

## Facts on Fluids

By Kristine Clark, special to the WUSA Dr. Kristine Clark, Ph.D., R.D., is Director of Sports Nutrition for the Penn State University Dept. of Athletics.

When it comes to exercise, the adage, drink before you are thirsty is one worth paying attention to. But the interesting dilemma is that few people follow that advice. Instead, most exercisers are cued in to drinking only after they feel thirsty, a response that is triggered once the body has already experienced a slight degree of dehydration. Water, sports drinks, juice, and carbonated soft drinks reign as the top four liquids that exercisers claim to drink as part of their hydration or rehydration strategy. Most say they select their beverages based on three criteria: taste, convenience, and caloric value. Rarely do I hear someone say they've chosen a fluid because it improves their performance or makes them feel considerably better before, during, or after exercise.

**Water:** Typically the best beverage to drink for simple hydration prior to exercise. In most cases it's free and available. Plain tap water or bottled water is calorie free but many carbonated waters can contain an equal number of calories to their carbonated soft drink cousins, approximately 150 calories every 12 ounces. Water is an equally good beverage to drink during and after exercise. The important part is to drink it in adequate amounts, 4-6 ounces every 15 to 20 minutes during physical activity. Since the taste of water may not hold interest, quantity consumed may be a significant problem from a rehydration standpoint. We lose about 16 ounces of body fluid for every pound lost during exercise. Therefore, we have to drink, and drink again -- in other words gulp, guzzle, and chug down fluids -- in order to appropriately replace lost body water. Studies have shown that athletes tend to quit drinking before fully rehydrated if water is the only beverage choice available.

**Sports Drinks:** Do sports drinks really offer any benefit beyond providing a taste that's different from water? Interestingly many sports nutrition papers still claim that sports drinks are gimmicky and not needed by exercisers. In fact, I remember hearing at very early sports nutrition conferences that sports drinks were not additionally beneficial and that water was still the absolute best hydration fluid. But let me present some reasonable arguments from a clinical standpoint. Getting exercisers to drink a lot of fluid is key to hydration (adequate fluid before exercise) and rehydration (replacing lost body water from sweat and respiration during and after exercise). Sports drinks offer several features missing in water. First, they contain various sugars, or carbohydrates. Second, they contain minerals (electrolytes) that to some degree are lost in sweat during exercise. Finally, they are flavored and colored to meet the diverse demands of consumers, as well as stimulate basic interest in drinking them. The original lemon-lime flavor introduced by one sports drink company 15 years ago, and eventually copied by the others, was tart and sweet at the same time. This taste sensation proved to stimulate drinking larger amounts because it didn't actually "quench" thirst. In the earlier years of sports drink evolution, sodium was added in larger amounts than it is today. The logic was that it was a mineral lost in sweat but would also stimulate thirst, causing athletes to drink more.

Today what is known is that both the carbohydrate and sodium content of sports drinks influence absorption of the water portion of the beverage. Since the goal of drinking is to get water to the cells quickly, hydrating them completely before activity and then throughout and after exercise, the rate of absorption of the drink is an issue. Water is absorbed quickly, with no ingredients in it to decrease absorption, but sports drinks also leave the small intestine quickly, delivering water and energy to the cell. The question I consistently raise is, "who needs the extra energy?" After running my daily three to five miles, the last thing I want to do is hydrate myself with calories when water is available. And, truthfully, most people exercising at that level probably don't need anything but water. But, if the scenario is one in which energy is needed due to the duration of

activity, a sports drink can be perfect. As a clinical nutritionist I've learned that sports drinks fit in for other very practical reasons.

For example, men and women who plan to go to the gym right after work may feel hungry on the way or even one or two hours before leaving work. Rather than succumbing to a snack that may leave them feeling too full for exercise, or eating the traditional high calorie 3 p.m. "wake-me-up" snack, a sports drink at that time will boost energy and hydrate without interfering with the 5 p.m. exercise plans. The good news is that the calories in sports drinks are small enough at 70 per 8 ounce serving that it may be just the amount to stave off hunger and motivate a workout. In addition, sports drinks can be kept in a car ready to gulp en route to the gym as a quick energy source. Another practical example using sports drinks is to provide fluid and calories for those who simply don't want solid calories before physical activity. Whether it's a competitive athlete or a recreational exerciser, 30-60 grams of carbohydrate an hour before activity reinforces energy levels. Competitive athletes who get "butterflies" in their stomachs prior to an event tend not to want to eat, yet need the pre-exercise carbohydrate a sports drink can provide.

Finally, carbohydrate is needed after exercise to replace glycogen used during physical activity. The goal is to begin eating or drinking carbohydrate sources within the first two hours post-exercise to maximize glycogen formation and increasing the opportunity for optimal training the next day. Since high intensity workouts have a tendency to decrease appetite, eating solid foods after exercise may be difficult. Athletes able to drink fluids can easily get an initial amount of needed carbohydrate through sports drinks.

Fruit Juices: Now that I've got you to consider the role of water and energy in a drink, let's consider fruit juice. Although carbohydrate is found in juice, it's in the form of fructose, which interferes with the rate absorption of the water portion of the juice. Fructose has been found to decrease absorption rate, hindering rapid hydration of the cells. Juice comes in as many colors and flavors as sports drinks but to use it just before or during physical activity has been discouraged primarily from the hydration standpoint. It tastes great, typically contains vitamin C and vitamin A, is a rich source of potassium, sodium, and in some cases is fortified with calcium. Carbonated soft drinks: Reasons cited for using soft drinks as a fluid before exercise are the caffeine and sugar content. Both substances can boost energy.

Caffeine stimulates the central nervous system, increasing heart rate and a sense of alertness. The sugar truly is an energy source that may benefit the person who simply needs the calories. But is it the best beverage to choose for exercise? The answer is probably maybe. Although carbonation at the level of 3% may interfere with the ability to drink quantities at a fast rate, some exercisers prefer beverages that are carbonated and find no problem what so ever in using them before or after workouts. The issue of whether or not carbonation presents a problem is more of a personal taste issue. The more important question is whether or not sucrose, the carbohydrate used in soft drinks delays absorption of the water portion of the beverage. Research shows that it does. This is probably the best reason to choose something else.

The bottom line is to encourage fluids that will be drunk, plentifully and frequently. Without adequate fluid replacement, fatigue sets in prematurely. As exercise continues without appropriate fluid replacement, more serious complications develop including dizziness, cramping, nausea, headache, and decreased sweat losses impairing thermoregulation, which can lead to heat stroke. We need to encourage older clients and children to drink just as much as teens and middle-aged adults. Thirst mechanisms may be impaired in seniors and children may simply not pay attention to fluid intake. In addition, children have lower heat tolerance and sweat losses than adults so they do not thermoregulate as well.