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# All About Water

## I

### Water the Essence of Life

How many times have you heard "drink your water"? In the health profession we use that statement quite a bit, but few people take the time to explain why. In this column today I would like to explain why, then maybe you might drink more water.

Water is the second most important element on earth. You can only live a few days without it, maybe a week but not much more. The human body is composed of 70% water, as are most of the foods we eat. Our muscles are 75% water and our blood a whopping 90% water. Our blood carries nutrients to every part of our body and waste products away to be eliminated. Without enough water our bodies' would starve and we would poison ourselves with our own waste products.

The most current research that is available states that in order for a human to remain hydrated they should consume one half their bodyweight in fluid ounces daily. That's a pretty easy formula to follow, if you weight 100 lbs. you should drink 50 ounces per day. If you would like to lose body fat you must increase the amount you take in daily. Our bodies are very reluctant to let go of fat if we don't have plenty of pure water.

Yes other liquids will count but not as much, the body must work to separate the water from the remaining contents at a price. Energy is the price a person pays to have the water extracted, that might be something you want to keep in your reserves. All alcoholic beverages, coffee and tea work as a diuretic, in other words they extract water from your body. When you take in these liquids you need to add water.

Our body uses water for almost every function that takes place within it. Our kidneys help remove waste products from our blood, which then is excreted in the urine. When we have water shortage the bodies' automatic reaction is to retain the water it already has. When this occurs the stored water becomes increasingly contaminated with waste and the kidneys can not remove the toxins, as they should. They simply overload. The body then shifts the cleaning load to the liver.

The body must get rid of as much waste as possible, in most cases the liver is already burdened with trying to filter and clean our blood. So when it has to take up part of the kidneys job the liver can't do all of its work efficiently.

Pay attention here, one of the most important jobs the liver has is metabolizing stored body fat into energy. As a result ones weight increases because the stored up fat can't be burned and turned into energy, and the body tends to hold onto more water because of the initial deficiency. Do not get me wrong, it takes more than drinking water to lose weight, eating right and exercise help, but I will go so far as to say you can't lose body fat properly without drinking water.

If you drink more water you will urinate more, but that's a good thing. Remember this is the way the body rids itself of toxins. If you allow the toxins to build up in the body the eventual price will be greater than going to the bathroom more often. If you have been dehydrated for some time you should increase your intake slowly. At first you will actually be thirstier, then after a short time the increased thirst and believe it are not the increased urine output will decrease.

*Source: Dr. David S. Dyer, N.D.*

# All About Water

## II

### Hydration

Water is the most abundant, yet possibly the most overlooked, substance in the body. The body's fluid status is a truly delicate balance, so much so that experts rank water second only to oxygen as essential for life. Water plays a vital role in all bodily processes by providing a universal medium for chemical reactions, lubrication, nutrient delivery, waste disposal, heat dispersion and temperature regulation. In order to consider what fluids to drink, when to drink and how much to drink, it is first necessary to consider the basis of fluid regulation.

Water represents 45 to 60% of an adult's total body weight. The variation is explained by the difference in body tissue proportions between individuals, with muscle comprising 80% water compared to fat which is only 20% water. The lower a person's percentage of body fat the higher their percentage of body water is (this is the key premise used for bioelectrical impedance analysis). Women will therefore tend to have a lower percentage of body water compared to their male counterparts.

In order to maintain the fluid balance within the body water gain needs to equal water loss. Fluid loss is heavily dependant on a person's activity level as well as environmental temperature and humidity, but for a sedentary adult in this country, an expected total water loss would be approximately 2500 ml per day and would comprise of -

- 1500 ml/day excretion by kidneys in the form of urine
- 500ml/day evaporation and perspiration from the skin
- 300ml/day from the lungs
- 200 ml/day from the gastrointestinal tract

In order to maintain a constant body fluid volume these water losses have to be matched by water gain. Only a small amount of water (200ml/day) is produced within the body through metabolic reactions thus leaving 2300ml/day which has to be ingested in either liquid or food form. Exercise increases muscular work and consequently the demand for oxygen. Three quarters of muscular activity is lost as heat and therefore, sweat production is increased to maintain body temperature via evaporation. The rate of respiration increases to supply sufficient oxygen to the muscles which results in greater water loss from the lungs, as the air is moistened to provide more efficient diffusion from the lung space into the blood.

It can therefore be seen that exercise significantly increases fluid loss which can reach levels of up to 4 litres per hour during heavy exercise. A loss of body mass through dehydration of as little as 2% significantly impairs performance (Armstrong et al 1985) which emphasizes the importance of the maintenance of hydration, especially during exercise.

