

SOCCER MEDICAL INFORMATION NUTRITION AND HYDRATION

Playing in the heat and humidity of Florida can be very demanding on the body.

Are you prepared? Are you well hydrated? Do you get enough to eat to last through a game, two games or even a week of games? Do you meet your nutritional needs for playing healthy?

The following is a summary of staying hydrated and nutritional guidelines for playing healthy.

HYDRATION

Dehydration of 1% to 2% of body weight begins to compromise physiologic function and negatively influence performance. Dehydration of greater than 3% of body weight further disturbs physiologic function and increases an athlete's risk of developing exertional heat illness (i.e., heat cramps, heat exhaustion, or heat stroke).

1% - 2% dehydration level is common in sports. It can be elicited in just an hour of exercise or even more rapidly if the athlete enters the exercise session dehydrated. The onset of significant dehydration is preventable when hydration protocols are followed:

- establish a hydration protocol for athletes
- Consider the unique features of each sport. The athlete must consume fluids to maximize hydration within the sports confines and rules.
- easily accessible fluids – athletes should begin all exercises well hydrated
- Proper pre-exercise hydration – athlete should consume approximately 500-600mL, 2 to 3 hours before exercise and 200-300mL, 10 to 20 minutes before exercise.
- Maintaining hydration status in athletes with high sweat rates, in sports with limited fluid access, and during high-intensity exercise can be difficult and special efforts should be made to minimize dehydration. Dangerous hyperhydration is also a risk of athletes who drink too much, based on published based on recommendations and not according to individual needs. High relative humidity limits body cooling and evaporation.
- Post exercise hydration, ideally completed within 2 hours, should contain water to restore hydration status, carbohydrates to replenish glycogen stores, and electrolytes to speed rehydration.

Consuming carbohydrates during the pre-exercise hydration session – 2 to 3 hours pre-exercise, along with a normal daily diet increases glycogen stores. If exercise is intense, consuming carbohydrates 30 minutes pre-exercise may also be beneficial.

Signs and symptoms of dehydration:

- thirst
- irritability and general discomfort
- followed by headache
- weakness

- dizziness
- cramps
- chills
- vomiting
- nausea
- head or neck sensations
- and decreased performance

Early diagnosis of dehydration decreases the occurrence and severity of heat illness. A conscious, cognizant, dehydrated athlete without gastrointestinal distress can aggressively rehydrate orally, while one with mental compromise from dehydration or gastrointestinal distress should be transported to a medical facility for intravenous rehydration.

Hydration Protocol for Athletes

- *This will only succeed if athletes, coaches, athletic trainers and team physicians realize the importance of maintaining proper hydration status and the steps required to accomplish this goal.
- *Educate athletes on the effects of dehydration on physical performance.
- *Inform athletes on how to monitor hydration status
- *Convince athletes to participate in their own hydration protocols based on sweat rate, drinking preferences, and personal responses to different fluid quantities.
- *Encourage coaches to mandate rehydration during practices and competitions, just as they require other drills and conditioning activities.
- *Have a scale accessible to assist athletes in monitoring weight before, during and after activity.
- *Provide the optimal oral rehydration solution (water, carbohydrates, electrolytes) before, during and after exercise. Implement the hydration protocol during all practices and games, and adapt it as needed.
- *finally, encourage event scheduling and the rule modifications to minimize the risks associated with exercise in the heat.

Athletes generally do not rehydrate to pre-exercise levels during exercise due to personal choice, fluid availability, or a combination of these factors. Since most fluid consumed by athletes is with meals, the presence of ample fluids during meals and adequate amount of time to eat are critical to rehydration. An athlete exercising in the heat will voluntarily ingest more fluid if it is chilled. An athlete who knows that rehydrating enhances subsequent performance is more apt to consume fluid before significant dehydration occurs, so appropriate education of athletes is essential.

Hydration helps prevent heat stroke, but there is no advantage to consuming fluid in excess of sweat loss. It is not necessary to over-hydrate the night before or during the hours prior to a long run or practice.

Teach athletes to drink for their needs. During training have them weigh in before and after a workout and learn to adjust fluid intake to minimize weight loss. If weight loss occurs:

- *rehydrate after activity is critical
- *drink 20-24 ounces of fluid for every pound of weight loss
- *eat foods with high water content – fruits and vegetables

*a sports drink beats plain water because it has sugars to fuel muscles and brain, flavoring to encourage drinking, and sodium to hold fluid in the body and help replace sweat loss.

Weight loss the first few days is fluid loss, not fat loss. Start slow. Athletes can not safely start full tilt in the stifling heat. Pace and duration should start slow and build slow.

Off field behavior also counts. Athletes sleeping poorly or ill, especially with vomiting, diarrhea or fever are more prone to heat stroke. The same applies to taking diuretics or drinking alcohol. Monitor all medications.

