

Liquid Assets: The Value of Fluids to Your Health



Introduction

What is ...

- the most abundant compound in your body?
- utilized by every system in your body?
- the most important (but most forgotten) nutrient?

The correct answer to all three questions is **water**.

Some people are aware of the value of healthy food choices in disease control and prevention.

Some people have heard of the health benefits of increasing physical activity and getting plenty of rest.

But some people are unaware of the marvelous dividends they can receive from daily consumption of adequate amounts of water and other nutritious fluids.

Maintaining your body is a lot like running a business. You have certain assets available to keep your body healthy. These assets include nutritious foods, physical activity, and adequate rest. However, the greatest assets you have at your disposal are liquid assets . . . plenty of

water and nutritious fluids. Your body can't survive for long without fluids. Your body will function a lot better if you remember to make large deposits of fluids into your health account every day.

Your Body Is Mostly Water

As the most abundant compound in the body, water constitutes about 55 percent to 75 percent of an adult's body weight. The numbers are even higher in children. How much water each person has varies. For example, the less fat a person has, the higher the proportion of water in his or her body. Because male bodies are more muscular, males usually carry a higher percentage of water than females. Muscle tissue is about 70 percent water, while body fat is about 10 percent water. Even bones can be up to 25 percent water.

Water . . . Reducing Your Liabilities

Dehydration is a liability you want to avoid. It is essential to good health to consume adequate amounts of fluids daily. The body's requirement for water is greater than its ability to produce it, so you must

replace the water that is lost from your bodies. Water is lost from the body by the skin as perspiration, the kidneys as urine, the intestine in feces, and the lungs as water vapor when you exhale.

Dehydration occurs when the body's water output exceeds water input. Dehydration is a condition that develops from inadequate water intake or from excessive water loss. The chart on page 2 shows possible health problems that can occur when a percentage of fluid is lost from the body.

Water . . . Protecting Your Assets

Water is necessary to protect the body's health. Some critical functions of water within the body include:

Transportation. Blood, which is 90 percent water, is the body's transportation system for oxygen, nutrients, hormones, enzymes, and other life-sustaining materials to the cells. Blood also carries waste products to organs for removal.

Lubrication. Water is present in the mucous linings of organs and in the fluids between internal organs. These fluids make movement easier and reduce friction within the body. Water also lubricates joints, making it easier for bodies to move.

Digestion. In the digestive tract, water is present in mucus, salivary juices, and digestive juices. These help break down certain foods and transport food through the digestive system.

Temperature control. It's important for good health that the body's temperature stays within a narrow range. Since water changes temperature slowly, the water in our bodies is able to store heat and help regulate temperature. Water also helps regulate body temperature through perspiration. Heat leaves our bodies as we sweat, and the water evaporates off the skin.

Cellular work. Water helps build hormones and enzymes that control reactions in the body. Within the cells of our bodies, many reactions that involve water take place. For example, water plays an important role in the digestion of protein and carbohydrates.

Waste removal. Our bodies produce wastes in many ways. Water plays a key role in removing them through our urine and bowel movements. Wastes also leave our bodies through perspiration and in the air we exhale.

Water plays an incredible role in keeping your bodily systems functioning properly. Following are some examples:

Water and your brain. Brain tissue is 85 percent water. Dehydration can cause fatigue, dizziness, headache, depression, confusion, and disorientation. Dehydration also may lead to migraine headaches.

Water and your muscles. Muscles are 70 to 75 percent water. A small loss of fluid will affect their function because water helps regulate electrolytes. Muscles need electrolytes to function, especially during exercise.

Muscles are weakened when they are slightly dehydrated. Dehydration can cause muscle cramping and loss of muscle coordination. New muscle growth is supported by proper amounts of water being available.

Water and your kidneys. Waste products are removed in water by your kidneys. Urea and lactic acid (a substance that causes muscle aches) must be dissolved in water for effective removal.

Dehydration can damage your kidneys because they have to work too hard to remove toxins and waste products. Dehydration is especially harmful to your kidneys if you also exercise heavily or are on a high protein diet. Dehydration can cause kidney stones and urinary tract infections.

Common Signs of Dehydration	Possible Results of Dehydration	Percent Loss of Body Weight
Thirst		0% - 1%
Thirst, fatigue, weakness, and loss of appetite	Can impair physiological and performance responses	1% - 2%
Dry mouth, flushed skin, fatigue, headache, reduced urine output, impatience, and apathy	Further impair physical performance	3% - 4%
Difficulty concentrating, headache, irritability and sleepiness, increased breathing and pulse rate	Heat exhaustion	5% - 6%
Dizziness, muscle spasms, loss of balance, swollen tongue, delirium, exhaustion, and collapse	Heat stroke	7% - 10%
Poor blood circulation, failing kidney function	Death	11%

Water and breathing. We need water to breathe. It moistens the lungs, promotes oxygen intake, and helps us exhale carbon dioxide. We lose 1/2 to 1 liter of water every day just by breathing as we exhale water vapor.

