

What's Inside Your Drinking Water?



Two Hydrogens, One Oxygen

Let's start with the basics. Water needs three simple atoms to exist: two hydrogens and one oxygen, which bond to make the molecule H_2O . Those two common chemicals give water some rather uncommon properties. For instance, when most liquids freeze and become solid, they sink rather than float. If it sank instead, ice would kill the fish that live beneath freezing ponds and lakes, and also any plants living below, wiping out whole ecosystems.

It takes plenty of warming energy to heat water, too. This is due to something called specific heat capacity. Because water's specific heat capacity is so high, it maintains its temperature fairly easily. Think about how a pool or an ocean can still feel cold on a hot day. Now consider that the cells of our bodies are full of water content, which comprises as much as 75% of our bodies depending on our age and other factors. Since water maintains its temperature easily, so do we. That means we don't have to work as hard as we might to stay within a comfortable temperature range.

Since we depend on drinking water, it is important to know what's actually in there. In this article, learn about potential drinking water health hazards, environmental protections put in place to protect your water, and safe treatments that can assure you are getting the best quality of healthy water.



Is Your Drinking Water Safe?

Thanks to the standards set by the Environmental Protection Agency, the American public can almost always expect healthy drinking water quality from a municipal source. Our waterways are tested for a wide variety of contaminants. Everything from disease-causing microbes to radioactive deposits are screened to assure public safety. These safety measures may let you take healthy water for granted.

The sanitation standards of developing nations may be lower, however, than what you can expect in the developed world. If you're traveling overseas, you will want to take more care when taking a drink. According to an EPA report, possible contaminants include

- Microorganisms, including Giardia, E. Coli, and Legionella
- Disinfectants, especially chlorine
- Inorganic materials such as cyanide, asbestos, and mercury
- Organic materials like styrene and benzene
- Radioactive material, including radium and uranium

Tips for Avoiding Contaminated Water

Although bottled water can also contain contaminants like pesticides, it is probably safer to drink than tap water in countries known to have sanitation problems. Exercise caution, however. Sometimes "sealed" bottles can be faked with a drop of glue by unscrupulous vendors. Anything carbonated is a safer bet, as the carbonation indicates the drink has been sealed from the factory. Steaming hot water such as hot tea should be OK for drinking. Juice from concentrate could be dangerous. Drinking water from the tap can be a bad idea, but so is showering if you allow it to enter your mouth. The same goes for brushing your teeth, so get it from the bottle instead.

Skip the ice as well, because this is typically made from the municipal supply.



Well, Well, Well

Natural well water doesn't come from the public water system, so if you own a well, it is up to you to make sure it is healthy. The National Groundwater Association recommends testing personal wells at least once a year by a professional. This applies to all of the 15 million American households that rely on wells for their main water source. This helps prevent illness.

Speaking of illness, if the members of your household have had many unexplained illnesses, this could be a sign that your well water needs to be tested. It may also need to be treated with chlorine. Other signs your well needs to be tested include a change in the taste, color, smell, or clearness of your water. You should also test if one of your neighbors has had well contaminants, or if there has been a chemical spill near your well.

Wells can be contaminated when foreign substances either get inside the well directly or seep into the ground near a well. Possible well contaminants include

- Fuels such as motor oil and gasoline
- Pesticides
- Animal waste
- Sewage overflows
- Naturally occurring minerals and chemicals, including nitrate and radon

If you find contaminants in your well, it is important to tell any neighbors who may be using the same ground water in their homes.



Fluoride Safety

You may have heard of fluoride, and you may wonder why two thirds of all communities in the U.S. add it to their public drinking water. Fluoride has been added to public water systems for more than 70 years after it was found to improve dental health. We now know that fluoride reduces the incidence of cavities by about 25%. Fluoride actually strengthens teeth and can even rebuild the surface of the tooth through frequent, low-level exposure. Because of this, the practice saves money for both families and the health system overall. It also protects children from tooth loss, decay, and painful extractions, which is why the Center for Disease Control named fluoridation one of the top 10 public health achievements of the 20th century.

The amount of fluoride is carefully controlled when it comes from municipal water systems. This, along with regular brushing, provides all the fluoride you need. Children under age 2, however, should not be given fluoridated toothpaste without the recommendation of a dentist or doctor. And children under age 6 should be given only a pea-sized amount to brush with, and should be instructed to rinse thoroughly afterwards.



Is it Salty?

Salt has a way of creeping into our diets, but could it even be in your drinking water? Yes, according to the World Health Organization. Usually the amount is small—less than 20 milligrams to every liter—but that’s not always true.

How Does Salt Get in?

Salt can occur naturally in drinking water, but it also seeps into the water supply through other sources. The salt poured on roads in colder climates can contribute to the saltiness of the drinking water. So can chemicals used for treating public supplies, as well as water softeners and ion exchange treatments used at home.