RECOGNITION OF HEAT ILLNESS

Heat-related illness has been a concern to participants in outdoor activity for centuries. Hot, humid weather is one of the leading causes of environmental distress in athletes. Heat stroke, second only to spinal cord injury, is one of the primary causes of activity-based death in high school athletes.

Heat-related illnesses are typically classified, in order of severity, as heat cramps, heat syncope, heat exhaustion and heat stroke.

HEAT CRAMPS

- *painful cramping of abdominal and extremity muscles
- *elevated body temperature

HEAT EXHAUSTION/SYNCOPE

- *can progress rapidly to heat stroke unless managed properly
- *exhaustion, nausea, vomiting and dizziness
- *weakness, fatigue and fainting
- *elevated body temperature

HEAT STROKE

- *acute medical emergency due to thermoregulatory failure
- *nausea, seizures, disorientation and possible unconsciousness or coma
- *hot, dry skin and high body temperature (105°F)

MANAGEMENT OF HEAT ILLNESSES

HEAT CRAMPS* cessation of activity

- *gentle passive stretching of affected muscles
- *drinking cool water or an electrolyte solution (low in sugar)
- *for severe symptoms treat as heat exhaustion

HEAT EXHAUSTION/SYNCOPE

- *remove the athlete from the hot environment and rest in a cool, shaded area
- *remove restrictive clothing – give fluids orally, if the athlete is conscious
- *apply active cooling measure such as a fan or ice towels if the core temperature is elevated

*refer to a physician to assess the needs of fluid/electrolyte replacement and further medical attention, especially if nausea and vomiting are present

HEAT STROKE

*this is a MEDICAL EMERGENCY

*activate EMS immediately

*monitor core body temperature and lower it as quickly as possible

*remove as much clothing as possible

*immersion in an ice bath has been shown to be the best method to decrease core temperature

*apply ice packs in the armpits, groin and neck areas

*continue cooling efforts until EMS arrives

In heat stroke, every minute counts. When core temperature is very high, body and brain cells begin to die, so fast cooling is vital. Using cold towels or splashing cold water on the face, head and neck provides a psychological boost but little physiological benefit. Field treatment is fast cooling. No faster way to cool exists than putting the athlete into an ice-water tub. Remove the athlete from the tub when rectal temperature drops to 102°F, and before shivering starts, to prevent overcooling.

Cool first and transport second. Send the heat stroke athlete to the hospital after cooling. With fast cooling, survival rate approaches 100%. In fact, fast cooling can allow athletes to walk away in good health. Heat stroke is often slow to evolve and the vigilant observer can detect early warning signs and avoid the worst outcome.

Early warning signs of heat stroke may include:

*irritability

*confusion

*apathy

*belligerence

*emotional instability

*irrational behavior

*giddiness

*undue fatigue

*vomiting

Paradoxical chills and goose bumps signal shut down of skin circulation, portending a faster rise in temperature. The player may hyperventilate to shed heat; this can cause tingling fingers as a prelude to collapse. Incoordination and staggering are late signs followed by collapse with seizure and/or coma. Many factors, such as environmental and personal, contribute to heat stroke is possible any time the air temperature is above 80°F and the relative humidity is above 40%.

Tips to protect yourself and your teammates include:

*improving your physical fitness and adjusting your body to the heat over several days lower your risk of heat stroke. Don't jump from an easy, air-conditioned life into a summer athletic camp.

*get fit first, and adjust to the heat for a week or two before formal practices begin by jogging 30-45 minutes a day in the heat in shorts and T-shirt. Be prepared.

*the highest risk for heat stroke occurs in the first days of training in hot weather. The largest and fittest athletes are the most heat-sensitive.

*on the field, read your body, don't defy Mother Nature, and never ignore early warning signs of illness. Train, don't strain.

*take full advantage of every rest break. Sit in the shade, take hats off, and get in front of a misting fan. Sit in a cold tub right after practice. The cooler you stay, the better you play.

*off the field, never skip meals, get plenty of fluids and get plenty of sleep.

*heat stroke is a medical emergency. Early recognition and proper treatment can save lives.

*you may be the first to notice early signs of heat stroke in a teammate or running buddy. If so, pull him/her out, cool him/her down, and get help fast. When in doubt, cool first and transport to the hospital second.

What to do to avoid heat stroke:

*come to the first practice physically fit and heat fit

*report fever or illness to the athletic trainer

*show all your medications to the athletic trainer

*avoid stimulants like ephedra

*stay hydrated

*favor sports drinks over plain water

*watch urine, should be plentiful and pale

*watch weight, early weight loss is fluid loss

*after a workout, drink 1 ½ pints of fluid for every pound of weight lost

*dizziness on standing up is caused by fluid and salt loss

Getting heat-fit takes time. Acclimation, much of which occurs in a week or two, leads to better drinking and the body holds onto water and salt; increasing blood volume so the heart pumps more blood at a lower heart rate.

