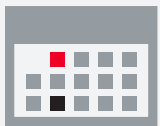


# HEAT SAFETY: TOOLS AND TIPS

- Heat-related illnesses can arise as a consequence of exercising in a hot environment. Heat illnesses include heat syncope (fainting), whole-body muscle (“heat”) cramps, heat exhaustion and heat stroke.
- Heat-related problems can be prevented with appropriate planning, vigilance and action plans.



## ALLOW FOR HEAT ACCLIMATION

One of the best methods for improving heat tolerance and decreasing the risk of developing a heat illness is to gradually acclimate to exercise in hot environments. Heat acclimation is a series of physiological adaptations, including increased sweating and improved cardiovascular function, which occur with repeated exposure to exercise-heat stress. Improved heat tolerance occurs over the course of 10-14 days of aerobic exercise in a hot environment. When beginning a heat-acclimation regimen it is important to start slow and gradually increase the intensity and duration of activity.



## COOL THE BODY

Cooling techniques prior to and during exercise, such as sucking on ice chips or drinking an ice-slurry, can attenuate the increase in body core temperature experienced while training in hot weather. Preventing significant dehydration by replacing sweat fluid losses can also be an effective strategy to keep the body cool.

Heat stroke is a potentially life-threatening condition in which body core temperature rises to > 104°F (40°C) (measured by rectal thermometer only) and requires emergency medical attention and rapid body cooling. If heat stroke is suspected, call 911. The athlete should be immediately immersed in a tub of cold water with supervision by an athletic trainer or adult in charge and 911 should be called. The goal when treating a heat stroke victim is to lower body core temperature to 102°F (38.9°C) or less within 30 minutes of collapse. The water should be ~35°F (1.7°C) to 59°F (15.0°C) and continuously stirred to maximize cooling. The athlete should be removed when body core temperature reaches 102°F (38.9°C) to prevent overcooling. If cold-water immersion is not available, alternative cooling modalities, such as dousing with cold water (e.g., cold shower) or covering the entire body with wet ice towels, is advised.



## ADOPT A HYDRATION STRATEGY

Preventing significant dehydration helps reduce an athlete’s risk of heat illness and can help the athlete maintain a high level of performance. Proactive steps athletes can take to avoid dehydration include:

- Throughout the day:** Check urine. If it looks like lemonade (pale yellow), that’s a sign of good hydration. If it looks like apple juice it is a sign of dehydration. If it is clear, the athlete may be overhydrated.
- During activity:** Weigh in and out before and after activity. Athletes should drink enough fluid to prevent > 2% loss of body weight (i.e., 2% dehydration). For example, a 2% weight loss would be 3 lbs in a 150-lb athlete. Overdrinking should also be avoided.
- After activity:** Replace fluid losses completely. If the athlete needs to train or compete again in less than 24 hours, he/she should consume 20 oz of fluid for each pound (16 oz) of body weight lost. The additional volume compensates for the diuresis stimulated by rapid consumption of large volumes of fluid.

It is recommended that sodium be consumed with water to help stimulate thirst, replace sweat electrolyte losses and retain ingested fluids. Providing a chilled beverage with the addition of flavor and sweetness can also help improve beverage palatability and voluntary fluid intake.



## KNOW THE RISK FACTORS

Be aware of the factors that increase an athlete’s risk of heat illness. Contributing factors include intense or prolonged exercise with minimal breaks, high humidity and/or temperature, repeated days of exposure to prolonged exercise-heat stress, failure to acclimate to the heat, being in poor physical condition or overweight, wearing too much clothing or protective equipment, dehydration, poor diet and/or sleep and having a history of heat illness.

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## BUDDY UP AND KNOW THE SIGNS

Encourage athletes to buddy up with a teammate and watch out for each other when it's hot and humid. They should know the signs and symptoms of heat illness, which can include headache, weakness, fainting, poor concentration, lightheadedness or fatigue. The main criteria for the diagnosis of heat stroke is 1) a body core temperature  $> 104^{\circ}\text{F}$  ( $40^{\circ}\text{C}$ ) and 2) central nervous system (CNS) dysfunction. The most accurate measurement of body core temperature in this situation is via rectal thermometry. CNS dysfunction can manifest as disorientation, confusion, loss of balance, irritability, irrational or unusual behavior, nausea, vomiting, collapse, loss of consciousness and coma.



## BE FLEXIBLE

An important step in avoiding heat illness is adjusting practice or game length and intensity based on the environmental conditions. Athletes should avoid prolonged and high-intensity activities during the warmest time of day (10 a.m. to 4 p.m.) and seek shade when possible. As advocates for the athlete, athletic trainers should be empowered to make decisions to alter or cancel events as they deem appropriate.



## DRESS FOR THE WEATHER

Light-colored (to minimize solar radiant heat gain), loose-fitting (for optimum ventilation, as tight or poorly ventilated clothing reduces the convective flow of air over the skin surface) clothing made of moisture-wicking fabric (to allow evaporation of sweat) should be worn while exercising in the heat. Protective equipment, such as helmets and pads, should be limited during situations of intense/prolonged exercise-heat stress, as they add weight and act as a barrier to evaporative cooling.



## FIND TIME FOR RECOVERY

Rest and recovery are an essential part of avoiding heat illness. During days 1-5 of the heat-acclimatization period (or initial exposure to exercise in a hot environment, e.g., preseason condition or training camp in summer) athletes should not participate in more than one practice session (lasting no more than 3 hours) per day. When two-a-day practices begin (after Day 5), total practice time should not exceed 5 hours. In addition, the two practices should be separated by at least 3 continuous hours in a cool environment. Athletes should attempt to get 6 to 8 hours of sleep a night and sleep in a cool environment.



## MAINTAIN A HEALTHY DIET

Athletes need to think about fueling before, during and after physical activity. In addition to consuming sufficient fluids and sodium to maintain hydration, athletes should also make sure to consume adequate carbohydrate to fuel activity. During most types of exercise, including endurance and stop-and-go sports, carbohydrate is the primary fuel source for muscle activity. Exercise in the heat can accelerate the use of carbohydrate, thus adequate replenishment is important to help mitigate fatigue. Protein ingestion is important for post-exercise muscle recovery.



## HAVE AN EMERGENCY PLAN

All facilities where athletes may be engaging in practice or competition should have an emergency action plan in place. This plan should include a method to contact medical assistance (call 911) in an emergency. In addition, an ice bath should be kept nearby so the sports medicine staff can immerse athletes suffering from heat stroke. The sports medicine staff must educate relevant personnel (e.g., coaches, administrators, security guards, athletes) about preventing exertional heat illness and the policies and procedures that are to be followed in the event of an incident.

### Sources:

Casa DJ, Csillan D, et al. Preseason Heat-Acclimatization Guidelines for Secondary School Athletics. *Journal of Athletic Training*. 2009;44(3):332-333.

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