unfortunately, most student athletes generally underestimate their sweat loss, and therefore don't voluntarily drink sufficient amounts of water to prevent dehydration during extended physical activity. Fluids are probably the most neglected aspect of an athlete's diet. Effective hydration before, during and after intense exercise is critical to healthy and successful athletics.

When exercising in conditions where the environmental temperature exceeds the body temperature, sweating is the primary method for cooling the body. This works through the evaporation of sweat, from the skin's surface. As humidity (*lots of moisture in the air*) increases, the rate of evaporation is much lower as the air is already saturated with water vapor. This greatly decreases the beneficial effects of sweat production. Exercise in extreme conditions can cause significant dehydration in as little as 30 minutes.

When the signs and symptoms of dehydration are overlooked or ignored, athletes can quickly fall victim to heat exhaustion. Because of a large loss of body fluid, the circulatory system can collapse, causing a sudden drop in blood pressure, which can lead to unconsciousness. Most athletes are oblivious to the subtle effects of dehydration and heat injury (*muscle cramps, nausea, dizziness, thirst, growing fatigue, irritability, inability to mentally focus*), in large part because they are so accustomed to experiencing these symptoms. There are many warning signs leading up to heat exhaustion which will, when heeded, allow you the opportunity to prevent this serious medical situation.

Our bodies are constantly fluctuating between stages of hydration. Athletes need to drink regularly because thirst is not a reliable indicator of either dehydration or fluid needs. Thirst mechanisms don't kick in until an athlete has lost 2% of body weight as sweat—at this level physiological function and sports performance is already impaired.

Nearly all the bio-chemical reactions that occur in body cells depend on water and electrolyte (sodium, potassium, calcium, chloride, phosphates, magnesium, etc.) balance. These balances are not only vital to maintaining life but also affect physical and mental performance. Our sweat contains a variety of these electrolytes.

The amount of fluid required for any athlete is dependent on how much sweat will be lost during exercise. During intense activity, athletes can lose up to two cups (one pound) of sweat for every 300 calories burned, depending on the weather conditions. Athletes with high body fat percentages can dehydrate faster under the same conditions. Body fat deters heat loss so these athletes have more trouble cooling the body. It can take up to 60 minutes for 20 ounces of fluid to empty from the stomach and be absorbed by the intestine and blood stream, thus drinking before exercise is a good practice.

Sports Drinks

Athletes should begin all sports activities well hydrated. While water is by far the most popular fluid choice during exercise, sports drinks can actually do a better job of hydration, while also providing other benefits that water does not. Plain water, although a good thirst quencher, is a poor rehydrator. The four primary benefits to consuming a properly formulated sports drink are:

- Encourage voluntary fluid intake
- Stimulate fast absorption
- Promote rapid and complete rehydration
- Improve performance

Thirst is driven by two key physiological changes: a rise in the concentration of sodium level and a drop in blood volume. Whenever we sweat, part of that sweat comes from blood. And by virtue of the fact that we lose more water molecules from the blood than we do electrolytes, plasma-sodium concentration – the saltiness of the blood – rises, which stimulates thirst. But if sweat is replaced by plain water, the plasma sodium concentration falls, which reduces thirst.

Fluids are absorbed through the stomach and into the bloodstream faster when their osmolality closely matches that of body fluids such as blood. Sports drinks contain electrolytes and carbohydrates, whereas water doesn't, so water doesn't reach the bloodstream as quickly.

Another advantage of sports drinks over water with respect to hydration is that the sodium content of sports drinks stimulates thirst, so athletes usually drink more fluid. Also, the calories in sports drinks have been shown to increase energy and endurance, limit the immune system suppression that sometimes follows hard workouts, reduce exercise-induced muscle damage, and promote faster recovery.

The key to rapid and complete rehydration is to provide enough electrolytes in the rehydration beverage to serve as an osmotic impetus to restore and maintain extra-cellular fluid volume, including blood volume. And this depends upon ingesting both the fluid as well as the electrolytes that are lost in sweat.

Ingesting a sports drink during intense exercise maintains blood glucose levels and promotes the uptake of carbohydrate into muscle cells. This in turn increases the use of carbohydrates as fuel by muscle and brain. Sustaining carbohydrate oxidation benefits performance in a wide variety of tasks, including maintaining motor skills in the latter portions of practice and games.

NOTE: Be careful to avoid any drinks that contain such supplements as caffeine, ephedrine or other stimulants.

Monitoring Hydration

Of course, it is important that athletes have a good idea of just how much sweat they lose during a typical practice or game so that they can judge how much fluid to ingest. This is most easily accomplished by having athletes record a nude body weight before and after practice. Any weight deficit represents a failure to drink adequately. For example, if an athlete weighs 178 lb before practice and 176 lb after practice, the 2-lb difference reflects the need to drink an additional 32 oz of fluid in future practices.

Your best bet is to monitor urine color and frequency of urination. Pale yellow urine without a strong smell is a good sign that plenty of fluid is on board for waste excretion. *(But don't judge your urine color within a few hours after taking vitamin supplements, since the unused vitamins, particularly the B vitamin riboflavin, turn your urine a bright yellow.)* Frequent urination (*at least every 3 hours*) is another good sign that you're getting enough fluid.

A urine color chart can be accessed at <http://at.uwa.edu/admin/UM/urinecolorchart.doc>

NATA - Hydration Recommendations

- Drink about 20 ounces of cool water (50-59°F) 1 to 2 hours before you exercise.
- Drink about 7-10 oz. of cool water or a sports drink 15 minutes before you exercise.
- Drink about 7-10 oz. of cool water or sports drink every 10-20 minutes during exercise.
- Drink about 20-24 oz. of cool or a sports drink within 2 hours after exercise.
- Avoid soft drinks, juices or beverages with carb concentrates greater than 8% before and during exercise.

Conclusion

Dehydration is a common condition that can affect the health and performance of athletes. Having coaches and parents encourage, and athletes follow an individualized hydration program, is one of the most effective ways to prevent dehydration to help keep athletes safe and performing at their best. The simple truth is that no other nutritional intervention comes close to providing the performance-enhancing effects of staying well hydrated. The most important point is to drink fluid, whether it's water or a sports drink. All athletes can learn to become better drinkers, and procedures should be put in place to assure that they do.

References:

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