How Much Is Too Much?

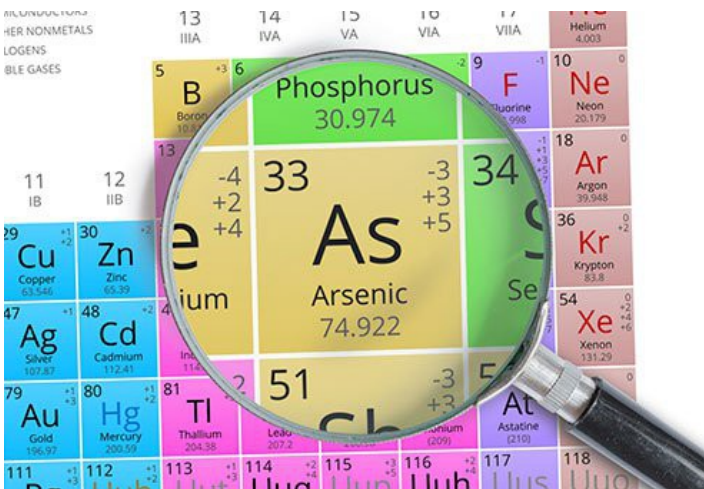
Neither the WHO nor the Environmental Protection Agency have set H₂O sodium standards for health.

However, the EPA does recommend that municipal supplies stick to less than 60mg/L for taste. For comparison, seawater contains about 30,000 mg of sodium chloride per liter.

Is Arsenic Always Dangerous?

Arsenic, the classic poison of mystery novels, can be found in your drinking water, too. Arsenic occurs naturally in the soil, but it can be found in higher concentrations in places with volcanic ash, rock erosion, and where forest fires have occurred. Industrial arsenic may get into ground water as well.

Arsenic can cause serious health problems if too much of it enters our bodies. It has been linked to various cancers, as well as skin lesions, heart problems, neurological problems, and more. Acute arsenic poisoning can be deadly. This is particularly true of inorganic arsenic, which is more commonly found in much water. But the dose makes the poison, and amounts of arsenic have to reach a certain level before they are considered dangerous. For this reason, US safety standards allow no more than 10 parts of arsenic per billion parts to assure quality H₂O.



Dangers of Lead Pipes

Lead-contaminated drinking water is odorless, colorless, and tasteless. It’s also quite dangerous. In fact it’s the most dangerous environmental hazard in the United States, according to the EPA. That’s why regulations went into effect in 1986 and again in 1996 to protect water quality from lead contamination in the U.S. Those regulations require that lead be limited to 15 parts per billion.

Despite these efforts, houses with older plumbing may still be impacted by lead. It’s not just lead pipes, either. Brass, a zinc/copper alloy that is often full of lead impurities, can leach into your next refreshing glass as well. Also, rarely, some pesticides from decades past may contaminate water systems, as well as certain industrial practices.

Lead contamination causes a whole host of health problems. It’s been linked to kidney disease, memory problems, cancer and more. Some people are at greater risk than others. Children are particularly susceptible, as their bodies absorb the substance more easily than adults. In children it can cause problems with learning, lower IQ, hearing loss and more. Pregnant women are also at greater risk.

Since it’s not something that can be tasted, smelled, or seen, it is important to have the quality of your drinking water tested if you suspect there may be lead contamination.





What is Living in Your Drinking Water?

Various diseases can find their way into our waterways. Usually the cause is human or animal feces. Some of the most common include *Cryptosporidium*, *Giardia*, and coliform bacteria.

Cryptosporidium

Commonly called “Crypto,” this microscopic parasite is known to cause diarrhea, and it’s the reason you are told to wait two weeks to go swimming after you come down with diarrhea. It is the most common waterborne disease in the United States. Unfortunately for us, Crypto lives inside an outer shell that makes it resistant to chlorine disinfection. One way to prevent it in your home is to boil your water content for one minute, then leave it to cool.

Giardia

Giardia is another parasite that is resistant to chlorine. Symptoms like gas, diarrhea, stomach cramps, and dehydration can last for two weeks or more. *Giardia* exists across the world, including all regions of the United States. Some animals that can carry the parasite include dogs, cats, beavers, and deer. If you have been infected, there are several drugs that can be helpful for treatment.

Coliform Bacteria

“Coliform” refers to a wide range of bacteria that live in water, as well as soil and plant matter. Most of these bacteria are harmless, but a few rare types can cause serious illness. Unlike many contaminants, testing for coliforms is relatively easy. Testing can be useful, even if the coliform is harmless, because it lets you know that your water has been contaminated and that you may be at greater risk of waterborne disease.



Chlorination

Chlorination is a common practice used to clean shared water sources of microbes. Chlorine is acceptable by the EPA at a concentration of 4 mg/liter. While it is considered safe to drink at this level, some worry about the cancer-causing potential of chlorine.

