

HYDRATION

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What is it?

Water is the main component of the human body and makes up about 60% of the total body weight. Total body water is different for each individual based on body composition; fat-free body tissues are about 75% water, while fat tissue is approximately 10% water.

Every day, water is lost through breathing, sweating, urination, and bowel movements. If water and electrolyte losses are not replaced, then the individual will dehydrate. Dehydration is defined as a greater than 2% decrease in body weight due to water loss. Dehydration not only decreases athletic performance, it can put an individual at risk for serious conditions including heat illnesses and rhabdomyolysis (a breakdown of muscle tissue that releases damaging proteins and chemicals into the blood).

The primary mechanism of fluid loss for an exercising athlete is sweating. The sweat characteristics (e.g., sweat rate, electrolyte content) of each athlete are unique and there is considerable variability between individuals. Sweating is further influenced by the type of physical activity, equipment (e.g., football helmet, pads), clothing, duration and intensity of exercise, and environmental conditions. The rate at which a person sweats also depends on individual characteristics such as body

weight, genetics, acclimatization, and metabolism. For example, an American football player (large body mass and wearing protective equipment) will sweat a great deal more than a cross country runner training in the same hot environment over a similar duration; 8.8 liters per day compared to 3.5 liters per day, respectively on average. Sodium is the predominant electrolyte lost in sweat; other electrolytes are lost in sweat but to a lesser degree including chloride, potassium, calcium, and magnesium. During prolonged (greater than 1 hour) of intense activity, electrolytes may need to be replaced.

For the body to function properly, water losses must be replenished by consuming beverages and foods that contain water. On average, food provides about 20% of total water intake. The Institute of Medicine recommends that men take in approximately 13 cups of fluid per day while women require about 9 cups of fluid per day. Remember, fluid can be in the form of food and beverages, so the recommended “eight 8-ounce glasses of water a day” is a roughly accurate recommendation for a healthy adult in a temperate climate not exerting themselves beyond normal day-to-day activities. Hydration and fluid replacement before, during, and after exercise can have a significant impact on an individual’s performance and protect against serious medical conditions associated with dehydration.



Fluid Replacement

Before Exercise:

- Slowly drink 12-20 ounces of fluid at least 4 hours before exercise
- If no urine is produced or the urine is dark, then consume another 8-12 ounces about 2 hours prior to exercise
- Consider ingesting a high sodium beverage to counteract anticipated sweat losses, especially when exercising in heat
- Avoid beverages high in glycerol (sugar) as this may cause abdominal cramping, increase the risk of having to urinate during competition, and provides no clear performance advantage

During Exercise:

- The amount and rate of fluid replacement depends on sweat rate, exercise duration, and opportunities to drink. However, a good rule of thumb is to drink when you are thirsty.
- ½ to 1 cup (4-8 ounces) of water every 15 minutes should suffice for short bouts of exercise (less than 1 hour)
- During prolonged exercise (greater than 1 hour), the optimum fluid replacement beverage strikes a balance between electrolytes and carbohydrates that taste good and is efficient in providing fuel and hydration
- Avoid over consumption of fluid beverages as this can result in low sodium levels known as hyponatremia

After Exercise:

- If time allows, consumption of normal meals and beverages will restore fluid losses
- Individuals needing a rapid and complete recovery following a prolonged exercise activity can drink 3 cups (24 ounces) of fluid for every pound of body weight lost within the first 0-60 minutes after competition; another 1-2 cups (8-16 ounces) of fluid should be consumed between 60-120 minutes following exercise
- Fluids containing sodium will help the athlete to hold on to the fluid taken in

Summary

- Dehydration occurs when fluid losses are not replaced by fluid intake
- Dehydration leads to decreased athletic performance and can predispose to serious medical conditions such as heat stroke
- Sweating is the primary form of fluid loss when exercising
- Sweating varies greatly from person to person so individualized fluid replacement plans provide optimal results
- Use thirst, urine color and urine volume as general indicators of hydration status

Water is sufficient for short bouts of exercise, but for exercise lasting greater than 1 hour, a drink with carbohydrates and electrolytes is more appropriate

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