Hughston Health Alert

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SUMMER ATHLETICS AND YOU

Volume 19, Number 3 - Summer 2007

Inside...

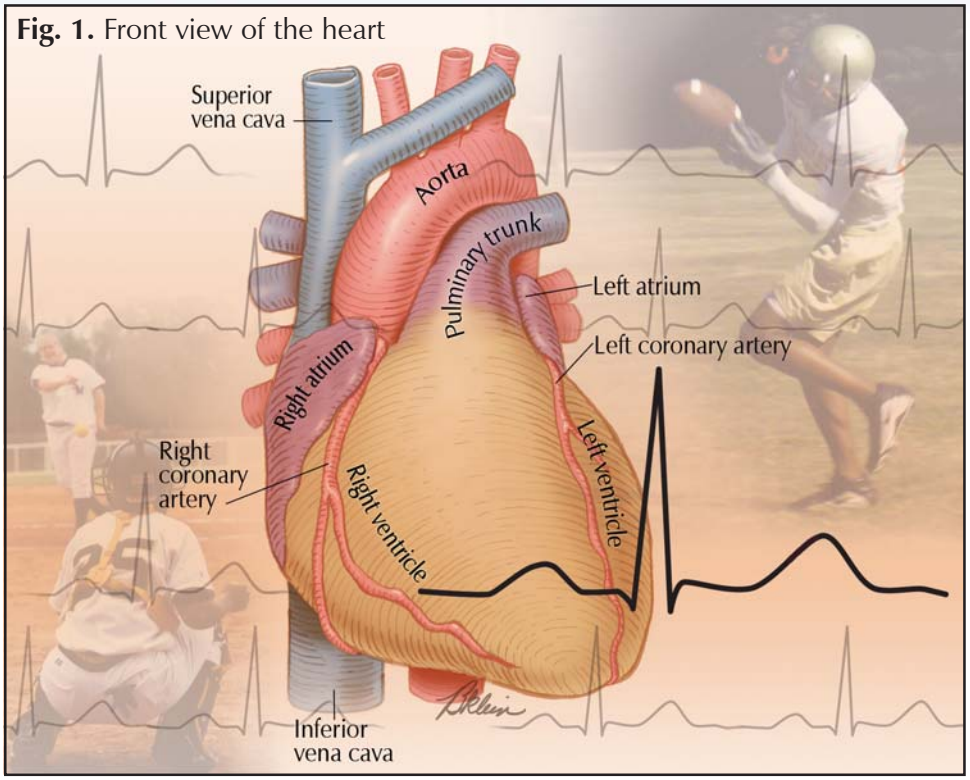

Fig. 1. Front view of the heart

The Sudden Death of Young Athletes

Athletes represent the healthiest, most dynamic people in our society; however, they can still be affected by cardiovascular disease. Sudden death in young athletes is very rare and it occurs in male athletes 5 times more often than in female athletes. Congential cardiovascular disease (heart and blood vessel disease from birth) is the leading cause of nontraumatic sudden athletic death.[1] Most sudden deaths in athletics occur during or immediately after exercise, competition, or training; but, can occur while the athlete is at rest or while asleep.

What causes sudden death in athletes?

In most cases, the sport does not cause the death of the athlete. The sport, however, can trigger or set off a cardiovascular disease that the athlete already has. The exception is commotio cordis, which is caused by a direct blow to the heart during practice or competition.

Cardiovascular diseases prove to be the major causes; however, drug abuse; injury to the neck, head, chest, or spine; sickle cell trait; heat stroke; and exercise induced asthma can cause sudden death in athletes as well. Hypertrophic cardiomyopathy is the predominant heart abnormality occurring in about 1/3 of the cases. The second most frequent cause is congential coronary anomalies.[2]

What is hypertrophic cardiomyopathy?

During a heartbeat, the heart contracts or tightens to push blood out of the heart and into the body and lungs. The heart muscle then relaxes allowing the heart chamber to fill with blood again. With hypertrophic cardiomyopathy, the ventricular muscle is thick, which means there is a smaller area to fill with blood. Often, the wall is so thick that it does not relax enough to allow sufficient filling of the chamber.[3] Therefore, less blood is being pumped through the body.

Often, hypertrophic cardiomyopathy is silent, showing no signs or symptoms. However, a personal or family history of unexplained syncope (fainting) or a history of sudden death in the family can help diagnose the disease. In young athletes, the frequency of sudden death on the athletic field tends to be dominated by hypertropic cardiomyopathy. About 1 in 500 people in the United States have this condition. For them, exercise can cause an increased risk of life-threatening cardiac arrhythmias.[2]

What is commotio cordis?

