

Water & Hydration - An Important Component for Health and Vitality

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We tend to take water for granted, because there is an abundance of it on earth with about 71% of the earth made up of water. Most of the water on earth exists in our oceans, which has a salt content similar to that of our blood plasma. The remaining fresh water is primarily taken up in glaciers and the polar ice caps with the rest found in ground water. Water consumption is of importance for all life on earth, but in particular infants, young children and the elderly are more affected simply because of their needs for growth and development and preservation of body water as we age. We can live for days, weeks, and even months without food, but 2 to 3 days without water could lead to death.

An individual's thirst generally provides a better guide for how much water they require rather than a specific, fixed quantity, but this mechanism is not always the best guide as individual preferences vary. Other factors such as activity, one's health status, age and climate all play a role in how much water the body needs.

Similar to the earth, the human organism primarily consists of water as well, it on average being 55% to 75% of our composition. The wide range is due to the fact that different cells contain varying amounts of water. Muscle cells, as an example, are 70-75% water whereas fat cells are only about 10-15% water. Therefore, the higher the fat content of the body, the less water we retain. There are primarily 3 pools of fluid in the body; blood, which makes up about 5 liters, interstitial fluid, the fluid that bathes our cells makes up about 15 liters, and intercellular fluid that comprises about 25 liters. With dehydration, water is lost first from the blood which is made up of about 90% water. As water deprivation continues, the interstitial fluid and then cells will start to lose their water content.

Dehydration is usually expressed as the loss of a certain percentage of one's weight. Dehydration is defined as fluid losses greater than only 1% to 2% of body weight but many people can tolerate up to 4% loss without immediate adverse health effects. Dizziness and fatigue are often the first signs of water losses of 5% to 8 %, with losses of 10% or greater often resulting in more pronounced physical and mental symptoms such as headaches, confusion and disorientation as well as extreme fatigue. Dehydration can become fatal when greater than 12% of your body weight is lost.

The human body is constantly losing water. The most obvious way is through daily urine output but perspiration and breathing also contribute. With exercise, sweat losses of 2 quarts per hour can occur. Even when not exercising we are losing water through our skin and respiratory tract which is termed 'insensible loss'. Insensible water loss is affected by temperature, humidity, altitude, and exposure to air currents, the volume of inspired air and blood circulation through the skin. Insensible loss is variable depending upon a variety of conditions but becomes important when the loss exceeds replacement.

Another way water is lost is through the use of medications such as diuretics or caffeine and alcohol. These work by increasing blood flow through the kidneys resulting in

increased urinary excretion. Certain diseases such as diabetes and chronic kidney disease also affect water loss.

Often the first sign of dehydration is thirst. As a rule, there is a lag time with our thirst mechanism and water loss. By the time we are thirsty, our bodies have already reached the point of moderate dehydration. Other signs of moderate dehydration are low-grade headache and fatigue. Dehydration becomes severe when accompanied by nausea, chills, increased heart rate, an inability to sweat, and lightheadedness. When these symptoms are found, intravenous fluid replacement is a must, as oral intake usually cannot provide adequate replacement fast enough to alleviate symptoms.

A general rule of thumb is that is no less than 64 oz. or about 8 glasses of water per day of water should be consumed. This amount would probably be adequate for someone who lived in a temperate climate and was sedentary. When you add exercise and hot or cold and dry weather, ones fluid needs increase significantly. Adding at least two more cups per day if you live in a hot and or dry climate is generally recommended even if your activity level does not increase. Higher altitudes that are generally colder and dry also lead to greater needs for hydration.

Water intake is also related to how many calories you burn daily. It is estimated that we need about 1 ml of water for every calorie we burn, so when exercising, greater amounts of fluid are needed.

Elderly and Hydration

As a rule, elderly patients will drink less because as we age, our thirst mechanism begins to loose its effectiveness. The elderly have a narrower margin of safety, which is primarily due to poor tolerance to stress because our ability to adapt decreases with age. As an example: anemia is worse in the elderly due to changes in vasculature and a decreased capacity to produce new RBC's. Therefore it takes longer to replace lost red blood cells.

Elderly patients experience a reduction in renal concentrating function resulting in a decrease in the maximal urine specific gravity and osmolality. Therefore the elderly patient is predisposed to fluid loss when fluid intake is limited or loss is accelerated. This is probably due to a lack of kidney response to Anti Diuretic Hormone (ADH) or Vasopressin. ADH increases the amount of solute free water reabsorbed back into the circulation by the kidney's nephrons and constricts arterioles which increases vascular resistance raising blood pressure.