Water and your back. Water stored in the spinal column supports 75 percent of body weight. The remaining 25 percent of body weight is supported by the fibrous material around the disks.

Dehydration can cause back pain. The joints in the spinal column are dependent on the hydraulic properties of the water stored in the disks.

Water and your joints. Water is necessary for the lubrication of the joints. Proper hydration decreases damage caused by friction as we move. Dehydrated joints deteriorate over time faster than well hydrated joints.

Weight loss. Water contains no calories. Drinking water may help reduce appetite. Water assists the body in metabolizing fats. When you feel hungry, your body is often dehydrated. Fluids are the most important foods consumed during the day.

But I'm Not Thirsty

Unfortunately, the onset of thirst lags behind the body's need for water. Thirst occurs when a person has already lost 1 percent to 2 percent of his or her body weight. Water loss that develops slowly can turn on a sense of thirst in time to prevent serious dehydration. Water loss that develops quickly, such as with physical activity, may not be accompanied by a sense of thirst. Athletes or outdoor workers can lose 1 to 6 pounds of body fluid per hour doing strenuous physical activity, depending on body size.

To ensure that lost fluid is replaced, body weight can be measured before and after doing strenuous activities. For each pound lost, 1 pint (2 cups) of fluid should be consumed to replace water lost. Fluids should be consumed before, during, and after physical activities so that body weight remains relatively constant. By the time the brain signals thirst, an athlete or worker may have lost 1 percent of the body's weight, which is the equivalent of 1.5 pounds (three cups) of sweat for a 150-pound person. A 2 percent loss (3 pounds) may reduce the body's work capacity by 10 to 15 percent.

Monitor children carefully. Fluid needs of children should be monitored very carefully, especially during warmer months. Children don't tolerate heat as well



as adults do because their bodies generate more heat relative to their size. They are not as quick to adjust to changes in temperatures. Plus, children have more skin surface relative to their body size which means they lose more water through evaporation from the skin. Kids tend to forget to drink when they are playing and need to be reminded. They usually don't instinctively drink enough fluid to replace what their body loses.

Muscle work of any kind causes the body to lose water through sweat. This is true even when swimming or playing in other cool environments. Water breaks should be taken every 15 minutes during activity. Preferably, children should drink at least 1/2 cup of water during those breaks.

Older adults are especially at risk. As people get older, they may not be able to rely on thirst to indicate a need for fluids because the ability to sense thirst declines over the years. Or, older adults may just forget to drink enough liquid. It is especially important for older adults to monitor their fluid intake to maintain adequate hydration. Failure to do so can increase risk of urinary tract infections, pneumonia, pressure ulcers, confusion, and disorientation. Also, since body water decreases with age, older adults have a smaller margin of safety and are at higher risk for dehydration. Lack of fluids is one common reason people over 65 years of age go to the hospital.

Drink How Much?

How much fluid you should drink each day is a simple question with no easy answer. Studies have produced varying recommendations over the years. Your need for liquids depends on many factors, including your health, how active you are, and where you live. The Dietary Reference Intakes (DRIs) have determined that an adequate intake (AI) for men is roughly 3.7 liters (about 125 ounces or 15 ½ cups) of fluid a day. The AI for women is 2.7 liters (about 91 ounces or 11 ½ cups) of fluid a day. For many people, 80 percent of this amount is met by consuming water and beverages including caffeinated, while the other 20 percent is derived from foods.

When you exercise or engage in any activity that makes you sweat, you need to drink extra liquid to compensate for fluid loss. An extra 400 to 600 milliliters (about 1.5 to 2.5 cups) of water should suffice for short bouts of exercise. But intense exercise lasting more than an hour requires more fluid intake. Although not a precise indicator, the Hydration Calculator found at <https://bottledwater.org/hydration-calculator/> can be helpful when used as a guideline for determining appropriate water intake.

The simplest way to tell if a person is properly hydrated is to check the color and quantity of urine. If the urine is very dark and scanty, it is concentrated with metabolic wastes. This is a signal that the body needs more fluids. When urine is a clear, light color, the body has a normal water balance. If a person takes vitamin supplements, these may color the urine. In this case, the volume of urine may be a better indicator than color.