Commotio cordis, or cardiac concussion, is the term for a blunt, non-penetrating blow to the chest that triggers an irregular heartbeat called ventricular fibrillation. Such a blow can be caused by hard contact with another person

as in football or hockey, or through contact with equipment such as a baseball, baseball bat, hockey stick, or puck.

Timing is the difference between a sore chest and commotio cordis. If a blow occurs directly over the heart at a particular time in the heart's cycle, the result can be fatal. The blow can result in ventricular fibrillation, a condition in which the heart's electrical activity becomes chaotic. The heart's lower (pumping) chambers contract in a rapid, unsynchronized way and little or no blood is pumped from the heart. Collapse and sudden death often follows unless medical help is provided immediately.[3]

What are congenital coronary anomalies?

Most coronary artery anomalies show no signs or symptoms and do not affect the quality of life or lifespan of the affected individual. However, specific forms of anomaly can cause a reduction of blood flow. Compression of the arteries can exist without being life threatening or the compression can occur only during vigorous exercise or can cause a heart attack because the arteries are not able to supply the needed blood during exercise.

Often, a physical exam will be normal with no sign of heart problems. Therefore, family history of early coronary artery disease, premature death, or coronary anomalies can help determine if the athlete should receive additional testing beyond a pre-participation exam. A personal history of exercise-induced chest pain, fainting, or fatigue are symptoms that should not be overlooked or ignored because they could point to a coronary artery anomaly.

What can we do to prevent sudden death in athletes?

Sudden death occurs less often than we suspect but because the occurrence is such a shock to the community, it gains a lot of attention. Shock or not, rare or not, the chance that it can occur concerns parents, coaches, and sports medicine professionals. In many states pre-participation physical exams are required for middle-school, high-school, and college-level athletes. But are pre-participation physical exams enough?

Researchers have estimated that 200,000 competitive asymptomatic (no symptoms) athletes would need to be screened to potentially identify 1 athlete who would die as a result of competition.[1] The American Heart Association (AHA) resolved that a complete and careful personal and family history and physical examination designed to identify (or raise suspicion of) cardiovascular disease is the most practical approach to saving young athletes.[1]

Screening athletes for disorders capable of provoking sudden death is a challenge because of the low prevalence of disease and the cost and limitation of available screening tests. Current recommendations for cardiovascular screening call for a careful history and a physical examination performed by a knowledgeable health-care provider. Specialized testing is recommended only in cases that warrant further evaluation.[1] If a young athlete is at a higher risk because of past symptoms, or family history, he or she should have an annual pediatric exam and not just the pre-participation exam.

Parents have a right to know all the risks associated with sport participation and they should feel comfortable that the medical profession is doing as much as possible to prevent sudden death. To help prevent sudden death in athletes there should be standard public access to defibrillators at athletic events and qualified individuals who are trained to recognize cardiac arrest, able to activate the emergency medical services, and who can deliver CPR or defibrillation if and when it is needed.

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References

1. O'Connor FG, Kugler JP, Oriscello RG. Sudden Death in Young Athletes: Screening for the Needle in a Haystack. *American Family Physician*.[serial online]. June 1998;Vol 57, No 11.

2. American College of Cardiology. Sudden Death in Athletes. Available at: www.cardiosource.com/rapidnewssummaries/index. Accessed May 15, 2007.

3. American Heart Association. Chest gear may not protect young athletes from deadly blows. Available at: www.americanheart.org. Accessed June 13, 2007.

4. American Heart Association. Youth and Cardiovascular Diseases—Statistics.Available at: www.americanheart.org/downloadable/heart/1059110431975FS11YTH3REV7-03.pdf. Accessed June 13, 2007.

5. Minneapolis Heath Institute Foundation, Sudden Death In Athletes. US National Registry. Available at: www.suddendeathathletes.org/about_project.asp. Accessed May 15, 2007.

