

# **You're an Athlete-So Drink Like One**

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It may be just as important to pump water into the firefighter as onto the fire. Research in sports medicine has yielded some impressive arguments that getting enough to drink makes you do your job better. And what better performance could there be than saving lives and property? Today's firefighter, an elite athlete, needs to make hydration a top priority to their training program.

Even the rookie's know that to get a raging fire under control, one of the main objectives is to get as much water onto the fire as possible in the least amount of time. In recent years, with the emphasis on health & safety, professional firefighters may have found another important virtue of water. Drinking water prevents dehydration an important aspect of both health & safety. One of the most debilitating and deadly occupational hazards of working hard in the heat - while wearing heavy bunker gear and breathing dry, compressed air - is dehydration. As the profession has acknowledged the firefighter as an elite athlete, many of the 21<sup>st</sup> Century nutritional and fitness components of Olympic caliber training methods are finding their ways into the fire service.

Chief Richard Williams, Gainesville Fire Rescue said it this way, "Today we see firefighters taking hydration breaks. We send our support personnel around to get the process started. We don't see the cramps, the stomach heaves, the all-out fatigue from heat stress and exertion. Our people come out of rehab quickly with few after-effects from working hard. Granted there are other contributing factors - better conditioning, better turnouts, non -smokers, lighter equipment -- but there is significant help that comes from getting the body fluids back to normal as a routine part of the job. The firefighters know the difference it makes, and are ready to drink the fluids well ahead of feeling the thirst."

Performance in all endurance events - which are defined as those lasting longer than 20-30 minutes - is reduced under conditions of heat. An Olympic athlete will easily be 3.5 percent SLOWER when competing at 2 percent dehydration. For the fire fighter this translates to being at least 6 seconds SLOWER when trying to escape from a burning structure. This amount of time could mean the difference between getting out alive or being caught inside.

## **DEHYDRATION IS UNHEALTHY & UNSAFE**

Even slight dehydration has physiological consequences that place not only the fire fighter in danger, but also the fire company and the citizens needing service. For example, every two pounds of body water lost, heart rate is elevated about 8 beats/minute which ultimately means less time on the air tank. This same two pounds of body water lost causes a decline in cardiac output and a rise in body core temperature of 0.3C when exposed to prolonged heat.

Dehydration results in thirst, fatigue, loss of coordination, confusion, irritability, dry skin, decreased urine production and elevated body temperature. Heat stroke, the most dangerous heat injury, has a mortality rate of 80%. And of the surviving 20%, many suffer from permanently impaired ability to regulate their own temperatures, predisposing them to future heat injury.

To many, thirst is the first indication they need something to drink. But, in reality, by the time you are thirsty it's too late. You're already 2% dehydrated. At 4% you are unable to do your job efficiently (all those hours of training for proper technique wasted); at 7% you're throwing up (not a pretty sight in your bunker gear) and at 10% you're dead.

Under normal conditions body water is conserved by hormonal control mechanisms that maintain the osmolality,(sodium content and volume of extracellular fluids) all of which play a role in the >regulation of water balance. However, in situations where water losses are increased acutely, the thirst response can be delayed and the firefighter may become dehydrated without much >warning.

## **DEHYDRATION IS COSTLY**

Dehydration can cost your fire company thousands of dollars a year. Recognizing the economic drain, the Florida State Fire College in Ocala decided to take action. According to Rusty Barrett, EMT Instructor, "Every year, six to eight students at the College would be taken to the emergency room or hospitalized and treated for dehydration. Several years ago, we recognized dehydration as a preventable problem. We began emphasizing proper hydration and re-hydration. It was as easy as encouraging the students to drink water during lectures." "We've had only 1 episode since."

The cost of dehydration can look something like this for a single case:

- \$345-\$400 plus \$4.75/mile base cost for ambulance ride in Florida
- \$75 for renal profile to test kidney function
- \$93 for blood work
- \$40 for each bag of IV fluid used

- \$250-\$300 for each physician or nurse/day
- \$80 for monitor

This brief visit to the hospital can cost about \$900. "Dehydration is expensive and preventable!" says paramedic Barrett. "We're saving thousands of dollars every year."

## **WATER AND THE FIREFIGHTER**

When you stand on the scale, if you're like most people, when you gain weight you are concerned; when you lose weight you consider it a triumph worthy of celebration. But, in reality, your weight as you see it on the scale is the sum of four components: bone, fat, muscle and water. And the water portion of that sum varies minute by minute. Consider that your body is over two-thirds water, this can be quite a variance. And, the ability to store water is different from men to women because of their body composition. On the average, men have less body fat and more muscle mass than women. The more muscle the body has the more heat is generated and the more water is held in the cells of the muscles. Fat, although it insulates against cold, does not generate heat and does not hold as much water. Approximately 62% of body water is located inside the cells (intracellular) and 38% is located outside the cells (extracellular).

## **WHY IS WATER THE MOST IMPORTANT NUTRIENT**

For a firefighter, one of the main benefits of being properly hydrated is internal temperature control and thus the body's ability to dissipate heat. Not only are you working in extremely hot environments, but you are, in all likelihood, wearing 45 pounds of bunker gear. Frankly, you get hot. Real hot. Your working muscles are generating up to 100 times more heat than they produce when they are at rest. Your core temperature is rising. Your body knows that it has to maintain a temperature of 98.6 to keep you healthy and functioning so it needs to get rid of this heat. Blood circulating to your muscles picks up the heat and circulates it to the top of the skin. You sweat. The sweat evaporates and cools your skin which cools the blood which circulates back to your working muscles and the process continues. It's similar to the cooling system in your vehicle, where fluid circulates through the engine after it's been cooled by the radiator. (We all know what happens when a radiator overheats!) If the body stores heat instead of dissipating it, the internal temperature rises at a rate of 1C or 1.8F every five to eight minutes which will result in physical collapse within 15 - 20 minutes. (the time most fire fighters use one tank of air).

