

# Position Statement and Recommendations for Hydration to Minimize the Risk for Dehydration and Heat Illness

By on July 16, 2014

National Federation of State High School Associations (NFHS)

Sports Medicine Advisory Committee (SMAC)

## DEHYDRATION, ITS EFFECTS ON PERFORMANCE, AND ITS RELATIONSHIP TO HEAT ILLNESS:

- Appropriate hydration before, during, and after physical activity is an important ingredient to healthy and successful sports participation.
- Weight loss during exercise and other physical activity represents primarily a loss of body water. A loss of just 1 to 2% of body weight (1.5 to 3 pounds for a 150-pound athlete) can negatively impact performance. A loss of 3% or more of body weight can significantly increase the risk for exertional heat-related illness. If an athlete is already dehydrated prior to beginning activity, these effects will occur even sooner.
- Athletes should be weighed (in shorts and T-shirt) before and after warm or hot weather practice sessions and contests to assess their hydration status.
- Athletes with high body fat percentages can become significantly dehydrated and over-heat faster than athletes with lower body fat percentages while working out under the same environmental conditions.
- Athletes have different sweating rates and some lose much more salt through their sweat than others. "Salty sweaters" will often have noticeable salt stains on clothing after workouts, and often have a higher risk of developing exertional muscle cramps.
- Poor heat acclimatization/fitness levels can greatly contribute to an athlete's heat intolerance and heat illness risk.
- Certain medications, or fever, can negatively affect an athlete's hydration status and temperature regulation, increasing the risk for heat illness.
- Environmental temperature and humidity each independently contribute to dehydration and heat illness risk.

- Clothing that is dark or bulky, as well as protective equipment (such as helmets, shoulder pads, and other padding and coverings), can increase body temperature, sweat loss and subsequent dehydration and heat illness risk.

- Even naturally dry climates can have high humidity on the field if irrigation systems are scheduled to run prior to early morning practices start. This temporary increase in humidity will continue until the water completely soaks into the ground or evaporates.

- A heat index chart should be followed to help determine if practices/contests should be modified or canceled. The NOAA National Weather Service's heat index chart can be found at:

<http://www.weather.gov/om/heat/index.shtml>

- On-site wet-bulb temperature should be measured 10-15 minutes before practices or contests. The results should be used with a heat index to determine if practices or contests should be started, modified, or stopped.

- If wet-bulb temperature measurement is not available, the heat index for your approximate location can be determined by entering your postal zip code: <http://www.osaa.org/heatindex/>

**Example of the effects of relative humidity on the risk for dehydration and heat illness:**

- A relative humidity of 40 percent and a temperature of 95 degrees Fahrenheit are associated with a likely risk of incurring heat illness if strenuous physical activity is conducted. However, even with a lower air temperature of only 85 degrees Fahrenheit, the risk for exertional heat illness could be the same or greater with a higher relative humidity of 70 percent.

**WHAT TO DRINK DURING EXERCISE AND OTHER PHYSICAL ACTIVITY:**

- For most exercising athletes, water is appropriate and sufficient for pre-hydration and rehydration. Water is quickly absorbed, well-tolerated, an excellent thirst quencher and cost-effective.

- Traditional sports drinks with an appropriate carbohydrate and sodium formulation may provide additional benefit in the following general situations:

- Prolonged continuous or intermittent activity of greater than 45 minutes

- Intense, continuous or repeated exertion

- Warm-to-hot and humid conditions
- Traditional sports drinks with an appropriate carbohydrate and sodium formulation may provide additional benefit for the following individual conditions:
  - Poor hydration prior to participation
  - A high sweat rate or "salty sweater"
  - Poor caloric intake prior to participation
  - Poor acclimatization to heat and humidity
- A 6 to 8% carbohydrate formulation is the maximum that should be utilized in a sports drink. Any greater concentration will slow stomach emptying and potentially cause the athlete to feel bloated. An appropriate sodium concentration (0.4–1.2 grams per liter) will help with fluid retention and distribution and decrease the risk of exertional muscle cramping.

#### **WHAT NOT TO DRINK DURING EXERCISE:**

- Fruit juices with greater than 8 percent carbohydrate content and carbonated soda can both result in a bloated feeling and abdominal cramping.
- Athletes should be aware that nutritional supplements are not limited to pills and powders as many of the new "energy" drinks contain stimulants such as caffeine and/or ephedrine.
- These stimulants may increase the risk of heat illness and/or heart problems with exercise. They can also cause anxiety, jitteriness, nausea, and upset stomach or diarrhea.
- Many of these drinks are being produced by traditional water, soft drink and sports drink companies which can cause confusion in the sports community. As is true with other forms of supplements, these "power drinks", "energy drinks", or "fluid supplements" are not regulated by the FDA. Thus, the purity and accuracy of contents on the label is not guaranteed.