Heat-fit athletes also sweat sooner, in greater volume, and over a wider body area, so they stay cooler. Athletes in the heat can sweat 1-2 L an hour and most athletes drink less than they sweat. The result is DEHYDRATION.

Dehydrating only 2% body weight can impair physical performance. Dehydration increases heart rate and decreases cardiac output. Dehydration drains mental sharpness and willpower along with muscle power and endurance. Over motivated athletes can overheat by doing too much too fast or trying to endure too long. Victims of heat stroke are described as "the hardest worker" or "determined to prove him or herself." During a hard practice on a hot day, the never-quit mentality can work against a player.

In summer sports, it is not the heat, but the heat AND humidity. Heat illness can advance quickly and early warning signs of heat stroke can be subtle. Yet early diagnosis and proper therapy can save lives; exertional heat stroke should be preventable.

Most research has implicated heat stress on the prior day as a factor. So a primetime for heat stroke is the day after an exhausting and dehydrating day in the heat. Physical fitness, especially aerobic fitness, confers some of the same physiological benefits as heat acclimation. Fitness also makes workouts less taxing. In contrast, lack of fitness increases risk of heat illness.

The cooler athletes stay, the better they play. In team sports, take frequent cooling breaks' provide shade, ice water, and misting fans for rest breaks. As the temperature rises, reduce practice pace and duration and increase rest breaks. Hold practices earlier and later, with more time between – time for rest, recovery and cooling.

Thirst mechanisms do not kick in until a player has lost about 2% of their body weight. Players often drink to quench their mouth thirst. If an athlete only drinks to quench their mouth thirst they may only be replacing about 1/2 to 1/3 of fluids lost.

Because of this, special emphasis must be placed on ensuring adequate fluid intake or fluid breaks before, during and after physical activity.

- *encourage athletes to bring their own water bottles

- *drink 4 to 8 ounces every 15 to 20 minutes during activity even if they do not feel thirsty

- *frequent fluid and rest breaks in the shade should be scheduled

After exercise young athletes need to replace fluid lost during exercise by drinking 16-24 ounces for each pound of weight lost. Juice or carbonated soda should NOT be used for fluid replacement during activity because they contain too many carbohydrates (10% to 20%). Avoid caffeinated beverages like iced tea and certain soft drinks because they promote diuresis.

Liquid meals are a safe and effective alternative for athletes who have difficulty eating prior to competition. They are also advantageous because they are high in fluid content, easily digestible and emptied quickly from the stomach. The post-event meal is very beneficial. Consuming carbohydrates within 30 minutes after a vigorous exercise followed by additional carbohydrates 2 hours later enhances muscle glycogen stores. This glycogen build-up exceeds that which would occur by consuming the same amount of nutrients later in the day.

NUTRITION

To meet the nutritional needs for activity and health, the training diet should provide about:

- *55% to 60% of total energy from carbohydrates

- *12% to 15% of total energy from protein

- *25% to 30% of total energy from fat

Use the Food Guide pyramid to make healthy and adequate decisions.

The body needs 6 basic nutrients for daily living. They are the following:

- *Carbohydrates
- *Protein
- *Fats
- *Vitamins
- *Minerals
- *Water

The new American Heart Association dietary guidelines include the following:

- *Eat a variety of fruits and vegetables. Choose 5 or 6 or more servings per day
- *Eat a variety of grain products, including whole grains. Choose 6 or more servings per day
- *Include fat-free and low-fat milk products, fish, legumes (beans), skinless poultry and lean meats
- *Choose fats with 2 grams or less of saturated fats per serving, such as liquid and tub margarines, canola oil and olive oil

Choose snacks from these foods:

- *fruits and juices
- *raw vegetables and low fat dips
- *low-fat cookies
- *low-fat crackers
- *plain unsalted popcorn
- *hard candy, gum drops
- *sugar, syrup honey, jam, jelly, marmalade – as spreads

SAMPLE 2000 CALORIE MENU

(50-60% total calories are from carbohydrates)

BREAKFAST

- 1 cup raspberries
- 1 1/2 cups of unsweetened cereal with 1/2 sliced banana
- 1 cup skim milk
- 1 slice whole wheat toast
- 1 teaspoon margarine
- 1 teaspoon jelly
- 1 cup skim milk

LUNCH

- Turkey pita pocket sandwich (2 slices whole wheat pita bread, 3 ounces lean turkey breast)
- 1/2 cup shredded lettuce
- 1/2 cup diced tomatoes
- 1/2 cup green peppers
- 1 tablespoon salad dressing
- 1 cup skim milk
- 2 fresh medium-sized peaches