Often we think about drinking fluids when the weather is hot or when we are exercising. But, cold weather leads to an increased need for fluids as well. Why? When the temperature drops, the body works even harder to maintain a normal temperature. In addition, heated room air can cause skin to lose moisture. No matter what the weather, make sure you consume plenty of fluids.

Health issues and size can affect water needs. When a person has a fever or diarrhea, vomits, hemorrhages, or gets burned the need for fluids increases. Large bodies need more fluid than smaller bodies.

Is Water My Only Choice?

Better and best choices. Water remains the best drink for keeping humans “hydrated” because it’s easiest for the body to absorb. Cool water can help maintain your



body temperature and cool you down faster.

Other replacement fluids can come from foods and beverages with a high water content, such as milk, fruit juice, fruits and vegetables (for example, melons and tomatoes), soups, and broths. These foods offer more nourishment than just replacement of water.

Watch out for these choices. Drinks that do not do the job as well, such as sports drinks, energy drinks, carbonated beverages and fruit drinks, include a large dose of sugar calories. Drinks containing sugar pull body fluids into the stomach and intestine. This takes fluids away from other parts of the body and can cause gastric distress. In addition, sugary drinks may add significantly to daily calorie consumption.

In addition, energy drinks frequently contain massive amounts of caffeine. These drinks can cause minor health effects (such as a laxative effect, insomnia, and headaches) as well as very serious adverse health effects (such as increased blood pressure, irregular and abnormal heart rhythms, impaired blood flow to the heart, and sudden death). Careful label reading is encouraged to determine the amounts of caffeine, sugar, and other ingredients included before consuming energy drinks.

Consuming sports drinks is not necessary for most people participating in physical activities for one hour or less in moderate temperature conditions. Plain water is rapidly absorbed, and it cools the body from the inside out.

For people participating in physical activities lasting longer than one hour and/or in extreme temperature conditions, such as a high temperature and /or humidity, consumption of a sports beverage may be appropriate. Sports beverages replace water lost through sweating and also provide a source of carbohydrates to supplement the body's limited glycogen storage.

When a person sweats, small amounts of electrolytes (substances including sodium, potassium, chloride, and magnesium) are lost along with water. Lost electrolytes can be replaced by eating a diet that meets calorie and nutrient needs. The typical American diet provides enough electrolytes to replace losses from sweat. For extremely demanding physical activities lasting longer than three hours, sports drinks may be advised to replace fluids and electrolytes. Salt tablets are not recommended unless prescribed by a doctor. Salt tablets may worsen dehydration, impair performance, increase potassium losses, irritate the stomach, and cause vomiting.

Excellent Rate of Return

Consistent deposits of liquid assets can contribute to large dividends of good health.

What About Bottled Water?

Bottled water is becoming increasingly popular among Americans and is growing rapidly in terms of drink preferences. People in the United States spend billions of dollars every year to purchase bottled water. There are various reasons why individuals choose to drink bottled water. Some opt for it as a substitute for other beverages, while others prefer its flavor or believe it offers greater safety compared to tap water.

Bottled water is defined as water that is intended for human consumption and that is sealed in bottles or other containers with no added ingredients. An exception is that it may contain a safe and suitable antimicrobial agent, and fluoride also may be added.

Bottled water, including those products that originate overseas, is regulated by the Food and Drug Administration (FDA). It is classified as a packaged food. The FDA has established standards of identity and quality for bottled water and manufacturing practice requirements for processing and bottling drinking water. The FDA relies on state and local government agencies to approve water sources for safety and sanitary quality. Individual states may have additional regulations as well.

Bottled water can be a good beverage choice. It contains no caffeine, no calories, and no sugar. It is convenient to carry with you and may also have a better taste and smell than tap water because of the blend of minerals and method of processing.

Chlorine is typically used as the disinfectant in tap water. Bottled water is usually disinfected using ozone or other technologies such as ultraviolet light or chlorine dioxide. This difference in processing results in a taste that many people find more pleasing.

Be aware of these facts about bottled water. Bottled water is much more expensive per gallon than tap water. Therefore, it is important to consider your reasons for purchasing bottled water and to compare the cost to the value it provides you. Regarding safety, bottled water and tap water are equally safe to drink since both must meet the high control standards set by the U.S. Environmental Protection Agency (EPA) or the Food and Drug Administration (FDA).

Since many bottled waters do not include fluoride, they may not be the best choice if used exclusively for a long period of time, especially for children. Fluoride is often added to tap water to promote dental health. Check the label to see if the bottled water you use contains fluoride.

