

## Exertional Heat Related Illnesses

(Resource: Korey Stringer Institute)

### Exercising and Athletic Participation in Hot Weather

The main problem associated with exercising in the hot weather is water loss through sweating. Water loss is best replaced by allowing the athlete unrestricted access to water. Water breaks two or three times every hour are better than one break an hour. Probably the best method is to have water available at all times and to allow the athlete to drink water whenever he/she needs it. Never restrict the amount of water an athlete drinks, and be sure the athletes are drinking the water. The small amount of salt lost in sweat is adequately replaced by a balanced diet including whole foods, fruits and vegetables. Athletes that appear to have heat stroke or heat exhaustion should be cooled by ice water immersion.

### Dehydration

- Dehydration can affect an athlete's performance in less than an hour of exercise. Sooner if the athlete begins the session dehydrated.
- Dehydration of just one to two percent of body weight (only 1.5-3 lbs., for a 150-pound athlete) can negatively influence performance.
- Dehydration of greater than three percent of body weight increases an athlete's risk of heat illness (heat cramps, heat exhaustion, heat stroke).
- High body fat athletes can have a harder time with exercise and can become dehydrated faster than lower body fat athletes working out under the same environmental conditions.
- Poor acclimatization to heat or lower fitness levels can greatly contribute to an athlete's dehydration problems. This is important with the first practices of year, especially in the summer.
- Certain medications or fevers can greatly affect an athlete's hydration status.
- Environmental temperature and humidity both contribute to dehydration and heat illnesses.
- Clothing, such as dark, bulky, or rubber protective equipment can drastically increase the chance of heat illness and dehydration.
- Wet bulb globe temperature measurements should be taken 10-15 minutes before practice, and the results should be used with a heat index to determine if practices or contests should be started, modified or stopped.

### Recommendations For Hydration To Prevent Heat-Related Illness

- Beverages containing caffeine will affect hydration since urine production will increase compared to non-caffeinated beverages.
- Carbonated beverages are found to cause decreased voluntary fluid intake.
- Alcoholic beverages are inappropriate for high school athletes.
- Drink according to a schedule based on individual fluid needs. Drink before, during and after practices and games. Drink 17-20 ounces of water, two to three hours before exercise. Drink 7-10 ounces of water 10 to 20 minutes before exercise.
- Drink early – By the time you're thirsty, you're already dehydrated. In general, every 10-20 minutes drink at least 7-10 ounces of water or to maintain hydration, and remember to drink beyond your thirst. Drink fluids based on the amount of sweat and urine loss. Within two hours, drink enough to replace any weight loss from exercise.
- If exercise lasts more than 50 minutes, water should be provided during the session.

### Heat Stroke

1. **THIS IS A MEDICAL EMERGENCY – DELAY COULD BE FATAL. ACTIVATE YOUR EMERGENCY ACTION PLAN BY CALLING – 911.**

2. A RECTAL TEMPERATURE (only taken by a qualified healthcare professional; athletic trainer, nurse, EMT, physician; not the coach) NOT ORAL, AURAL, OR TEMPORAL IS DAGNOSTIC OF HEATSTROKE. Other methods of temperature have given false core body temperatures and caused delay in care. If you are unable to obtain a rectal temperature it is safer to cool the athlete than delay cooling pursuant to waiting for a medical professional to take a rectal temperature. Immediately cool the athlete while waiting for transfer to a hospital. Remove equipment and immerse body in ice-cold water and keep cooling athlete.
3. Despite the many ways athletes can be cooled, immersion therapy has the best cooling rates. Ice water immersion should be your choice of cooling. A plastic kiddie pool or large plastic tub filled with water and with ice on standby should be available at all practices and games. Continue cooling efforts until EMS arrives. Recommendation is to continue cooling the athlete until core temperature is <100 degrees Fahrenheit.

### **Heat Exhaustion**

1. Contact licensed health care provider.
2. Cool body as you would for heat stroke while waiting for medical personnel. Activate your emergency action plan.

### **Heat Stress And Athletic Participation**

Sports practices and contests are conducted in very hot and humid weather in many parts of the United States. This can lead to heat-related illnesses. Most of the heat-related problems have been associated with football, due to the special equipment and uniforms needed. From 1995 through the 2005 football season there have been 19 high school heat stroke deaths in football. This is not acceptable. Heatstroke deaths are fully preventable in high school sports if the proper precautions are taken.

During hot weather conditions the athlete is subject to the following:

**Heat Cramps** – Heat cramps are a mild heat illness that can be easily treated. These intense muscle spasms usually develop after an athlete has been exercising for a while and has lost large amounts of fluid and salt from sweating.

**Heat Syncope** – Weakness, fatigue and fainting due to loss of salt and water in sweat and exercise in the heat.

**Heat Exhaustion** – Heat exhaustion is a moderate heat illness that occurs when a child continues to be physically active even after he or she starts suffering from ill effects of the heat, like dehydration. The child's body struggles to keep up with the demands, leading to heat exhaustion.