Sudden Death In Athletes Web sites you can trust

Minneapolis Heath Institute Foundation, Sudden Death In Athletes. US National Registry. www.**suddendeathathletes**.org/about_project.asp

American Heart Association. Statistical Fact Sheet—Populations. www.american**heart**.org/downloadable/**heart**/1059110431975FS11YTH3REV7-03.pdf

Hypertrophic Cardiomyopathy Association. www.4hcm.org/

Fig. 2 Hypertrophic cardiomyopathy

Recent studies show that 36% of young athletes who die suddenly have probable or definite hypertrophic cardiomyopathy.[4]

Intense training and strain of competition increases physical demands on the heart producing changes in electrolytes, blood volume, and levels of hydration which contributes to hypertrophic cardiomyopathy.[5]

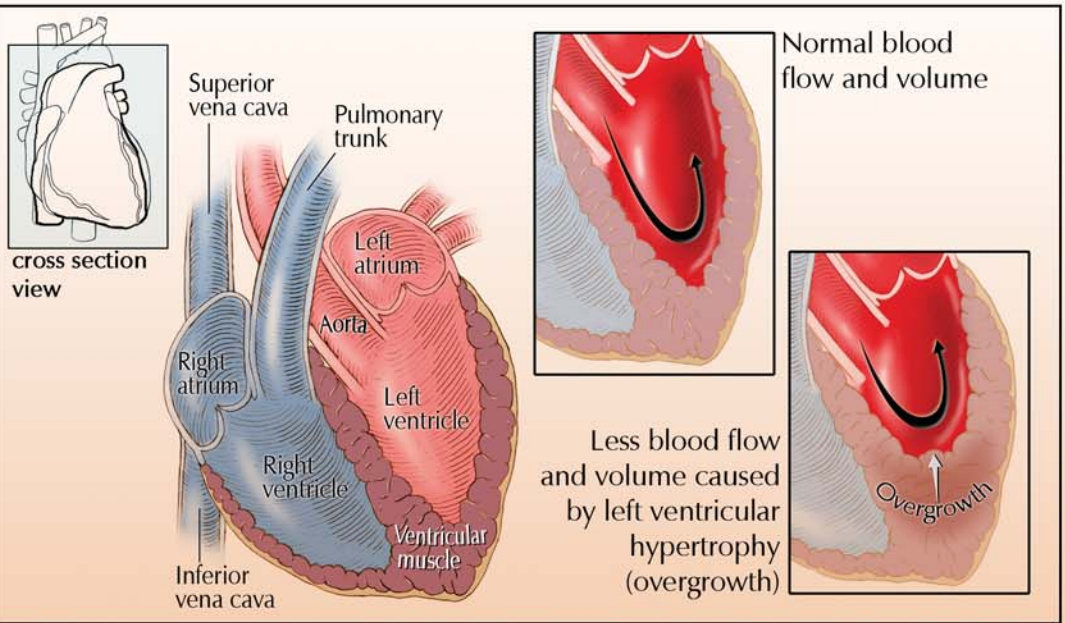


Fig. 3 Commotio cordis or innocent chest blow

A low-energy chest blow when timed precisely, creates devastating consequences by triggering ventricular fibrillation.[5]

Commotio cordis is not always fatal. Approximately 10% of the victims are known to survive with prompt cardiopulmonary resuscitation and defibrillation.[5]

