Can Alkaline Water Treat or Prevent Cancer?

We're surrounded with health fads. Is alkaline water an exception?

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You probably already know this, but water is good for you. Like, really good for you. Like there's-no-substance-more-important-to-our-bodies good for you. But did you also know that there's a drink on the market that proponents say is even better for you than water? A drink that (allegedly) will make you healthier and more hydrated and comes with a host of other health benefits? This supposed miracle liquid is alkaline water.

You can get bottles of it at the grocery store or you can buy an ionizing device (for anywhere from a few hundred to a couple thousand dollars) to alkanize tap water from the comfort of your own home. So, what's the deal—is there really a water out there even better for us than, well, water?

So, what even is alkaline water?

For starters, let's talk about pH. A substance's pH (potential hydrogen) is the measure of the hydrogen ion concentration within it. The pH scale ranges from 0 to 14, and is based around the hydrogen ion concentration of pure water, which is neutral—a pH of 7. A pH below 7 is considered acidic and above a 7 pH is referred to as basic. The more hydrogen ions present, the more acidic the solution will be, and the lower the pH. Conversely, lower hydrogen concentration means a solution is more basic and therefore it has a higher pH.

Now, the term "alkaline" gets used interchangeably with "basic" but they're not exactly the same. Alkaline compounds are things—salts, metals—that, when added to water, make it more basic. That's what people are talking about when they talk about "alkaline water."

Water always contains some amount of dissolved solids (inorganic salts like calcium, magnesium, potassium, and sodium, for example), which influences its pH. According to Nicole M. Hancock, executive director of the Safe Drinking Water Foundation, the higher the total dissolved solids, the more alkaline the water tends to be. The pH of tap water is close to 7, while water with more alkaline compounds in it typically has a pH of 8 or 9.

The idea that alkaline water is medicinal, curative, and able to bring about optimal health seems

to be based on the belief that acidic properties in the body and blood are the cause of ill health and disease, and need to be neutralized. Therefore, a more alkaline body will lead to better health.

Is it even possible to "optimize" the body's alkalinity?

According to Stephen Lower, PhD professor emeritus of chemistry at Simon Fraser University in Vancouver, Canada, who also manages the website Chem1, there's really no such thing as "the body's pH" in the first place. "A wide range of pH values, from highly acidic to moderately alkaline, can be found in different parts of the body, and even in different regions of a single cell," he says.

Every organ in the body has a different pH range needed for the organ to function, so pH values vary greatly within the body. For example, gastric fluids as well as vaginal fluids are highly acidic because they break down proteins and limit growth of microbes respectively.

Our blood on the other hand has a specific and stable pH that is always between 7.35 and 7.45, explains Charles Mueller, PhD, RDN, CDN, CNSC, clinical assistant professor of clinical nutrition at New York University. If that number gets too low, the risk of coma, heart failure, multi-system organ failure, and death increase. Because of this, our bodies are specifically designed to make it so that, if everything is functioning as it should be, our blood pH can't fluctuate too much. In fact, thanks to the body's various buffering systems, what we consume "by and large has nothing to do with" our blood's pH, says Mueller. I also talk about this in a prior post written on the alkaline diet here.

According to Adam Ramin, MD, urologist, and medical director of Urology Cancer Specialists in Los Angeles, agrees. "There is absolutely no need to tamper with this well functioning system in our bodies by drinking water that is alkaline," he writes to SELF. Dr. Ramin explains that the kidneys are primarily responsible for maintaining proper levels of acidity in the bloodstream. And that as long as we have healthy kidneys, "the delicate balance of pH in our blood stream is kept intact." David Gorski, MD, PhD, FACS, a cancer surgeon, researcher, professor of surgery at Wayne State University School of Medicine, and managing editor of the website Science-Based Medicine agrees, saying that when it comes to changing the pH of the blood, "it's difficult because the body's buffering mechanisms through the kidneys and lungs are very good at maintaining the blood pH within a narrow range."

That said, there are certain conditions that can lead to a rapid, dangerous rise in acidity in the bloodstream. "Severe infection known as sepsis, laxative abuse, uncontrolled diabetes, physical muscle trauma, kidney failure, massive blood loss, and respiratory failure are some conditions that lead to pathologically high levels of acidity in the bloodstream…," Dr.Ramin says. Of course, in patients with kidney failure or other life-threatening conditions that cause high acidity in the blood, "drinking alkaline water amounts to trying to fight a forest fire with a garden hose." While these patients need urgent medical attention to reduce the acidity of their bloodstream, alkaline water is not nearly strong enough to do the job. "These patients will need to undergo intravenous infusion of alkaline solutions directly into their bloodstream, undergo dialysis, and [receive] treatment of the underlying cause.

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So, then what does happen if you drink alkaline water?

Besides the fact that our bodies have various systems that keep our blood pH regulated, our gastrointestinal tract in particular was basically made to cope with foods and liquids that run the gamut of the pH scale. In fact, by the time something we've consumed hits our bloodstream or exits our body, its pH has already been altered several times.