Chlorine and Cancer

Once added to H₂O, chlorine can break down into trihalomethanes (THMs). THMs are believed to encourage free radicals in the body, which have in turn been linked with cancer. In particular, chlorinated drinking water has been associated with bladder and rectal cancer for a long time. This may be because much of what we drink ends up in those places for longer periods. More recently studies have shown high concentrations of chlorine by-products in women with breast cancer.

If you are concerned about these potential health concerns, there are some steps you can take to minimize your risk. One is to try leaving your drinking water to sit for 24 hours before drinking it. This may give the chlorine enough time to escape the water as gas. Another solution is to invest in a carbon water filter, which absorbs chlorine before it enters the body.



Filtration

Making sure you are safe at the tap becomes a lot easier with a filter. Filtration can remove heavy metals, chemicals such as chlorine, and potential parasite dangers like *Cryptosporidium*. But you should know that filters vary, and no one filter will remove all potential contaminants. So think about why you want a filter in the first place. Here are some common problems and ways to address them through filtration.

I Want Better Taste

If taste is your main concern, improving it is easy. Most commercial filters (the kind that tend to come in plastic pitchers) are designed to make tap water taste better. However, keep in mind that most dangerous contaminants can't be seen, smelled, or tasted, and many of these filters do little to improve the risk that contaminants may pose.

Lead Concerns Me

If you have reason to think there may be lead in your drinking water, you should look for a filter that specifically claims to be useful in removing lead. Make sure it has a certification from the National Sanitation Foundation (NSF).

I Want to Avoid Parasites

Many common filtration devices can screen out potential pathogens, but not all. If the filter says "reverse osmosis," you're in the clear. If not, look for filters that advertise a pore size of 1 micron or smaller. These come in two types: "absolute 1 micron" and "nominal 1 micron" filters. "Absolute 1 micron" filters are more consistently effective at removing *Giardia* and *Cryptosporidium*, whereas some "nominal 1 micron" filters allow as much as 20% to 30% of these parasites through. Also check the label for the words "cyst reduction," "cyst removal," or "NSF 53" or "NSF 58." These terms indicate the filter has been tested and proven to remove pathogens.



Is Bottled Water Best?

Sure, it comes in a reassuring, sealed bottle. Sure, it advertises some exotic mountain spring as the source. But is H₂O from the bottle any better than the stuff you draw from the tap at home? Both sources must meet EPA health standards. And unlike the wet stuff that springs forth from your spigot, bottled water often lacks tooth-preserving fluoride. Plus all of that plastic to make the bottles comes with an environmental cost. Americans throw away roughly 50 billion of the things every year, and fewer than one in four are recycled. The rest fill up landfills or worse—land in the ocean, contributing to the death of various species, including endangered turtles and seals.



Bringing it to a Boil

Sometimes you need a temporary solution for clean water. If you've experienced a natural disaster like a flood or an earthquake, or if you've discovered a broken pipe in your home, there is a quick and convenient solution to make sure your H₂O remains safe. Simply bring it to a boil for one minute (it takes three minutes in elevations above 5,000 feet) to get rid of viruses, bacteria, and parasites. Boiling can leave a flat taste, which can be improved by adding a pinch of salt to every liter.



Bleach Protection

Sometimes the typically reliable water pumped into your home may become unsafe. This is true during some natural disasters like floods, hurricanes, and when pipes break. When emergencies happen, boiling is one safe option, but so is disinfection using bleach.

What Type of Bleach Should I Use?

Stick to regular, unscented bleach—no lemon scent! Only use plain bleach that has been stored for one year or less at room temperature. Also, check the label. It should say that it has 8.25% sodium hypochlorite. Note: never mix chlorine and ammonia. Doing so cause a chemical reaction that can be deadly.

How Much Bleach Should I Use?

Bleach should be limited to six drops per gallon (slightly under 1/8 tsp.). However, if your water is cloudy, you may double this amount. After adding the bleach, shake your mixture well and leave it to sit for 30 minutes or more before you drink. It should have a slightly chlorinated odor. If not, repeat the dose of chlorine and let stand another 15 minutes.