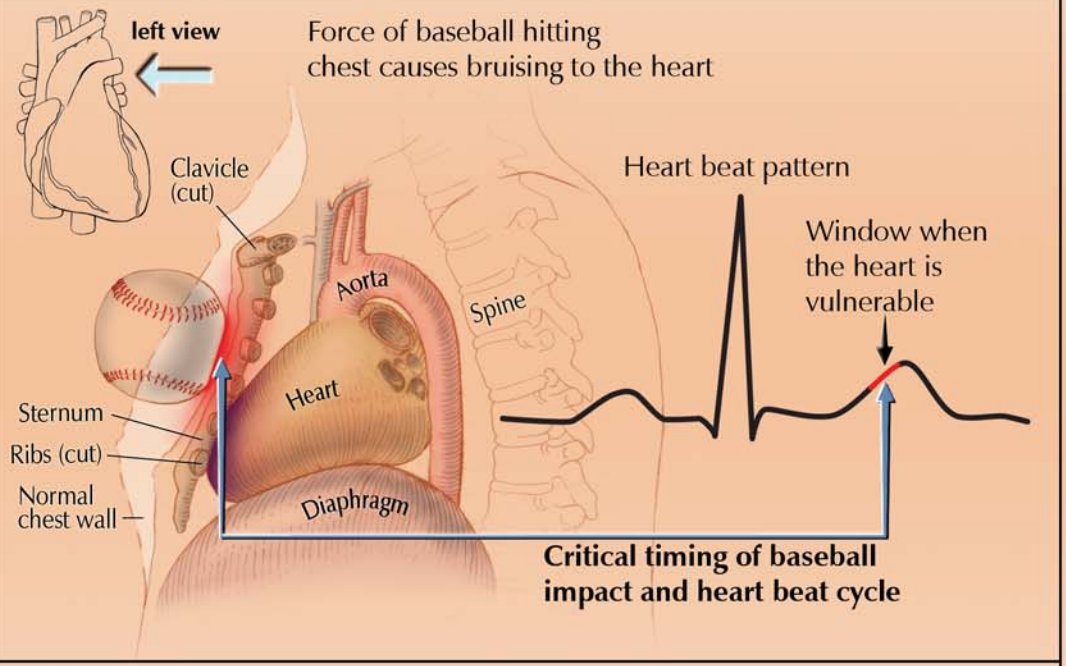
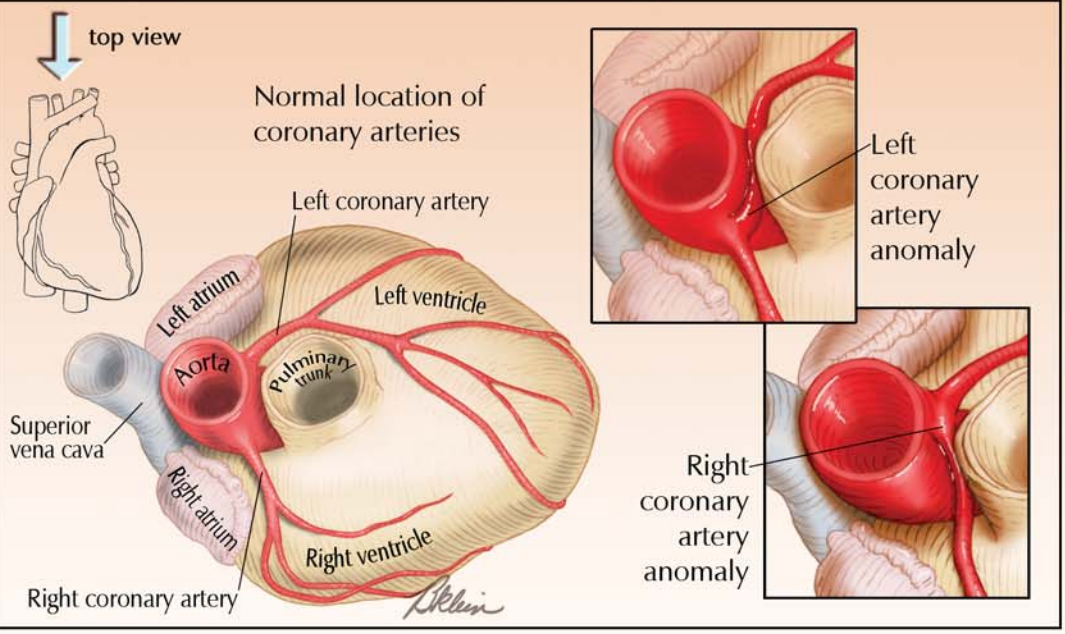


Fig. 4 Congenital coronary anomalies

The wrong origin of the left main coronary artery is the second most frequent cause of athletic field deaths.[5]

About 40,000 babies are born each year with congenital heart defects.[4]

In the year 2000, 51.9% of deaths from congenital cardiovascular defects occurred in people under age 15.[4]



Dehydration: Balancing Water and Electrolytes

Water is essential to your health because it forms the basis of all body fluids, including blood and digestive fluids; it helps with the transport and the absorption of nutrients, and it helps eliminate waste. Dehydration can be defined simply as losing more fluids than you take in.

Illness, diarrhea, vomiting, urination, and excessive perspiration can cause dehydration because your body often expels more fluid during illness and activity. Symptoms of dehydration include a dry or sticky mouth; low or no urine output, or very dark urine; the inability to produce tears; sunken eyes; and, in severe cases, a lethargic feeling or comatose state. A person who is dehydrated can have low blood pressure or blood pressure that drops rapidly when changing from sitting to standing, a rapid heart rate, poor skin elasticity, delayed capillary refill, and shock.

Fig. 1. Electrolytes chart

Electrolytes	
• Minerals in blood, tissues (cells), and body fluids that carry an electrical charge. • Balance is critical for normal functions of cells and organs.	
Sodium (Na^+)	• Regulates the total amount of water in the body. • Excess sodium is excreted in the urine. • The movement in and out of cells generates electrical signals which play a critical role in brain, nervous system, and muscle functions. • Extreme levels (high or low) can be fatal.
Potassium (K^+)	• Proper levels are essential in regulating the heart beat and muscle function. • Extreme abnormal levels can effect the nervous system, cause an irregular heart beat, muscle weakness, and in some cases it can be fatal.
Chloride (Cl^-)	• Helps maintain a normal balance of fluids in the body. • Excess is lost in urine, sweat, and stomach secretions. • Significant level changes can have harmful or fatal consequences. - Increased levels from diarrhea and certain kidney diseases. - Excessive loss from heavy sweating, vomiting, kidney and adrenal gland disease.

