TSM Towson Sports Medicine

Tips From the Training Room

For more information contact the athletic training staff at Towson Sports Medicine, 410-828-4TSM (4876).

What you need to know about Heat Illness and Hydration

Heat related Illness is a spectrum of disorders from the most mild heat edema to life threatening heat stroke. It occurs when there is a disruption in the normal homeostatic mechanism whereby environmental heat and metabolic production exceeds the heat dissipation from the skin through evaporation, radiation and convection. This disconnect results in the body's inability for the body to maintain a normal body core temperature (36.0 -37.5ºC. There are three aspects that are looked at when heat illnesses are involved; Body temperature, environmental factors and non- environmental factors.

Body temperature is affected by the following factors:

- Metabolic heat production
- Conductive heat exchange
- Convection heat exchange
- Radiant heat exchange
- Evaporative heat loss

Environmental factors:

- Ambient Air Temperature
- Relative Humidity
- Air Motion
- Amount of radiant heat from the sun or other sources

Non-environmental factors:

- Barriers to evaporation
- Dehydration
- Febrile Illness
- Chronic medical illness (cystic fibrosis, etc)
- Prior history of heat illness
- Medications/Drugs
- Electrolyte imbalance
- Poor physical conditioning

- Overweight or Obese Athletes- BMI greater than or equal to the 85% for age
- Insufficient recovery between events
- Not heat-acclimatized
- Inadequate prehydration
- Little sleep/rest
- Insufficient access to fluids and opportunities to rehydrate
- Current or recent illness (diarrhea, gastrointestinal distress, or fever)

There are four types of heat illness: heat cramps, heat syncope, heat exhaustion and heat stroke.

Heat Syncope

Heat syncope, is attributed to dehydration and reduction in cardiac output. This usually occurs within the first five days of exertion in the heat due to lack of acclimatization.

Signs and Symptoms:
- Pale or sweaty skin
- Hypotension and weak or thread pulse
- Normal or minimally elevated core body temperature

Treatment
- Move Athlete to shaded area
- Monitor vital signs
- Elevate legs above level of head
- REHYDRATE!!!! Oral or IV depending on tolerance
- Medical evaluation to rule out more serious cardiac or neurological abnormalities is warranted.

Heat Cramps

Heat Cramps are acute, extremely painful, involuntary muscle contractions most commonly in the extremities and abdominal muscles. It occurs during or after intense exercise sessions. Heat cramps are caused by excessive loss of water and electrolytes (most commonly sodium, chloride, or potassium), muscle fatigue, dehydration or a combination of the symptoms. Athlete should be questioned on the use of performance enhancing substances such as creatine, amino acids, or excessive protein.

Signs and Symptoms
- Profuse sweating
- Transient muscle cramps

- Muscular fatigue
- No systemic symptoms such as vomiting, diarrhea, or temperature elevation are present

Treatment

- Stop activity
- Replenish liquids: it is recommended that for every pound of water lost, should replenish with 16 oz of fluids
- Replenish electrolytes
- Mild prolonged stretching
- Ice massage of muscle in spasm
- Athlete unable to continue participation for remainder of day
    - Cramps are likely to re-occur if returned prematurely

Heat Exhaustion

Heat Exhaustion results from inadequate replacement of fluids lost through sweating; it occurs most frequently in hot humid conditions. The athlete may collapse, develop heat cramps and may become disoriented and light headed. The athlete will not be able to perform as well as they usually are able too.

Signs and Symptoms

- Persistent muscular cramps
- Generalized irritability
- Headache
- Weakness
- Fainting, dizziness, disorientation
- Nausea, vomiting
- Rapid pulse
- Chills
- Confusion
- Core body temperature < 104^{o} F (40^{o} C)

Treatment

- Remove excess clothing
    - Increases evaporative surface
    - Facilitates cooling
- Move to cool/shaded environment
- Cool with ice bags/towels
- FLUID REPLACEMENT
- Transfer and IV fluid replacement is required if:
    - Persistent vomiting
    - Vital sign abnormalities (low blood pressure or elevated heart rate)

- Recalcitrant muscle cramps

Heat Stroke

Heat Stroke is a serious, **life-threatening medical emergency**; it is clinically distinguished from heat exhaustion by a core body temperature greater than 40^{o}C and central nervous system changes (seizures, disorientation, delirium, loss of consciousness).