Filtering water at home versus purchasing bottled water. Numerous companies sell point-of-use filtration systems. Some attach to the faucet and filter water as it comes through the tap. Others are containers that filter the water in them. Water purified by these products typically costs less than buying bottled water. However, consumers need to be careful about maintaining these filters. Without proper maintenance, it is possible that bacteria or other contaminants can build up in the products.

Other bottled water facts to consider. Bottled water is considered to have an indefinite safety shelf life if it is produced in accordance with FDA regulations and is stored in an unopened, properly sealed container. Therefore, the FDA does not require an expiration date for bottled water. However, long-term storage of bottled water may result in aesthetic defects, such as an off-odor and taste. It is recommended that plastic water bottles be stored in a dry, dark place away from chemicals (such as paint thinner, gasoline, and dry cleaning chemicals). If the label does not include an expiration date, consumers may want to write the purchase date on bottled water that will not be used immediately.

The materials used to produce the plastic containers for bottled water are regulated by the FDA as food contact substances and must be approved under FDA's food additive regulations. Based on current research, these containers are considered safe to use and may be safely reused if they are thoroughly cleaned and dried between uses.

Bottled water puts a large burden on the environment. Consumers at least partially decrease its environmental impact when they recycle their used bottled water plastic. Most bottled water is packaged in the common recyclable material, PET plastic.

Information Resources

Adams, W. M., Vandermark, L. W., Belval, L. N., & Casa, D. J. (2019). The Utility of Thirst as a Measure of Hydration Status Following Exercise-Induced Dehydration. *Nutrients*, 11(11), 2689. <https://doi.org/10.3390/nu11112689>

Duyff, R. L. (2017). *Academy of Nutrition and Dietetics complete food and nutrition guide*. Fifth edition. Boston ; New York, Houghton Mifflin Harcourt.

Hydration Calculator – Bottled Water | IBWA | Bottled Water. (n.d.). Bottledwater.org. Retrieved July 24, 2023, from <https://bottledwater.org/hydration-calculator/>

Judge, L. W., Bellar, D. M., Popp, J. K., Craig, B. W., Schoeff, M. A., Hoover, D. L., Fox, B., Kistler, B. M., & Al-Nawaiseh, A. M. (2021). Hydration to Maximize Performance and Recovery: Knowledge, Attitudes, and Behaviors Among Collegiate Track and Field Throwers. *Journal of human kinetics*, 79, 111–122. <https://doi.org/10.2478/hukin-2021-0065>

Lorenzo, I., Serra-Prat, M., & Yébenes, J. C. (2019). The Role of Water Homeostasis in Muscle Function and Frailty: A Review. *Nutrients*, 11(8), 1857. <https://doi.org/10.3390/nu11081857>

Mayo Clinic. (2020, October 14). Water: How much should you drink every day? Mayo Clinic. <https://www.mayoclinic.org/healthy-lifestyle/nutrition-and-healthy-eating/in-depth/water/art-20044256>

National Cancer Institute. (2020). Composition of the Blood | SEER Training. Cancer.gov. <https://training.seer.cancer.gov/leukemia/anatomy/composition.html>

National Kidney Foundation. (2018, April 16). Can Dehydration Affect Your Kidneys? National Kidney Foundation. <https://www.kidney.org/newsletter/can-dehydration-affect-your-kidneys>

Office of the Commissioner. (2019). Bottled Water Everywhere: Keeping it Safe. U.S. Food and Drug Administration. <https://www.fda.gov/consumers/consumer-updates/bottled-water-everywhere-keeping-it-safe>

Surowiec, R. K., Allen, M. R., & Wallace, J. M. (2021). Bone hydration: How we can evaluate it, what can it tell us, and is it an effective therapeutic target?. *Bone reports*, 16, 101161. <https://doi.org/10.1016/j.bonr.2021.101161>

Revised by

Priscilla Brenes, Ph.D., Nutrition Specialist, K-State Research and Extension

Thanks to the original author, Barbara L. Ames, retired family and consumer sciences agent.

Reviewers

M. Gayle Price, M.S., R.D., L.D., Professor and Southeast Area Family and Consumer Sciences Specialist, K-State Research and Extension.

Jan F. Stephens, Southeast Area Multicounty Food, Nutrition, Health and Safety Specialist, K-State Research and Extension.

Mary L. Meck Higgins, Ph.D., R.D., L.D., C.D.E., Professor and Extension Specialist, K-State Department of Human Nutrition.

Tandalayo Kidd, Ph.D., R.D., L.P.N., Associate Professor and Extension Specialist, K-State Department of Human Nutrition.

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