Don't forget your electrolytes

Electrolytes, which include sodium, potassium, chloride, sulfate and other minerals, are necessary for cellular metabolism and proper kidney, brain, and heart function. To maintain a proper water and electrolyte balance, you must replace lost fluids and electrolytes. Sometimes our bodies lose too much water and electrolytes which results in dehydration. Water and electrolytes are consumed normally in food and beverages over the course of a day. A healthy body adjusts normally to the intake of water and electrolytes using hunger and thirst mechanisms. For example, a craving for salty foods can mean you need to replenish a loss of sodium. The kidney is the primary organ that adjusts to loss and intake of the minerals and fluids. Lethargy or unconsciousness, shock, confusion, dizziness, and light headiness are signs of advanced dehydration and require medical attention.

Who is at risk?

Older adults and infants are at the greatest risk for dehydration because their bodies are unable to adjust as well as an adult's body to the loss of fluids and electrolytes. Additionally, illnesses that result in vomiting and diarrhea are more common in infants and the elderly. Athletes should also be aware of their hydration level and they should replace water lost due to sweating. Extreme perspiration, along with hot temperatures, can create a situation for the dehydrated athlete. Athletes need to drink plenty of water before, during, and after any activity. One good way athletes can monitor fluid loss and intake is by weighing themselves before an activity. After a workout, the athlete can weigh in again and then replace the weight lost during activity. Some fluids, like those that contain high amounts of caffeine, do not actually benefit the body and, sometimes, can exacerbate dehydration.

Prevention

Fluids should be administered as soon as possible if mild dehydration symptoms begin to show. You should drink frequently and in small amounts. Mild dehydration can cause dizziness, fatigue, and weakness. If the severity of the symptoms increases, seek medical attention immediately.

The rule of thumb is 9 glasses of water per day for females and 13 glasses of water per day for males. Drink plenty of fluids—even when you are not thirsty—to maintain hydration. Be aware of the signs and symptoms of dehydration and take a preventative approach to ensure hydration levels are within an acceptable range. Electrolytes are consumed in our everyday diet, but you should still be aware of the intake and loss of these minerals.

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Resources:

1. Mayo Clinic. Dehydration. Available at: http://www.mayoclinic.com/health/dehydration. Accessed June 15, 2007.
2. MedicineNet.com. Dehydration: How to Recognize and Prevent Its Effects. Available at: http://www.medicinenet.com/dehydration/article.htm. Accessed June 29, 2007.

