

Hydration

By Ryan Mathias, CPT

What is Hydration?

Hydration is a balance of fluids in the body, or having adequate fluids within the body tissues. There are many factors which affect the balance of fluids within the body as our systems are constantly functioning and changing. Fluid balance will change depending upon activity, temperature, electrolyte balance, fluids consumed and many other factors. To stay hydrated, simply follow these Hydration Practices:

Hydration Practices

- Always carry fluids
- Consume water regularly throughout the day
- Drink 1 Liter of water within one hour of first waking up
- Drink at least 0.7oz X Bodyweight of water during active days
- Consume 1/2 Liter of a 6% saturated (60g per 1 Liter) solution of carbohydrates in sodium water (400-500mg per Liter) for each hour of your training
- Consume an extra 1 Liter of water, or more, when exposed to hot conditions

Why is Hydration Important? Effects of Dehydration.

Hydration is important because even a slightly dehydrated fluid balance can have negative effects on your body's systems, health and overall performance. The effects of dehydration affect all tissues within the body. The blood is the smallest fluid compartment in the body, which also regulates the fluid within the surrounding cells, so fluid loss affects the cardiac system the most. This is due to a decrease in blood plasma volume, which holds a large amount of oxygen and allows for normal cardiac output. This loss also decreases the blood flow to skin, which is a mechanism used to cool the blood, and decreases sweat rate therefore increasing core temperature. An increase in core temperature increases the likelihood of heat exhaustion and other dangerous heat related illness. The effects of dehydration can also have a great effect on athletic performance. **¹A fluid loss of even 2-3% (% of bodyweight) can decrease your VO2 Max (aerobic performance/ the amount of oxygen the body can use) by 5% and fluid loss of 5% can decrease work capacity by 30% (fluid loss % based upon bodyweight).** Those are major effects occurring after only slight dehydration. The effects of dehydration are a major concern for endurance athletes that compete continuously for over 1 hour, but there is also a concern for athletes performing high intensity exercise. **¹It has been found that a fluid loss of only 2.5%, prior to exercise, can decrease the capacity for high intensity exercise, such as sprinting or powerlifting, by 45%.** That is nearly half of the athlete's work capacity decreased just by not staying hydrated before performing. Even for non-active individuals hydration is important for proper body function. A constant state of dehydration leads to frequent headaches or migraines, rough skin, decreased muscular function, decreased joint function, joint pain, decreased kidney function and multiple health problems. Many health and performance concerns can be alleviated by simply staying hydrated daily.



How to Stay Hydrated.

Luckily, our bodies are smart and they do not give up fluid easily, so normal hydration is not difficult to maintain. The kidneys are used to filter the blood, removing waste, and maintain fluid balance within the body. There is a constant battle between the pull of fluids inside the body versus the pull of fluids out of the body. The side which has the most pull will take most of the fluids. If the pull is too great in one direction or the other, there is an imbalance that will have negative effects. To be in fluid balance, the pull of fluids out of the body should be equal, or slightly greater, than the pull of fluids inside the body. If the pull of fluids is shifted towards a pull inside the body, then you are in a state of dehydration. This pull is used to maintain a constant blood plasma volume, which then brings fluids to all other cells within the body. The pull of fluids out of the body is based on the amount of waste products that need to be removed through urine. If there is a greater pull of fluids out of the body through urine then you are either hydrated or there is a major amount of waste product that needs to be removed. This waste can be excess sodium, or other used electrolytes, proteins and nitrogen, from broken down cells, or toxins within the body.

In the kidneys, Sodium, Water and Glucose are filtered together and move together. One of the major functions of sodium, an electrolyte [Na⁺], is to help maintain fluid balance within the body's cells. In the body, where sodium goes so too does water in order to maintain a constant concentration gradient, or balance of fluids compared to particles in and out of the cells. Also, for every gram of carbohydrates in the body, in the form of glycogen, there are 2.7g of water attached to it. This gives carbohydrates within fluids an advantage for hydration. If there is sodium and carbohydrates within a water based drink, such as sports drinks, then there is a large pull towards fluids inside the body during absorption and filtration. This is why it is important to utilize appropriately concentrated sports drinks during long duration exercise to stay hydrated. **The most optimal concentration of carbohydrates in water has been found to be 6% concentration.** That is 6g per 100mL or 60g of carbohydrates per Liter of water. The amount of sodium needed within the solution varies depending upon the individual, but it is an important part of replenishment. The standard sodium content should be enough to taste like Ocean water, or about 400-500mg per Liter of water. It was also found that cold fluids moved through the stomach faster allowing for sooner absorption in the intestines, so keep fluids cool during exercise, when possible. **To stay hydrated during exercise sessions exceeding one hour, continuous or not, drink ½ Liter of water with about 30g of fast digesting carbohydrates, in the form of sugar, for every hour of activity.**

Throughout the day manage fluid intake by consuming water. You should consume the same amount of water that you lose throughout the day so that fluid in equal fluids out. This will help to maintain a state of hydration while allowing for urine production to remove waste products. **For individuals with a high activity level, drink a minimum of 0.7oz per pound of bodyweight to stay hydrated while removing the waste product from excessive muscle contractions.** During hot days, consume at least one extra Liter of water to account for the excess fluid loss from skin dissipation, or sweat.



Final Words

Overall, staying hydrated is not difficult but if neglected it can have major negative effects on your body's ability to perform and function properly. The first step to staying hydrated is being prepared. If you are going to be away from a water source for a long period then carry enough fluids with you. Think ahead and know what you need to consume for the activity you are doing. Also, learn to enjoy water. You should not constantly be craving water, as that is a sign of dehydration, but you should not dread every drink you take. Water should make up a majority of the fluid you drink so have no complaints about the taste. It takes some dedication to consume a large amount of fluid daily for active individuals, but it is the same dedication it takes to be fit. By neglecting to stay hydrated you are neglecting to maintain a healthy functioning body. Just be consistent and you will find it is not as hard as you may think. Stay strong, stay healthy, and stay hydrated.

Strength to You,

Ryan Mathias, CPT
MathiasMethod.com

1 = Gleeson, M. Ph.D., Jeukendrup, A. Ph.D. (2010) Sports Nutrition, Second Edition. Excerpt.

<http://www.humankinetics.com/excerpts/excerpts/dehydration-and-its-effects-on-performance>