- Many of these beverages which claim to increase power, energy, and endurance, among other claims, may have additional ingredients that are not listed. Such ingredients may be harmful and may be banned by governing bodies like the NCAA, USOC, or individual state athletic associations.

- See the **NFHS Position Statement and Recommendations for the use of Energy Drinks by Young Athletes** for further information.

### **HYDRATION TIPS AND FLUID GUIDELINES:**

- Many athletes do not voluntarily drink enough water to prevent significant dehydration during physical activity.

- Drink regularly throughout all physical activities. An athlete cannot always rely on his or her sense of thirst to sufficiently maintain proper hydration.

- Drink before, during, and after practices and games. For example:

- Drink 16 ounces of fluid 2 hours before physical activity.

- Drink another 8 to 16 ounces 15 minutes before physical activity.

- During physical activity, drink 4 to 8 ounces of fluid every 15 to 20 minutes (some athletes who sweat considerably can safely tolerate up to 48 ounces per hour).

- After physical activity, drink 16 to 20 ounces of fluid for every pound lost during physical activity to achieve normal hydration status before the next practice or competition.

- The volume and color of your urine is an excellent way of determining if you're well hydrated. Small amounts of dark urine means that you need to drink more, while a "regular" amount of light-colored clear urine generally means you are well-hydrated. A Urine Color Chart can be accessed at:

<http://at.uwa.edu/admin/UM/urinecolorchart.doc>

- Hyponatremia is a rare, but potentially deadly disorder resulting from the over consumption of water. It is most commonly seen during endurance events, such as marathons, when participants consume large amounts of water over several hours, far exceeding fluid lost through sweating. The opposite of dehydration, hyponatremia is a condition where the sodium content of the blood is diluted to dangerous levels. Affected

individuals may exhibit disorientation, altered mental status, headache, lethargy, and seizures. The diagnosis can only be made by testing blood sodium levels. Suspected hyponatremia is a medical emergency and EMS (Emergency Medical Services) must be activated. It is treated by administering intravenous fluids containing high levels of sodium.

**References:**

Casa DJ, Armstrong LE, Hillman SK, et al. National Athletic Trainers' Association position statement: Fluid replacement for athletes. *Journal of Athletic Training* 2000;35:212-224.

McKeag DB, Moeller JL. *ACSM's Primary Care Sports Medicine*. 2nd Ed, Philadelphia: Wolters Kluwer/Lippincott Williams & Wilkins, 2007.

Montain SJ. Hydration recommendations for sport 2008. *Current Sports Medicine Reports* 2008;7:187-92.

National Collegiate Athletic Association. Guideline 2c: Prevention of heat illness. 2010-11 *Sports Medicine Handbook* (21st edition).

Sawka MN, Burke LM, Eichner ER, et al. American College of Sports Medicine position stand. Exercise and fluid replacement. *Medicine & Science in Sports & Exercise* 2007;39:377-90.

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# Position Statement and Recommendations for the Use of Energy Drinks by Young Athletes

By on July 16, 2014

**National Federation of State High School Associations (NFHS)  
Sports Medicine Advisory Committee (SMAC)**

**Background:** Energy drinks have become increasingly popular among adolescents and young adults in recent years. In 2006, nearly 500 new brands were introduced to the market place, and over 7 million adolescents reported that they had consumed an energy drink. Estimated sales of energy drinks for 2011 are expected to exceed \$9 billion. These beverages are particularly popular among young athletes who see the consumption of energy drinks as a quick and easy way to maximize athletic and academic performance.

**The NFHS SMAC strongly recommends that:**

1. Water and appropriate sports drinks should be used for rehydration as outlined in “**NFHS Position Statement and Recommendations for Hydration to Minimize the Risk for Dehydration and Heat Illness.**”
2. Energy drinks should not be used for hydration prior to, during, or after physical activity.
3. Information about the absence of benefit and the presence of potential risk associated with energy drinks should be widely shared among all individuals who interact with young athletes.
4. Athletes taking over the counter or prescription medications should not consume energy drinks without the approval of their primary care provider.

**WARNING:** The exact content and purity of energy drinks cannot be insured, as there are no regulatory controls over these products. Thus, there is the risk for adverse side-effects, potentially harmful interactions with prescription medications (particularly stimulant medications used to treat ADHD), or positive drug tests.

## Frequently Asked Questions

### What is an energy drink?

- An energy drink is a beverage marketed to both athletes and the general public as a quick and easy means of relieving fatigue and improving performance. In addition to water, nearly all energy drinks contain

carbohydrates and caffeine as their main ingredients. The carbohydrates provide nutrient energy while the caffeine acts as a stimulant to the central nervous system.