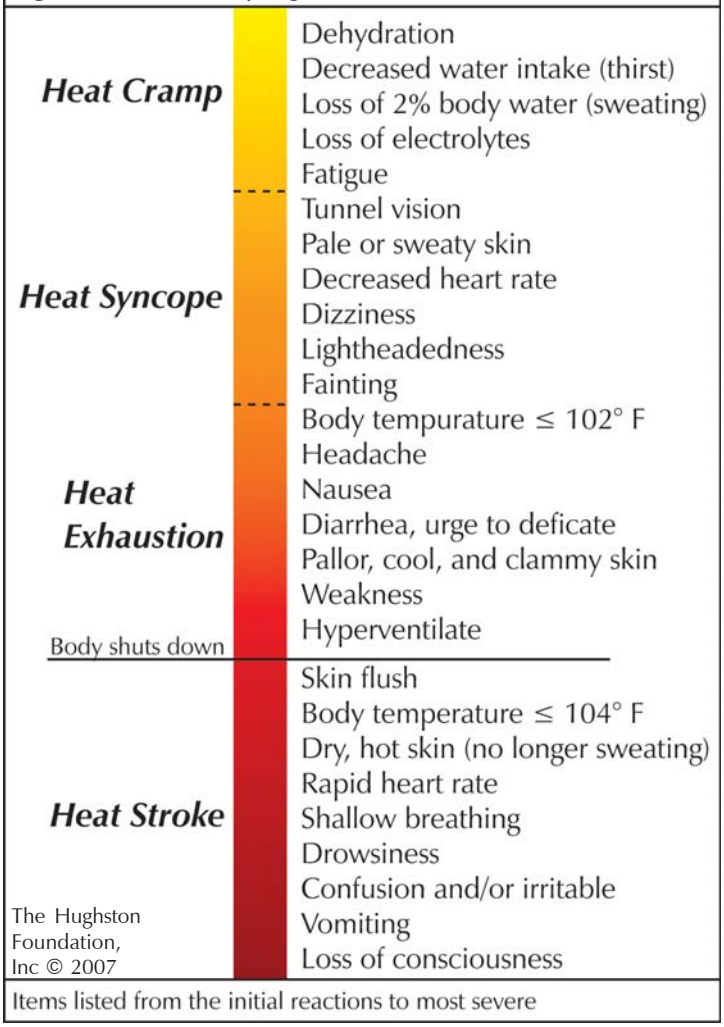
Avoiding Heat Illness

Everyone should be aware of the risks, symptoms, and prevention methods related to heat illness. Heat illnesses fall into different categories and often progress from one category to another, depending on symptom severity. Heat cramps and heat syncope are less severe illnesses that can serve as early warning signs to the much more serious heat exhaustion and heat stroke. Being aware of the signs and symptoms of heat illness can greatly reduce the risks and can save a life.

Dehydration plays a major role in the progression of heat illness, especially when a person is subjected to high temperatures for extended periods of time without the replenishment of fluids. Symptoms can be noticeable after 2% of the body's normal water content is depleted. Dehydration can cause electrolyte imbalances, which in turn can lead to abnormal functioning of the heart, the kidneys, and the nervous system.

When the heat index (the temperature and humidity it feels like to the body) exceeds 90 degrees there should be an unlimited amount of fluids available to athletes. Athletes should not start drinking when they feel thirsty; by the time thirst develops they are already a little dehydrated. Drink enough water or sports drinks throughout the day and during practice to keep from getting thirsty. Athletes should avoid drinking fruit juices, carbonated drinks, and drinks containing caffeine because these can lead to further dehydration.

Fig. 1. Heat illness progression chart



Heat cramps

Heat cramps can occur while active in high temperatures. Heat cramps are extremely painful muscle spasms that are seen most often within the calf and abdomen, although any muscle in the body can be affected. Heat cramps are most commonly related to excessive water and electrolyte loss. Electrolytes include sodium, potassium, magnesium, and calcium, but the most common loss is sodium. Electrolytes are essential for normal muscle function. The person most likely to develop heat cramps is one who is in fairly good condition but overexerts themselves in the heat. You can replenish some electrolyte loss by eating bananas to add potassium, add a little salt to your food, eating or drinking dairy products to replenish calcium, and drink plenty of water and sports drinks. If heat cramps occur, drink plenty of water or a sports drink and stretch and ice massage the muscle.

Heat syncope

Heat syncope, or orthostatic dizziness, results from blood pooling and can be a scary experience for everyone involved. A fainting spell usually happens after a sudden change in position (i.e., from a sitting position to standing) or after a period of prolonged standing. Early symptoms include lightheadedness and weakness in a person who is dehydrated and not accustomed to the heat. After relocating to a shady area, you should help the individual lie down, elevate their feet above the heart, and encourage them to drink some fluids.

Heat exhaustion

The onset of heat exhaustion usually occurs because the athlete neglected to replenish the fluids lost through sweating. Athletes who become a victim of heat exhaustion will often collapse and will be profusely sweating with pale skin and an elevated body temperature of around 102 degrees Fahrenheit. Once the athlete is responsive, he or she can be extremely dizzy, can hyperventilate, and have a rapid pulse. This illness is most often seen in individuals in poor physical condition who attempt to exercise in the heat. If an athlete is suspected of heat exhaustion get them to a cool environment and have the athlete drink as much fluid as possible. In some cases intravenous fluid replacement is required. The body temperature must continuously be monitored to ensure the athlete does not go into heat stroke.

Heat stroke

Heat stroke is a life threatening emergency. The specific cause of heat stroke is unknown, although it is thought that as people work out in the sun for prolonged periods of time their bodies produce an extreme amount of internal heat, so much so that the cooling system shuts down resulting in the body producing dangerous levels of heat. Normally, the body cools its self through sweating and radiating heat from the skin. When the temperatures exceed a certain level the body is unable to work hard enough and eventually shuts that system down. Immediate medical attention should be given to athletes who fall victim to heat stroke. These athletes tend to suddenly collapse and usually lose consciousness. Upon examination their skin will be flush and typically dry because the sweating has stopped. The athlete will have shallow breathing with a strong rapid pulse. The most vital indicator of heat stroke is the athlete's core body temperature will be elevated above 104 degrees Fahrenheit. Heat stroke can occur suddenly without warning. If an athlete goes down on the field and heat stroke is suspected, decrease the body temperature by transporting him or her to a cool environment, pack the athlete's armpits, groin, abdomen, and neck with ice and call 911. If the body temperature is lowered back to normal within 45 minutes, it will greatly reduce the possibility of death.