Elderly patients show an increased secretion of ADH in response to high salt intakes or hypertonic solutions. Therefore, the elderly patient will tend to secrete sodium at a higher rate resulting in hyponatremia or sodium loss.

Sodium conservation can also decrease in the elderly due to a decline of atrial natriuretic

factor (ANF) with aging. Cardiac muscle cells, to help regulate blood pressure, produce ANF. It does so by reducing extracellular fluid volume through increased salt secretion. This results in an eventual sodium loss through the kidneys at a higher rate than in a younger person. Salt helps to retain fluid in the system so a balance between intake and loss needs to be maintained. In the elderly, this balance is often more difficult to maintain.

The combination of a decreased thirst mechanism, poorer adaptation to stress, changes in ADH, ANF and kidney function, act to predispose elderly patients to be more susceptible to fluid loss and dehydration.

Types of Water

Water comes in many different forms with each providing benefits. Generally water from the tap has been run through the local water plant and by and large follows Environmental Protection Agency (EPA) guidelines. Recent reports regarding the safety of the U. S. public water supply brings to question whether these guidelines are adequately followed, Flint Michigan's water woes being the most glaring example. Therefore it is incumbent upon all of us to be aware of whether our local municipalities are compliant. Regardless of what the quality of the local water supply is, it is almost impossible to remove all contaminating substances, These can be made up of organic environmental pollutants such as benzene and pesticides, drugs, heavy metals such as lead, mercury and aluminum and hormones such as estrogens to mention only a few. Therefore adding a home filtration system that removes these substances is something that needs to be considered.

Commercially there are many different types of water drinks on the market, each touting their benefits. What follows is a brief over view, but we recommend that you do your own research to find what if any of them is best for you and which products are truly what they profess to be.

Alkaline water – is touted by its proponents to help soothe acid reflux, neutralize acid in the body while improving energy and metabolism. It is also touted as a preventive for cancer due to its promotion of an alkaline environment in the body. While the body maintains an alkaline reserve in the interstitial and intracellular fluids, the kidneys and lungs help to maintain the pH balance of the blood and using excessive amounts of alkaline water can lead to an eventual mineral deficit. Body alkalinity can be maintained quite well by consuming the requisite amount of fruits and vegetables on a daily basis.

Bottled water – generally found in plastic containers these products are essentially tap water with slick advertising that tries to get you to purchase what comes out of the tap for free at home. The main problem here is that many plastic containers contain Bisphenol-A (BPA) a cancer causing agent as well as other contaminants that leach out into the water over time. This especially occurs as the water sits in the heat and adds to the land-fill burden for non-biodegradable plastic containers that has become a major environmental

problem.

Coconut water – is touted to contain a similar electrolyte profile to human blood, therefore making it an ideal beverage to replace fluids and help remove toxins from the body. Coconut water does contain some sugar but is high in potassium and low in sodium.

Deionized water – deionized water is water that has had all of the minerals and other particles/substances removed. It is considered the purest form of water but also does not provide any minerals. Long-term use may result in a mineral deficiency.

Electrolyte water – contains sodium, potassium, magnesium and phosphate, all electrically charged molecules that are needed for optimal muscle and nerve function as well as every other cell in the body. Electrolytes also help to regulate blood pressure and volume as well as maintain optimal cell function.

Mineral water - contains dissolved minerals like calcium, magnesium, iron and sodium, which is not a bad choice for women who need larger amounts magnesium and calcium. These minerals can also be added to regular water as well as there are a number of commercial products available.

Sparkling water - is naturally or unnaturally carbonated with carbon dioxide. The most important benefits seem to be with helping disordered digestion and constipation. Manufacturers also tout its benefits for treatment of motion sickness, maintaining blood sugar levels, weight loss and to prevent toxicity.

Spring water - is usually from an underground source where water flows naturally. I say usually because there have been several reports that “spring water” from some companies is really municipal tap water that has been fortified with minerals. Spring water contains natural minerals as opposed to added minerals, the thought being that they are more readily absorbed and utilized by the body. Magnesium, calcium, sodium, potassium and trace minerals are usually found.

Sterilized water - is water that has been purified so that there are no microbes present. It is used mainly for infant formulas and for immuno-compromised patients in hospitals and for intravenous solutions.

Regardless of ones age, maintaining proper hydration is important to help maintain homeostasis and health. It is particularly important in patients with any preexisting disease, but in particular diseases such as diabetes, arthritis or respiratory illnesses such as emphysema or COPD. Avoidance of diuretics such as caffeine or alcohol as well as monitoring drug therapy that affects kidney function is needed.

Being aware of the warning signs of dehydration is important any time of the year but in particular during the summer months as early intervention can help one to avoid the

consequences of dehydration.