

I. Health/Medical Issue: Expert information from Doctor Greg Kaiser **Heat And Hydration Issues**

During exercise, the body generates large amounts of heat energy which have to be dissipated in order to maintain a normal body temperature. This heat is gotten rid of by two possible routes: 1) increased blood flow to the skin for radiation and convection of the heat into the environment or 2) increased sweat production to enhance evaporation and subsequent cooling. In the humid heat of Florida, the body relies more on radiation and convection to cool you down since sweat evaporation is hampered in a high humidity setting. Unfortunately, this means that cardiac output is diverted to the skin's blood vessels and blood that normally would travel to other areas like the muscles, lungs, etc. decreases. This places an increased strain on the cardiovascular system, decreases oxygen delivery to important areas and makes you tired faster. Thus the need for cardiovascular training and exercise programs to build up your cardiac output to help you compensate and develop increased stamina.

Fluid intake is important before and during exercise, for if an individual is dehydrated, his or her blood volume will shrink which means less blood is pumped to the skin. The heat then cannot disperse as quickly and the snowballing effects of heat exhaustion take hold. Fluid intake is also obviously important for sweat production too. Therefore, this means that both mechanisms your body uses to rid itself of excess heat are fluid dependent.

There are several consequences to increasing body heat and poor hydration that are outlined below:

- 1) Heat Cramps – As fluids and electrolytes are lost via sweat and not replaced appropriately, the muscles begin to twitch and then progressively contract in localized groups, most commonly the legs, arms and abdomen. This problem is most typically seen during repetitive, high intensity exercise.
The treatment involves rest and drinking a rehydration drink.
- 2) Heat Exhaustion – Once fluid and electrolyte losses build to a significant extent; an individual reaches an inability to continue exercise. This is the definition of heat exhaustion. When dehydration of greater than 3% of body weight is compounded by the heat stress of exercise, the cardiovascular system is unable to pump sufficient blood to meet all of the body's needs. The consequences can be a variety of symptoms such as excessive sweating, the sensation of burning heat on the head / shoulders / chest area, weakness, "rubbery" legs, chills, slight confusion, dizziness, nausea / vomiting, disturbed vision and a dull headache. Treatment consists of resting in a cool environment, elevating the legs, drinking rehydration fluids and a cool mist of water on the skin.
- 3) Heat Stroke – In the last 50 years, there have been over 100 fatalities from heat stroke at the high school and college level. Heat stroke is a complete collapse of the body's ability to disperse heat and constitutes a medical emergency. An individual's body temperature begins to soar and typically exceeds 104°F. Symptoms can include an absence of sweat, hot and dry skin, feverish feeling, rapid pulse, extreme confusion, faintness, nausea / vomiting, a severe throbbing headache and possibly seizures. Treatment involves calling 911, rest, getting the person to a cool environment, immersing with cool water and caution with consuming excessive drinks.

There are several factors that put you at increased risk for developing problems with heat-related illness. These include:

- 1) Improper Preparation – You must drink prior to your game!
- 2) High Temperature and Humidity – Welcome to Tampa.
- 3) Excessive Age – Those > 65 years of age have a tougher time.
- 4) Obesity – Extra insulation inhibits the radiation of heat.
- 5) Fever – If your body temperature is already elevated from an illness, you are starting behind the 8 ball and are at a very high risk.
- 6) Sunburn – When the skin is damaged by sunburn this increases the skin's temperature and inhibits heat transfer to the environment. Use SPF 15 or higher sunscreen to prevent getting burned. Preferably choose a sunscreen that is water resistant and reapply as needed.
- 7) Alcohol Use – Alcohol is a diuretic and helps to accelerate dehydration.
- 8) Certain Prescription Medications – Antihistamines (cold medications), anticholinergics, phenothiazines, tricyclic antidepressants, diuretics and beta blockers are among some of the more common drugs that represent an increased risk.
- 9) Heavy Meals – Eating large meals and especially hot foods prior to a game increases core body temperature and diverts blood flow towards the intestinal tract. This greatly hampers the body's ability to conduct radiational cooling by the skin.

Thirst is typically a poor indicator of fluid needs during exercise. In very hot and humid conditions, vigorous exercise can lead to the start of dehydration in as little as 15 minutes. When out on the field, it would serve you well to drink something even if you're not thirsty. The water breaks are there for officials too!

Effective drinks for rehydration have both sugar and salt. However, the proportion of sugar to salt must be at an appropriate ratio. This proportion arises based on a transporter in the intestinal tract that actively moves glucose and sodium (Na^+) together from the bowel into the blood stream. Wherever Na^+ goes, water follows. Drinks with excessive sugar can actually aid in dehydrating further and drinks with no Na^+ tend not to hydrate as quickly. Gatorade is the most palatable and appropriate rehydration drink available commercially. Powerade, soft drinks and fruit juices are overloaded with sugar. Water has a more gradual ability to rehydrate since it lacks Na^+ .

Heat and hydration issues were one of the 2010 points of emphasis from the NFHS. It is important for us to not only look out for the health and safety of the athletes, but also not to forget to protect ourselves.