For example, Dr. Ramin explains that the pH of fluids in our stomach is very low—between 1.5 and 3.5. This fluid is highly acidic so that it can dissolve the toughest foods we eat. "Therefore, when one ingests alkaline water, this water mixes with the highly acidic gastric juice." The result? Most, if not all of the alkalinity of alkaline water will be neutralized in the stomach. What's more, explains Mueller, is that food and liquid we consume moves very quickly from the stomach to the duodenum (the part of the small intestine that immediately follows the stomach), which squirts bicarbonate, neutralizing the acidic contents. This is one of the body's built-in acid buffering systems. So, by the time the water is absorbed from the GI tract into the bloodstream, it has become neutralized as normal pH water, and is no longer alkaline or acidic. And beyond that, "Even if the extra alkaline found in 'alkaline water' was to make it into our bloodstream, it will

simply be filtered by our kidneys and excreted in the urine," he says. As you can tell, even if we wanted to influence our blood pH, we really can't. Our body is doing that for us. Dr. Zubin Damania of ZDoggMD also discusses this through a satirical video, giving a thorough explanation of alkaline water and the bodies physiological process here.

What does the research say about alkaline water?

The most common claims about alkaline water are that it can reduce acid reflux, improve hydration, and prevent cancer. Looking at the literature on reflux, you'll find a handful of studies. In 2012, a lab study showed that water with a pH of 8.8 neutralized pepsin, the enzyme that causes damage to the esophagus in people with acid reflux. The study authors said that while their findings suggested that alkaline water could have therapeutic effects for acid reflux, more systematic studies with actual heartburn patients are needed. When asked about this study, Gorski said, "It is lab work that might suggest benefit, but without showing an actual benefit in humans it's hard to get too excited." Two other studies have since followed and both recommend further scientific study.

A 2017 study looking at alternative methods for treating acid reflux symptoms found a correlation between the methods tested (alkaline water and the Mediterranean diet) and reducing symptoms, but the authors report that the clinical significance in differences requires further study. Another 2018 retrospective study investigated those who drank alkaline water, consumed a low-acid, low-fat diet, and made behavioral changes, versus another group who took medication and made behavioral modifications. The researchers concluded that the anti-reflux protocol that included alkaline water (along with the dietary and behavioral changes) "compared favorably with medication and behavioral modification alone" and that while this protocol had potential to be "powerful" in the effort to reduce longterm, widespread use of certain anti-reflux medications, further study is required.

When it comes to hydration, the evidence is limited. A small 2016 study looked at alkaline water compared to regular water to see if one improved hydration better or more than the other. Hydration was measured using four biomarkers in 100 adults who exercised until they were dehydrated. The researchers found that those who drank the alkaline water had reduced systolic blood viscosity, which indicates better hydration, but, as Mueller points out, there was no significant difference demonstrated between alkaline and regular water when it came to other biomarkers that indicate hydration status. A 2017 study that had 36 participants concluded that "preliminary data demonstrated that consumption of alkaline water can improve anaerobic performance and post-exercise recovery."

Mueller is skeptical about the possibility that alkaline water is exceptionally hydrating. For one thing, he explains (and most experts agree) that drinking regular old water when thirsty will keep healthy adults sufficiently hydrated. If the chances for become dehydrated increase because, for example, you're working out in the extreme heat and humidity, or are a heavy sweater, a fluid that contains electrolytes might be necessary. In this case, a drink like Pedialyte or a homemade oral rehydration solution (ORS) made of water, salt, and sugar would do the trick. As the CDC explains, when dehydration becomes severe (from diarrhea, for example), the appropriate protocol

is to administer ORS using the formula they provide. So far, neither research nor recommendations indicate alkaline water over regular water.

And finally, looking at the cancer research, the only systematic review of alkaline water for cancer treatment found there is almost no actual research to either support or disprove its use. No randomized trials exist and promotion of it is not justified for prevention to the public. According to Lower, “The statement made by many promoters of alkaline water that cancer cells thrive under acidic conditions is extremely misleading. It’s really the other way around: cancer cells tend to produce acidity because their more primitive nature causes them to metabolize anaerobically, and often because they typically have an inadequate blood supply.”

Basically, alkaline water has yet to be shown to benefit general health. It’s just good marketing!

The evidence to disprove alkaline water claims are sparse, but evidence to strongly support claims are also greatly lacking in scientific evidence. This leaves us with bottled water whose benefits are not backed with enough evidence to justify their cost. It’s possible there may be hints of some benefits for some people under certain circumstances, but nothing is conclusive.

When you hear many wellness claims it can be quite frustrating to feel like you have to spend more money to stay healthy. Often good nutrition isn’t as complicated as many people may make you feel. When it comes to hydration and well-being, experts agree that plain old tap water is just fine. We also know that eating enough fruits and veggies will have a major impact on overall health. But eating fruits, veggies, and drinking tap water just often seems too simple. If you drink alkaline water because it makes you feel good or you like the taste of it, then it may make you drink more water and stay better hydrated. If this is the case then it could have a major impact on your well-being. But the same could be true for any form of water you choose.

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