Signs and Symptoms

- Flushed, hot skin or profuse sweating
- Shallow breathing
- Rapid pulse
- Hypotension
- Mental status changes:
  - Irritability
  - Confusion
  - Loss of consciousness
  - Seizure

Treatment

- Essential to start with assessment of Airway, Breathing and Circulation assessment and management
- Activate EMS Immediately
- Lower body core temperature as quickly as possible
  - A large tub for emersion
  - Cool with ice bags/towels in axilla, groin, and neck
  - Remove excess clothing
  - Shade from heat

Return to play criteria for Heat exhaustion, Heat syncope and Heat cramps are the following:

- Gradually return the athlete based on directions from a physician
- Have a certified Athletic Trainer monitor the athlete during practice and games on a daily basis

Heat stroke:

- Physical activity is initially restricted
- The athlete needs to be cleared by the treating physician

Prevention

Prevention of heat illnesses is attainable through the education of coaches, parents and athletes on proper hydration, equipment, acclimatization, and practice times and duration based on environmental temperatures.

Review prevention techniques and signs and symptoms of heat illnesses with your athletes, coaches and parents prior to the season. Remind athletes to match fluid intake with sweat and urine loss. This can be accomplished by doing pre and post practice weights and drinking an additional 16 ounces of fluid for every pound of body weight lost. Schedule plenty of rest breaks for athletes that match the weather condition. Develop guidelines for event/practices occur during extremely hot weather.

Ensuring appropriate medical care

Always make sure that there is a Certified Athletic Trainer, doctor, EMT or a coach certified in first aid/CPR at all practices and games. Develop and practice an emergency action plan with the medical staff in case an athlete suffers from a heat illness. A pre-participation physical can warn medical staff of previous history such as past illness, medications, or heart conditions that can predispose to a heat illness.

Acclimatization

Acclimatization is the single most effective method of avoiding heat related illnesses. Acclimatization is the body's physiological response produced by repeated exposures to hot environments. To obtain proper acclimatization it can take up to 14 days. Proper hydration can improve induction and effect acclimatization. The first several exercise session should only last 15 to 20 minutes and should be light in activity. After this is successful completed, intensity and duration can progressively increase. Individuals that are well-acclimatized should train for 1-2 hours under similar heat conditions that they are competing in.

Hydration

Hydration is the key to optimal performance; fluid intake is based on length and intensity of activity, weather conditions, and individual differences in sweating rates. Water is essential in body functions such as:

- Transportation of nutrients/elimination of waste products
- Temperature regulation through sweating

- The best way to prevent dehydration is to "pre-hydrate"
  - Drink plenty of water throughout the entire day
  - 10-17 fluid ounces 2-3 hours before the event
  - 7-10 fluid ounces 10-20 minutes before the event
  - One fluid ounce is equivalent to one gulp.

- **AVOID** drinks that contain caffeine and alcohol.

- Drink cool water. Water that is at a temperature of 60-65 degrees Fahrenheit is easier for the body to absorb.

- Replenishment of fluids is very necessary – replace two cups of fluid for every pound lost.

- **TO MONITOR HYDRATION:**

    - Urine color = apple juice/dark colored urine means that the body is dehydrated.
    - You can also monitor hydration through body weight measurement—your weight should be back to baseline prior to the next practice or game.

- Water is the best source, but a sports drink is acceptable when exercising more than 1 hour.

- The guidelines below are highly recommended in keeping hydrated:

    - Drink before thirsty
    - Gulp don't sip
    - Avoid Caffeinated or carbonated drinks
    - Night before activity drink 16 oz of water
    - Drink another 16 oz upon waking
    - Should drink water or sports drink every 10-20 minutes during activity
    - Drink 20-24 oz after activity has ended or use number of pounds weight lost to calculate exact needs.

Dehydration

Dehydration occurs when the body contains an insufficient amount of water to carry out normal body functions. Dehydration is caused by inadequate fluid intake, excessive sweating, failure to replace fluid loss during and after activity, exercising in dry, hot or humid weather, and drinking only when thirsty. Dehydration can lead to heat illnesses and other potential life threatening conditions.