

Dehydration and Heat Injury

From

<http://www.rice.edu/~jenky/sports/dehydration.html>

The purpose of this article is to familiarize you with conditions that lead to dehydration and heat illness, and to show you ways to prevent it.

Humidity is not your friend The rate of sweating is higher in humid conditions but the cooling is less. The reason is that because the air is already very saturated with water, sweat can't evaporate. Sweat that beads up and rolls off doesn't function in the cooling process. However, this "futile sweat" does deplete the body of vital water and salt. As dehydration progresses cooling becomes more difficult. Performance drops and heat injury becomes a real threat.

Recognizing symptoms of heat injury There are three stages to heat illness; *heat cramps, heat exhaustion, and heat stroke* -- listed in order of increasing severity. Often the border between them is blurred into a continuous spectrum. Heat cramps are due to muscle spasms and often occur in the arms, legs, or abdomen. They are thought to be caused by dehydration and loss of salt and other electrolytes. Heat exhaustion is due to more profound loss of water and electrolytes. It is characterized by generalized weakness, headache, dizziness, low blood pressure, elevated pulse, and temperature elevation as high as 104 degrees F. Both can usually be treated by moving out of the sun, drinking fluids, and eating salty food.

Heatstroke is a life threatening condition and represents severe dehydration, high body temperature, and a shut-down of the cooling mechanisms. The athlete may be delirious or comatose, and half of the victims have stopped sweating. The pulse is rapid and weak, the blood pressure is low and body temperature is greater than 105° degrees F. The oral temperature is notoriously inaccurate in these circumstances. Damage to the brain, heart, lungs, kidneys and other organs may occur. Sometimes despite the best medical care, death is the end result.

Emergency treatment of heatstroke

- Call 911
 - Remove the patient from direct sunlight
 - Remove the patient's clothing
 - Wet the body surface and fan to promote air movement and evaporation
 - Rub the skin with bags of ice
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Prevention

- **Clothing** Your choice of clothing can influence your cooling efficiency. Light colored clothing reflects light and so is cooler than dark colored clothing.

Loose, lightweight material allows for better air circulation and facilitates evaporation of sweat. Clothing that is dry slows down evaporation of sweat, but once wet, cooling continues. Thus, changing into dry clothes during transitions is not a good idea.

- **Adapting to the heat** Heat acclimatization is a process by which the body makes adjustments to promote better cooling in hot environments. Sweat becomes more dilute. The threshold at which sweating begins is lowered and the sweat rate is increased. Make sure that you are properly adapted by training in conditions that you will experience during competition.
- **Some medications interfere with cooling** Certain drugs may cause dehydration or interfere with sweating. Antihistamines and some blood pressure medications decrease sweating. Caffeine and alcohol are diuretics and thus cause your body to lose water. You should avoid their use for several days prior to the competition.
- **Drink before, during, and after** Hydrate thoroughly the day before the competition. How do you know if you are drinking enough? A good sign of hydration is the output of large volumes of clear, dilute urine.
- **Hyperhydrate** just before the start of competition. Drinking approximately 13 - 20 ounces of cold water or an electrolyte solution can help delay the process of dehydration. Drinking 5 - 8 ounces every 10 - 15 minutes is probably the best way to attempt to stay hydrated while competing. For some people, drinking a lot causes discomfort and a feeling of being "bloated". Thus guzzling a liter once per hour will likely cause problems. Also realize that the more dehydrated you get the harder it is for your GI system to absorb what you drink. Dehydration also causes a variety of GI symptoms (nausea, cramping, and diarrhea). You must determine and plan your hydration strategy ahead of time.

Choice of fluid

For competitions lasting less than 1 hour, water alone is adequate. For longer competitions, there are many commercially available sports drinks. The most important features are taste, carbohydrate and sodium content. Taste is important, because if you don't like it you won't drink it.

Why is Salt important

Sweat contains between 2.25 to 3.4 grams of sodium chloride per liter. It is advisable to increase salt intake for several days before weekend competition.