When your body is warmer than the environment, heat is simply radiated to the cooler surroundings. But during vigorous exercise, your body can't radiate this heat fast enough and begins sweating-cooling your body through the 2.5 million sweat glands located beneath your skin. (One square inch of skin in the palm of your hand contains over 3,000 sweat glands!) The loss of water can be enormous and dangerous. During prolonged exercise in the heat, people can become dehydrated at a rate of one to two liters every hour. Each pound of weight lost corresponds to a 1 pint need for fluid.

## **WHEN IS IT TIME TO WORRY ABOUT ELECTROLYTES**

Sweat is more than just water. Sweat is salty. The "salty" taste comes from "electrolytes." You find them in sports drinks such as Gatorade & Powerade and they claim the ability to replace fluid and electrolytes lost in sweating during athletic competition. Electrolytes are nutrients with electrical charges that help your muscles contract and relax. Dehydration from excessive sweating increases the concentration of electrolytes in the extracellular and intracellular spaces and can result in muscle cramping and impairment of temperature control. It is more important to get electrolytes after you have been working hard for about an hour.

If you are concerned about electrolytes, it's easier than you think to find them. Two of the most important electrolytes sodium and potassium can be replaced with fruit, fruit juices, yogurt and other carbohydrates. Choosing these foods also provides fiber, antioxidants and other essential vitamins and minerals. It's also cheaper. When compared to commercial drinks, they are what nutritionists refer to as "power packed" foods.

Your body contains approximately 97,000 milligrams of sodium. In one pound of sweat, you lose about 450 - 700 milligrams of sodium. You have plenty. Sodium is easily replaced. If you're like most Americans, you already consume over 4,800 milligrams/day in your diet. It's easy to do:

- Gatorade - 8 ounces provides 110 milligrams of sodium
- Pizza - 1 slice provides 500 milligrams of sodium (do you know a fire fighter who has self control and only eats one piece?)
- Table salt - 1/4 tsp. provides 500 milligrams of sodium
- Pretzels - 1 ounce provides 500 milligrams of sodium

Like sodium, potassium is another electrolyte easily replace. In one pound of sweat there are approximately 80 - 100 milligrams of potassium. The body loses about 160 - 400 milligrams in one hour of exercise in the heat. Sound like a lot? It's not. Consider the fact that your body contains 170,000 milligrams of potassium.

- Gatorade - 8 ounces provides 25 milligrams
- Yogurt - 8 ounces provides 350 milligrams
- OJ - 8 ounces provides 500 milligrams
- Banana - provides 550 milligrams
- Potato provides 750 milligrams

Rehydration after strenuous exercise requires replacement of water loss, but just plain water is not an effective way to achieve a hydrated state. Replacement drinks should include some sodium and potassium simply because without them you will not feel the need to drink and you will need to urinate more. Hence you won't drink enough to replace what you've lost and you'll excrete much needed fluids.

## LET'S TALK ABOUT CAFFEINE

At most fire stations, there is always a pitcher of sweetened, iced tea ready and waiting for the first thirsty person. Rarely is the pitcher ever empty. If you're like most people when you're thirsty, you'll wet your whistle with a favorite beverage and think you've done the job. And, if you're like most fire fighter's you'll choose a caffeinated drink -- coffee, tea or a soft drink, not realizing that caffeine actually aggravates dehydration. It is shocking to note that experts recommend limiting daily caffeine intake to less than 300 mg/day. Look over the caffeine audit below and see how you score.

### Sources of Caffeine Servings/day Amount of caffeine Total

Coffee - 5 oz. cup

- Brewed (drip) - 115 mg
- Brewed (percolators) - 80 mg
- Instant - 65 mg
- Decaffeinated - 3 mg

Tea - 5 oz. cup

- Brewed - 50 mg
- Instant - 30 mg
- Iced (12 oz. glass) - 70 mg

Soft drinks - 12 oz. serving

- Jolt - 71 mg
- Sugar-free Mr. Pibb - 59 mg
- Mountain Dew - 54 mg
- Mello Yello - 54 mg
- TAB - 53 mg
- Coca-Cola - 46 mg
- Diet Coke - 44 mg
- Mr. Pibb - 41 mg
- Dr. Pepper - 40 mg
- Sugar-free Dr. Pepper - 40 mg
- Pepsi-Cola - 39 mg
- Diet Pepsi - 36 mg

Source: [Cardiovascular Disease: Nutrition for Prevention & Treatment](#)

## GENERAL GUIDELINES TO AVOID DEHYDRATION

### When not on shift:

- weigh first thing in the morning without clothes and then weigh again after working
- for every pound lost drink two 8 oz. glasses of fluid
- choose beverages with some electrolytes and sugar (watch your calories)
- drink 2 1/2 cups of water before working outside
- drink 1 cup of fluid every 20 minutes while working

- don't restrict fluids
- avoid beverages containing caffeine or alcohol (sorry but for every beer you need 3 glasses of water to metabolize).

**At the station:**

- drink plain water throughout the day
- avoid beverages containing caffeine
- urinate every hour to avoid getting into bunker gear with a full bladder

**At the fire scene:**

- begin drinking water on your way to the fire scene
- when changing tanks during a live burn - drink!
- when fighting fires lasting longer than a hour, drink water diluted with either juice or fluid replacement (eg. 1/2 cup juice with 1/2 cup water).
- continue drinking fluids on your way back to the station

In conclusion, dehydration is deadly, costly and preventable. Drink. Drink. Drink.