But how does dehydration affect the body and how does the body recognize it has a problem with fluid loss? Blood plasma is 92% water, and therefore, dehydration reduces the volume of blood in the body which makes the cardio-respiratory system work harder to pump the blood around the body and deliver sufficient oxygen to the working muscles. Exercise feels much harder as your body's systems aren't working as efficiently as they do with good hydration and performance is impaired. As dehydration progresses, nausea and vomiting may be experienced and by 5% reduction in total body weight, performance has dropped by 30%. Fluid losses greater than this creates weakness, confusion and dizziness leading ultimately to coma and death if fluid isn't replaced immediately.

The body's response to fluid loss is that of thirst and the stimulation of thirst by dehydration is what is known as a negative feedback system.

Physiologically dehydration results in:

- Decreased flow of saliva
- Decreased blood volume
- Increased blood osmotic pressure

These three reactions to dehydration stimulate the thirst centre, which is situated in the hypothalamus in the brain, producing a the sensation of thirst. However, the thirst mechanism is relatively slow. Although a person can only survive a few days without water, and yet the body can survive without food for around 30 days, the drive to eat is much greater than the drive to drink.

To the majority of recreational exercisers thirst will be viewed as an indicator that they need to drink or they will become dehydrated. In actual fact, thirst is a sign that the person is already dehydrated, albeit in the initial stages. This is particularly pertinent when considered in the light of the fact that the thirst mechanism also tends to be depressed during exercise which increases the level of dehydration which occurs before thirst is sensed. This is why fluid replacement should be considered before, during and after physical activity rather than relying on thirst to indicate that the body needs fluid.

There is always a tendency to think that water is plain and that additional ingredients will improve it. However, in actual fact, water is the best fluid you can choose for exercise of an hour or less in duration. If you think water is just water then think again. It is worth considering what type of water to use.

Tap water is not only recycled many times before it even gets to you but its contents are very variable. Soft water contains higher levels of sodium and has been linked to a greater incidence of high blood pressure. Hard water contains high concentrations of calcium and magnesium.

Water is water? A natural mineral: Comes from an underground source.

Types of Water

- Spring: Comes from an underground source and must meet Drinking Water in Containers Regulations and can be treated if necessary.
- Purified: Can be drawn from any source and can be artificially processed and chemically treated to make it drinkable.
- Tap: This water is chemically purified and on average recycled 9 times, When bottled, tap water may be termed 'purified' or 'table' water.

Practical Recommendations for Fluid Replacement

- Don't rely on thirst. Drink before, during and after any physical activity. Get into the habit of taking on fluids during training as well as competition.
- If the exercise lasts for less than an hour the body should have sufficient electrolyte and carbohydrate supplies to maintain optimal performance. Therefore, for short periods of exercise water is just as good as sports drinks.
- If exercise lasts for over an hour a drink with electrolytes and carbohydrates will aid performance by supplying additional energy.
- Contrary to popular opinion a relatively small amount of sweat is salt (0.2 to 0.4%) therefore unless the climate is extremely hot or the activity is over an hour in duration additional salt should not be needed.
- Always try to drink more fluids than you need. Smaller quantities at frequent intervals helps optimize hydration.
- The World Health Organization recommends drinking 6 to 8 large glasses a water a day. But it must be remembered that this is only to maintain normal fluid balance and does not take into account the extra fluid demands of exercise.
- Drink at least half a litre of water before exercise to ensure your fluid levels are up to start and then continue taking in as much as you can during exercise.
- Finally as a fitness professional a key role for you will be to educate and motivate your clients to adopt 'good hydration practices'.

References:

1. American College of Sports Medicine (1996) advise on fluid intake
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4. Fallowfield et al (1995), *Journal of Sports Sciences*, 13(1):26-27

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## All About Water III

### The Worsening Contamination of Water

It has been estimated that 53 million North Americans, about 20 percent of the population, have been drinking water that is contaminated with feces, radiation, lead, or other poisons. This is according to data collected by the United States Environmental Protection Agency in 1993-1994. This was a 7.6 million increase over the previous year.

The Environmental Working Group (EWG) reported that it had tested 29 Midwestern cities and towns and found that all had herbicides present in the drinking water. In one Illinois city, they found that the level of the weed killer cyanazine in the public water supply was 34 times above the federal standards. The EWG estimated that 20 to 25 million Americans are now drinking water polluted with herbicides. Research in laboratories has shown a higher incidence of cancer and birth defects in animals fed with food containing herbicides .

The EWG conservatively attributed at least 1000 deaths each year, and about 400,000 cases of waterborne illness, to contaminated tap water. Besides hazards for the unsuspecting general population, experts have noted the serious health consequences that exist for infants and children.

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