DINNER

- 4 ounces broiled salmon with 3 tablespoons lemon juice and sprinkled with paprika

1 cup pasta
1 dinner roll
6 steamed broccoli stalks with sprinkled black pepper
Salad:
1 cup lettuce
¼ cup sliced mushrooms
½ cup sliced tomatoes
½ cup sliced carrots
1 tablespoon salad dressing
½ cup frozen unsweetened strawberries, sweetened with 1 teaspoon sugar
1 inch slice Angel Food cake
1 cup skin milk

The pre-event meal serves two purposes:

1. To prevent athletes from feeling hungry before or during activity
2. To supply fuel to the muscles during training and competition

Ideally this meal should consist of something that is easily digested and quickly emptied from the stomach, low in fat and protein and high in carbohydrates.

The goal for pre-event eating is to:

- boost liver glycogen stores
- prevent low blood sugar
- over-hydrate the body's fluid systems

The following are events that occur at different times and the schedule of when to eat.

EARLY MORNING EVENT

The night before the event you should eat a high-carbohydrate meal. For example: pasta, potatoes, rice dishes, carrots, peas or corn, whole wheat bread, lemonade and angel food cake. Drink several glasses of water before and after the meal. Walk or stretch before bedtime.

The morning of the event, eat a light breakfast. For example: cheerios with skim milk and juice; or a liquid pre-event meal such as Exceed or Gatorade. Slowly drink several glasses of water. Allow 2 to 3 hours for food to digest.

EARLY AFTERNOON EVENT

The night before the event you should eat a high carbohydrate snack before bedtime. For example: oatmeal cookies and juice.

The morning of the event you should eat a substantial brunch (bagels, cereal, fruit and juice) or have a big breakfast and a light lunch. Increase fluids gradually during the morning until noontime.

EARLY EVENING EVENT

The night before the event eat a favorite high-carbohydrate meal and have a good night's sleep. The day of the event, both breakfast and lunch will be completely digested by evening. A light carbohydrate meal should be eaten 3 hours before the event. For example: sandwich, soup and juice. Drink fluids all day.

ALL DAY EVENTS

The day before the event, cut back on exercise, rest and eat carbohydrate-rich meals and snacks all day. Drink plenty of fluids. The day of the event, eat the largest, best tolerated carbohydrate-rich breakfast possible. For example: pancakes and hot cereal, or sip carbohydrate-rich fluids, such as Gatorade. Eat a low-fat lunch. Drink fluids throughout the day, and snack on orange slices, fig bars, favorite juices and fruits. You will not starve during competition but you will become dehydrated and glycogen depleted. Your pre-event eating should aid you in preventing these conditions. Keep favorite foods handy for travel and emergencies and never try anything new before competition.

AFTER THE GAME

Eating carbohydrate-rich foods and drinking extra fluids to maintain hydration are vital. Avoid alcohol and caffeine. The main purpose is to rehydrate you and to replace glycogen in the muscles. The first two hours after competition are the most crucial. Eat at least 400 carbohydrate calories or 100 grams of carbohydrates. For Example: 3 cups of oatmeal, ¾ cup of raisins, 3 large oranges or 3 2-ounce slices of toast, 3 cups of fruit salad or 6 large oatmeal cookies. Protein and carbohydrate snacks like peanut butter and jelly sandwiches replenish carbohydrates efficiently.

After an event the athlete often experiences fatigue and does not feel like eating or drinking. After a cool down period with fluids being sipped gradually and consistently the athlete can then eat and drink whatever sounds good.

ON THE GO SNACKS

- *BREADS: bagels, rye cracker, pretzels, pocket bread and granola
- *PROTEIN: peanut butter, low-fat cheese spreads canned tuna
- *FRUIT: all kinds of fruit and individual-size fruit juices
- *VEGETABLES: cherry tomatoes, cucumbers and bell peppers
- *DAIRY (with refrigeration): yogurt, cottage cheese, and all cheeses
- *oatmeal raisin or peanut butter cookies

Remember that most of your calories should come from complex carbohydrates, vegetables and fruits. Milk products and meats are used moderately. Fats and oils are used sparingly. Eat foods low in saturated fat, cholesterol and total fat. Choose a variety of foods to get enough carbohydrates, protein and other nutrients. Eat only enough calories to maintain healthy weight for your height and build.

The above information was compiled by Patty Lewis, a licensed certified athletic trainer with SM&OC (The Sports Medicine and Orthopedics Center, a division of Southeastern Orthopedic Specialists). The information contained here was compiled from the National Athletic Trainers Association, The American Academy of Orthopedic Surgeons, and The American Academy of Pediatrics, The American Heart Association and text, Eat to Compete by Marilyn Peterson.