### **What are the differences between an energy drink and a sports drink?**

- Sports drinks are designed to provide re-hydration during or after athletic activity. While contents vary, most sports drinks contain a 6 to 8% carbohydrate solution and a mixture of electrolytes. The carbohydrate and electrolyte concentrations are formulated to allow maximal absorption of the fluid by the gastrointestinal tract.
- Energy drinks often contain a higher concentration of carbohydrate (usually 8 to 11%), and thus a larger number of calories than sports drinks. They also contain high amounts of caffeine and, in some cases, other nutritional supplements. Energy drinks are not appropriate for re-hydrating athletes during physical activity and should not be used in such circumstances.

### **What ingredients are found in energy drinks?**

- Carbohydrates- Most energy drinks have from 18g to 25g of carbohydrate per 8 ounces. The high carbohydrate concentration can delay gastric emptying and impede absorption of fluid in the gastrointestinal tract.
- Caffeine- Nearly all energy drinks contain some quantity of "natural" or synthetic caffeine. The caffeine concentration may range from the equivalent to an 8 ounce cup of coffee (85mg) to more than three times that amount.
- Herbs- Many energy drinks include herbal forms of caffeine such as guarana seeds, kola nuts, and Yerba mate leaves, in addition to synthetic caffeine. The "performance enhancing" effects, safety, and health benefits of other herbs like Astragalus, Echinacea, Ginko biloba, ginseng, and countless others have not been well established by scientific studies.
- Vitamins- Athletes with even reasonably good diets should be assured that they are at low risk for vitamin deficiency and typically do not need supplementation. There is no evidence to suggest that vitamin supplementation improves athletic performance. Female athletes may benefit from iron and calcium supplements; but, those are more easily and inexpensively obtained in pill form rather than from energy drinks.

- Proteins and amino acids- Only a small amount of protein is used as fuel for exercise. Carbohydrates are utilized as the primary fuel source. To date, there is no definitive evidence that amino acid supplementation enhances athletic performance.

- Other ingredients- With the hundreds of energy drink brands that are available, the potential ingredients which they may contain are virtually unlimited. Possible additions include pyruvate, creatine, carnitine, medium-chain triglycerides, taurine and even oxygen.

### **What are the possible negative effects of using energy drinks?**

- Central nervous system- Caffeine often has the effect of making a person feel "energized." Studies have shown some performance-enhancing benefits from caffeine at doses of 6mg/kg of body weight. However, these and higher doses of caffeine may produce light headedness, tremors, impaired sleep, difficulty with fine motor control, and may exceed drug testing caffeine thresholds.

- Gastrointestinal system- The high concentrations of carbohydrates often found in energy drinks may delay gastric emptying, resulting in a feeling of being bloated. Abdominal cramping may also occur. Both carbohydrates and caffeine in the high concentrations found in most energy drinks may cause diarrhea.

- Dehydration- Energy drinks should not be used for pre- or re-hydration. The high carbohydrate concentration can delay gastric emptying and slow absorption from the gastrointestinal tract and may cause diarrhea. Caffeine can act as a diuretic and, therefore, may result in increased fluid loss.

- Positive drug tests- Like all nutritional supplements, there is little or no regulatory oversight of energy drinks. The purity of the products cannot be assured and it is possible that they may contain substances banned by some sports organizations.

- Consumption of energy drinks by adolescents and young adults has been linked to heart arrhythmia and liver problems.

- Sales of certain energy drinks have been banned in Denmark, Turkey, Uruguay, Germany, and Austria. Some states in the U.S. have introduced legislation to restrict sales of energy drinks to adolescents and children. In September 2010, the Virginia High School League banned the use of energy drinks.



- Recently, healthcare providers have voiced increasing concerns about the consumption of energy drinks in association with alcohol because of the interaction of the stimulant effects of energy drinks and the depressant effects of alcohol.

References:

American Academy of Pediatrics. Clinical Report. Sports drinks and energy drinks for children and adolescents: Are they appropriate? *Pediatrics* 2011;6:1182-1189.

Bonci L. Energy drinks: help, harm, or hype? *Sports Science Exchange* 2002:1.

Casa DJ, Armstrong LE, Hillman SK, et al. National Athletic Trainers' Association position statement: Fluid replacement for athletes. *Journal of Athletic Training* 2000;35:212-224.

McKeag DB, Moeller JL. *ACSM's Primary Care Sports Medicine*. 2nd Ed, Philadelphia: Wolters Kluwer/Lippincott Williams & Wilkins, 2007.

Meadows-Oliver M, Ryan-Krause P. Powering up with sports and energy drinks. *Journal of Pediatric Health Care* 2007;21:413-416.

Worcester S. Energy drink sales hit \$3 billion: at what health cost? *Pediatric News* 2007;41:1-4.

Seifert SM, Schaechter JL, Hershorer ER, Lipshultz EL. Health effects of energy drinks on children, adolescents, and young adults. *Pediatrics* 2011;127:511-28.

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