As the summer temperatures begin to rise be sure to stay well hydrated. Athletes should drink approximately 2 to 3 cups of water before practice, 3 to 4 cups during practice, and 2 cups for every pound of weight lost after practice to maintain hydration levels and avoid heat illness. Coaches and athletic trainers need to be aware of the weather conditions to ensure athletes are getting enough fluid replacements throughout the day. Never should water breaks be taken away as punishment, for this can greatly increase the risks of heat illnesses.

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References:

Mero M. Hydration & hydration: Help or hype? Available at: http://chppm-www.apgea.army.mil/NNM/articles/Hydration.pdf. Accessed: April 5, 2007.

Wikipedia (2007). Dehydration. Available at: http://en.wikipedia.org/wiki/Dehydration. Accessed: April 5, 2007.

Prentice W E. (2003). *Arnheim's Principles of Athletic Training*. McGraw Hill 2003 NY: New York.

Water: Don't overdo it

Proper hydration is always a challenge for athletes who are involved in prolonged exercise, but did you know you can drink to much water? Most often, dehydration is the concern of athletes and coaches and it is often the culprit in an athlete's inability to stay fit during competition. However, top performance can be lost when the pendulum swings the other way and an athlete actually drinks to much water and experiences the serious effects of hyponatremia.

Hyponatremia, or water intoxication, is a fluid-electrolyte disorder that can occur when the sodium level in your blood drops below normal. It is caused by a combination of excessive drinking and large sweat-sodium losses. Blood sodium between 136 to 142 mEg/L is normal and any measurement below 136 mEq/L is considered hyponatremic. A normal blood sodium level is critical for the body to function because sodium plays a key role in body-fluid balance and in the conduction of electrical impulses along nerves and across cardiac and skeletal muscle.

Hyponatremia is dangerous because it can disrupt the fluid balance across the blood-brain barrier which can result in a rapid influx of water into the brain. When this happens the brain can swell and other severe neurological responses such as headache, confusion, seizure, and coma can occur. If the sodium level is not brought back to a normal range, death can occur. The faster and lower the blood sodium falls, the greater the risk of fatality.

In athletes, hyponatremia is usually caused by the combination of excessive drinking, sodium loss in sweat, and the kidneys' limited capacity to excrete water. Most adults can drink 2 quarts of fluid or more an hour, but the most we can lose in urine is about 1 quart an hour. Athletes should drink fluids that contain electrolytes such as those found in sports drinks if they have consumed an excessive amount of water prior to competition or prolonged exercise. Everyone is different and will need a different hydration plan, but most athletes should drink 2 to 3 cups of fluid 2 to 3 hours before exercise and drink 5 to 10 ounces about a ½ hour before exercise.

A bloated stomach, puffy fingers and ankles, a bad headache, and confusion are warning signs that you have consumed an excessive amount of water. You may also weigh more after practice than you did before practice. Dehydration should be avoided by following a fluid replacement plan, but you must make sure you find a good balance so you don't overdo it.

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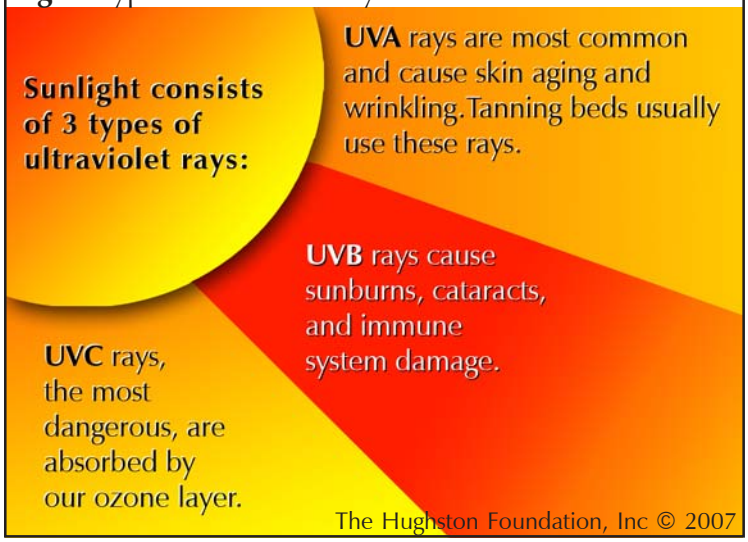
Sunscreens: Are they safe and effective?