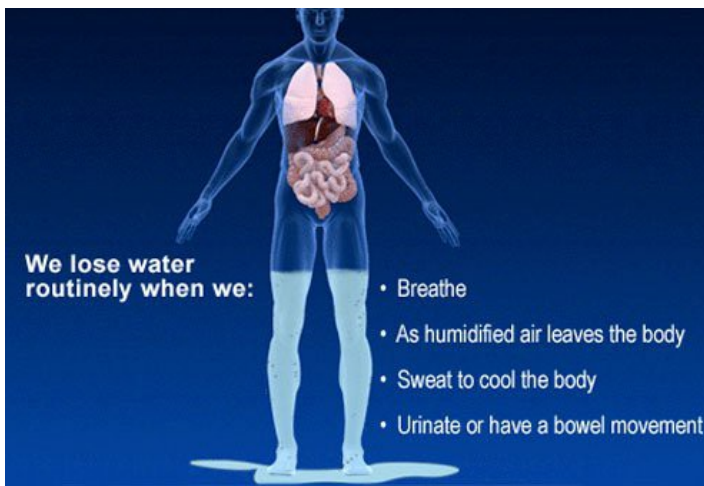


Drinking Water for Weight Loss

If you want to lose weight, adding more drinking water to your diet may benefit you. Here is some information about how this works. Your body weight is dependent upon how many calories you consume compared to how many calories you expend. Plain water adds zero calories to your diet, so an increase in water consumption isn't going to add any additional flab.

In addition, water can make you feel more full and satisfied if you are eating food that contains a lot of fiber. Soluble fiber uses fluids to create a gel-like substance that slows digestion, meaning the foods you eat take longer for the human body to absorb. Also, some research suggests that switching diet beverages for water may help lower your body weight.

With that said, it's good to remain skeptical about some other water intake weight loss schemes. For instance, there is little evidence that drinking cold water significantly burns calories.



Dangers of Dehydration

The human body loses an average of 10 cups of water every day from sweat, tears, urine, and by exhaling water vapor. So going without H₂O comes with serious consequences and can quickly lead to dangerous dehydration and even death.

Symptoms of dehydration vary from mild to severe. On the mild end of the spectrum, dehydration can cause thirst, dry lips, and a somewhat dry mouth. As dehydration becomes more pronounced, more symptoms occur like sleepiness, headache, muscle weakness, sunken eyes, and a dry, sticky mouth. Serious dehydration symptoms are more pronounced and can include confusion, low blood pressure, fever, rapid heartbeat, and blue lips. Death from dehydration can come in as few as three days without a drink, and is common after five to six days.



How Many Glasses of Drinking Water Per Day?

Since dehydration is so serious—even potentially deadly—it's crucial that you know how much H₂O you need every day. This is especially important to the elderly and very young children, who are at greater risk of dehydration.

8 Glasses a Day? Not So Fast...

Although getting enough water benefits everyone, there's no set rule to follow for how much is enough. Different circumstances require you to hydrate in different ways. If it's hot outside, if you've been exercising, or if you live in a drier climate, you will need more hydration. The National Institute of Health suggests three quarts a day for an average person under average circumstances. As for the common belief that eight glasses a day is optimal, there's little scientific evidence to back that claim. Many experts advise to simply drink when thirsty.

Do Tea, Coffee, Soda, and Juice Count?

It used to be common to assume that caffeinated drinks were dehydrating. But more recently studies have found that various drinks, from cola to coffee to orange juice, were as effective at hydration as plain water. Even so, health experts say you can benefit from getting at least half of your hydration needs met from H₂O.



What Are the Benefits of Drinking Water?

No doubt the main benefit of drinking water is to remain alive. But beyond that, making sure you hydrate has several other health benefits, so here are some water facts with information about its many health effects.

- Drinking enough water keeps your temperature under control.
- It helps keep your joints well lubricated.
- It keeps your spinal tissue safe.
- It allows you to eliminate your body's waste through urine, stool, and perspiration.
- Getting enough to drink each day is one of the best ways to prevent kidney stones, which are infamously painful.



How Does Drinking Water Benefit Your Skin?

For the human body, H₂O is an essential nutrient. Your body is made up of cells, and cells are mostly made of H₂O, and that includes your skin. So it sounds logical that an increase in daily hydration would benefit your skin, keeping it healthy and glowing and wrinkle-free. But is it so?

Maybe not. A medical study looked into the available evidence and found “no scientific proof” that skin looks healthier when you hydrate more every day. There are plenty of other health benefits caused by proper hydration, but more youthful skin may not be one—at least not in a way that has been proven through medical science.



What Health Benefits Come From Alkaline Drinking Water?

Alkaline water has become a trend in the world of beverage sales. Bottles of the stuff can be found in many stores, and at-home water ionizers sell for thousands of dollars. These machines are sold with many health benefits promised—to make you more youthful, to reduce blood pressure, to get over a hangover. Some even purport to treat cancer.

The scientific facts proving such claims is limited, however. Few studies have been attempted to show health benefits from daily alkaline H₂O consumption, and what studies have been attempted are generally not promising. For instance one review found that people with cancer have not shown any improvement in their conditions from these products. One health effect that does hold up is the product’s ability to neutralize stomach acid, which is useful for acid reflux. Of course eating a small portion of baking soda offers the same health benefit, though at a fraction of the cost.

Sources: https://www.medicinenet.com/whats_in_your_drinking_water/article.htm

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