**Heat Stroke** – Heat stroke is a severe heat illness that occurs when an athlete's body creates more heat than it can release, due to the strain of exercising in the heat. This results in a rapid increase in core body temperature, which can lead to permanent disability or even death if left untreated. An acute medical emergency related to thermo-regulatory failure, associated with nausea, seizures, disorientation, and possible unconsciousness or coma. It may occur suddenly without being preceded by any other clinical signs. The individual is usually unconscious with a high body temperature and a hot dry skin, (heatstroke victims, contrary to popular belief, may sweat profusely).

It is believed that the above-mentioned heat stress problems can be controlled provided certain precautions are taken. The following practices and precautions are recommended:

1. Each athlete is required to have, prior to participating in any way, a physical exam with a medical history when first entering a program and an annual health history update, good for 13 months. History of previous heat illness and type of

training activities before organized practice begins should be included.

2. It is clear that top physical performance can only be achieved by an athlete who is in top physical condition. Lack of physical fitness impairs the performance of an athlete who participates in high temperatures. Coaches should know the **physical condition** of their athletes and set practice schedules accordingly. Conditioning should progress over a period of time. Coaches should not assume that their athletes come into the first practice in good condition (despite being encouraged to do so.)

3. Along with physical conditioning, the factor of acclimatization to heat is important. Acclimatization is the process of becoming adjusted to heat and it is essential to provide for **gradual acclimatization to hot weather**. It is necessary for an athlete to exercise in the heat if he/she is to become acclimatized to it. It is suggested that a graduated physical conditioning program be used and that 80% acclimatization can be expected to occur after the first 7 to 10 days. Final stages of acclimatization to heat are marked by increased sweating and reduced salt concentration in the sweat.

4. The old idea that water should be withheld from athletes during workouts has **no scientific foundation**. The most important safeguard to the health of the athlete is the replacement of water. Water must be on the field and readily available to the athletes at all times. It is recommended that a minimum ten minute water break be scheduled for every twenty minutes of heavy exercise in the heat. Athletes should rest in a shaded area during the break. **Water should be available in unlimited quantities**. Check and be sure athletes are drinking the water. Replacement by thirst is inadequate.

5. Test the air prior to practice or game using a wet bulb, globe, temperature index (WBGT index) for the State of Connecticut: (Grundstein et al. 2015) .

There is also a weather guide for activities that last 30 minutes or more (Fox and Mathews, 1981) which involves knowing the relative humidity and air temperature.

Cat 1	Activity Guidelines
< 76.1	Normal Activities – Provide at least three separate rest breaks each hour with a minimum duration of 3 min each during the workout.
76.3 - 81.0	Use discretion for intense or prolonged exercise; Provide at least three separate rest breaks each hour with a minimum duration of 4 min each.
81.1 - 84.0	Maximum practice time is 2 h. <u>For Football</u> : players are restricted to helmet, shoulder pads, and shorts during practice. If the WBGT rises to this level during practice, players may continue to work out wearing football pants without changing to shorts. <u>For All Sports</u> : Provide at least four separate rest breaks each hour with a minimum duration of 4 min each.
84.2 - 86.0	Maximum practice time is 1 h. <u>For Football</u> : No protective equipment may be worn during practice, and there may be no conditioning activities. <u>For All Sports</u> : There must be 20 min of rest breaks distributed throughout the hour of practice.
≥ 86.2	No outdoor workouts. Delay practice until a cooler WBGT is reached.

Air Temp Danger Zone Critical Zone 70F 80% RH 100% RH RH = Relative Humidity 75F 70% RH 100% RH 80F 50% RH 80% RH 85F 40% RH 68% RH 90F 30% RH 55% RH 95F 20% RH 40% RH 100F 10% RH 30% RH

One other method of measuring the relative humidity is the use of a sling psychrometer, which measures wet bulb temperature. The wet bulb globe temperature should be measured prior to practice and the intensity and duration of practice adjusted accordingly. Recommendations are as follows:

6. Cooling by evaporation is proportional to the area of the skin exposed. In extremely hot and humid weather reduce the amount of clothing covering the body as much as possible. **Never use rubberized clothing.**
7. Athletes who are at high risk or who have a medical history, should be weighed each day before and after practice by the athletic trainer and **weight charts checked**. Generally a three percent weight loss through sweating is safe and over a three percent weight loss is in the danger zone. Over a three percent weight loss the athlete should not be allowed to practice in hot and humid conditions. Observe the athletes closely under all conditions. **Do not allow athletes to return to practice until they have adequately replaced their weight from fluid loss.**
8. Observe athletes carefully for signs of trouble, particularly athletes who lose significant weight and the eager athlete who constantly competes to the limit his/her capacity. Some trouble signs are nausea, incoherence, fatigue, weakness, vomiting, cramps, weak rapid pulse, visual disturbance and unsteadiness.
9. Teams that encounter hot weather during the season through travel or following an unseasonably cool period, should be physically fit, but will not be environmentally fit. Coaches in this situation should follow the above recommendations and substitute more frequently during games.
10. Know what to do in case of an emergency and have your emergency plans written with copies to all your staff. Be familiar with immediate first aid practice and prearranged procedures for obtaining medical care, including ambulance service.
11. Parents and Coaches Guide to Dehydration and Other Heat Illnesses in Children  
<https://www.nata.org/sites/default/files/heat-illness-parent-coach-guide.pdf>