Now that the summer sun is in full swing, it's important for us to use extra caution when protecting ourselves from its harmful rays. For many of us that means lathering on sunscreen before we start our beach vacation or spend a lazy weekend by the pool. Although we've been told that sunscreen will protect us, recently the safety and effectiveness of certain sunscreen products has been scrutinized. A new Web site that assesses the usefulness and protection of almost 800 sunscreens, The Sunscreen Screening Site, as it has been named, was put together by the *Environmental Working Group (EWG)* and gives detailed information about many sunscreen products.

Fig. 1. Types of ultraviolet rays



Sunscreen is a collection of chemical agents that help protect the skin from the suns rays. The sun gives off UVB rays that cause sunburns and UVA rays that penetrate the skin much deeper, causing wrinkling and what is known as the 'leather' look. The sun protection factor (SPF) is the scale used to measure the effectiveness of sunscreen. The higher the SPF the more protection you should receive. Most people trust that the claims on the bottle are true and that the product truly protects their health. However, the EWG found nothing could be farther from the truth.

In a recent investigation of 783 name-brand sunscreens, the EWG found widespread evidence that many products on the market are not safe or effective, and do not protect against UVA radiation. The products were rated for overall effectiveness in sun protection using 3 factors: 1) UVB protection (using SPF rating as the indicator of effectiveness); 2) UVA protection; and 3) stability. Overall, the methods and content of their analysis are based on a review of the technical sunscreen literature, including nearly 400 industry and peer-reviewed studies. The results are as follows:

- Of 783 sunscreen products, 84% offer inadequate protection from the sun or contain ingredients with significant safety concerns.
- Only 16% of the products on the market are both safe and effective, blocking both UVA and UVB radiation
- Twelve percent of high SPF sunscreens (SPF of at least 30) protect only from sunburn (UVB radiation) and do not contain ingredients known to protect from UVA radiation
- Sunscreens breakdown in the sun in minutes or hours and then let UV radiation through to the skin.
- The US lags behind other countries when it comes to products that work and are safe.
- Some sunscreens absorb into the blood and raise safety concerns.

The review of the technical literature showed some sunscreen ingredients build up in the body or the environment; some are linked to toxic effects; some release skin-damaging free radicals in sunlight; some act like estrogen and can disrupt hormone systems; and several are strongly linked to allergic reactions.

The EWG also suggested that consumers beware of common misleading claims related to sunscreen products. Some of these pseudo-advertisement claims include:

- All day protection or VERY HIGH SPF NUMBERS
- Provides "UVA-UVB" or "broad-spectrum" protection
- "8-hour"or "all day" protection
- "Blocks all harmful rays"
- Provides "instant" or "total" protection
- "As mild as water" or Chemical-free
- Waterproof

Misleading claims are often due to the non-mandatory sunscreen safety standards. Companies are free to make decisions on everything from advertising claims to product quality. As an alternative to setting final standards, the Food and Drug Administration (FDA) advises people to stay out of the sun from 10 AM to 4 PM.

When choosing a sunscreen, however, it's best to check the rating for specific products. The combination of active ingredients in a sunscreen formulation can affect the stability of these chemicals, thus modifying the sun hazard score of each product. The concentrations of active ingredients and the inactive ingredients found in each formulation can also affect sun hazard and health hazard scores.

To check the EWG's rating for specific brands of sunscreen visit www.cosmeticdatabase.com.

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Reference:

Sunscreen Summary–What Works and What's Safe. Skin Deep: Cosmetic Safety Database. www.cosmeticdatabase.com. Accessed July 11, 2007.

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The *Hughston Health Alert* is a quarterly publication of The Hughston Foundation, Inc. The Foundation's mission is to help people of all ages attain the highest possible standards of musculoskeletal health, fitness, and athletic prowess. Information in the *Hughston Health Alert* reflects the experience and training of physicians at The Hughston Clinic, PC, of physical therapists and athletic trainers at Hughston Rehabilitation, of physicians who trained as residents and fellows under the auspices of The Hughston Foundation, Inc., and of research scientists and other professional staff at The Foundation. The information in the *Hughston Health Alert* is intended to supplement the advice of your personal physician and should not be relied on for the treatment of an individual's specific medical problems.

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Correction: In Fig. 1 of Ankle Fractures (Vol. 19, No. 2, Spring 2007, pg 1) the anterior talofibular ligament and the anterior tibiofibular ligament were mislabeled. The corrected version of the illustration can be seen at www.hughston.com.

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