

# Water Quality and Its Importance to Optimal Wellness

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It is an essential component of all living things. It is a rarity in the universe yet abundant on this blue planet Earth. It is water – the key to life.

Sadly, the importance of water for our day-to-day wellness is often overlooked. Maybe it's because it is so ubiquitous that we take it for granted. Maybe it's because so many of us rarely drink plain water. In this article, I want to consider some of the

important questions that are so often asked about water. I'm sure you will see that there is more to water than we realize.

Water has several roles in the human body. It helps maintain the structure and form of cells and tissues. It provides the medium for movement of heat from the core of the body to the surface. It is important in biochemical reactions and cellular metabolism. Also, it is a transport mecha-

nism for the exchange of nutrients between the environment and cells and clearance of waste products. Therefore it is imperative to hydrate the body with sufficient high quality water to satisfy all of these requirements. Optimal hydration requires adequate uptake, not just intake, of water. But how much and what kind of water?

How much water should we drink? The amount will vary according to several

factors that include the amount of exercise (loss through increased respiration, metabolism and perspiration) and the ambient temperature (the hotter it gets, the more you sweat). Several studies have shown that exercise, exposure to environmental toxins, and the use of prescription and recreational drugs (including caffeine) quickly increase the kidney's requirement for water to facilitate clearance of waste products. The amount of water excreted each day is approximately 60% in urine, 5% in feces, 5% in basal sweating, and 30% in exhaled air. That water must be replenished as follows: 10% from the burning of carbohydrate fuel, 30% from ingested food, and 60% from ingested fluids. Current trends suggest a water consumption of between 5 and 12 glasses a day depending upon an individual's body weight, activity level, drug use, environment, and overall health.

What is even better, however, is to let the body itself set the correct intake on a moment to moment basis by maintaining an accurate and effective thirst reflex. Simply put, the thirst reflex is the mechanism by which our body regulates its water intake. The accuracy of the reflex is easily damaged but attention to appropriate intake of water over the long term will tend to maintain the integrity of the reflex and ensure that it's an effective regulator of water intake.

On face value, water appears to be a simple molecule, composed of one oxygen atom bound with two hydrogen atoms, hence H<sub>2</sub>O. It is, in fact, one of the most complex and remarkable compounds in nature. Water possesses many properties that, given its simple structure, are unexpected. Science knows much about water and volumes have been written about its importance in chemistry, physics, biology, geology, botany and economics and yet there are mysteries about water that are only now being unravelled.

Water is a difficult substance to obtain in its pure form, and that arises from one of water's important characteristics – the tendency to form chains, clusters and higher order structures. In liquid water, the individual H<sub>2</sub>O molecules associate to form clusters in sizes ranging from six to hundreds of molecules. This is because the hydrogen atoms attach to the oxygen atoms in a precise arrangement with the two hydrogens at 107° to each other – looking rather like a set of Mickey Mouse® ears. This arrangement means that, while each water molecule is electrically neutral (with the singly positive hydrogens neutralizing the doubly negative oxygen) there is an uneven charge distribution on the water

molecule. This gives a slightly negative charge in the region of the oxygen and a slightly positive charge on the side nearest the two hydrogens. This uneven charge distribution allows one of the wonders of nature – the hydrogen bond – to occur.

Hydrogen bonds arise from the slightly positive charge on one water molecule attracting the slightly negative charge on another and allow chains, networks and even three-dimensional lattices to form. The hydrogen bonds hold water together in structures giving rise to characteristics such as surface tension and the ability of water to wrap around other molecules in "hydration sheaths." Water can be thought of as a "liquid crystal" and just as solid crystals can trap other atoms, so can water lock impurities into cages from which they are difficult to break free. These structures can also hold electrical charge in the form of isolated ions and are also responsible for many of the important but unexpected characteristics of water, such as its ability to reduce its density upon solidification resulting in solid ice floating on liquid water.

The challenge of purifying water is to break down the structure to allow impurities to be removed. In distillation, this is done by boiling the water, which breaks apart the structures to individual H<sub>2</sub>O molecules. These rise and are condensed elsewhere, usually on some cooled surface, where they reassociate into larger order structures, to be collected as "pure" water leaving the impurities behind in a concentrated "soup." Other purification methods have the same aim. Reverse osmosis uses membranes that only allow small clusters, too small to carry impurities, to pass through. Ion exchange and activated carbon cartridge filters depend on the attraction between the filter matrix and the clusters containing impurities, which have different properties than the pure clusters without trapped impurities. Water purifiers that depend on "ionization" methods use a strong electric field to break down the structure of the water to facilitate the removal of impurities. "Depth" filters such as sand filters used in swimming pools and sizing membranes, as well as those used to generate sterile water for medical use, simply sieve out the larger clusters that wrap around large impurities such as particulates and bacteria.

Over the past few years, a sophisticated method for purifying water, using rare volcanic earths and gravel media arrayed around a magnetized core, has become available. In this technique, the interplay between the characteristics of the volcanic earths in the local magnetic field serves to

disassociate any impurity-containing clusters, and the impurities are bound by the layers of earths on an activated carbon element in the filter. This technique closely mimics the process of percolation through the soil and substrata which gives deep spring water its characteristics as a close to ideal water. More recently this methodology has been produced in a small sport-type bottle where the media are packed into a small purification element that allows convenient access to this high-quality water at any time.

### The energetic nature of water

The structure of water does more than give it surface tension and act as a net to hold impurities. The same structure allows water to carry all kinds of molecular "signatures" and energetic "information," and it has been theorized that this feature forms one of the bases of how homeopathy works. Recent studies suggest that there are some anomalies in homeopathic preparations where specifically shaped clusters created by the "succussion" process may in fact concentrate the dissolved signature molecules. The structure of water also allows water to carry a quality that has been termed "life force" or "vital energy." This may equate to the "chi" of Chinese medicine or even the "kundalini" of Indian medicine. Many techniques have been used to energize water and these are discussed below. All of them work to some extent to "restructure" the water into molecular arrays more akin to the structure found in water in nature – the spring-fed mountain stream being widely characterized as the "ideal."

Why is it that these energetic characteristics are so important to hydration? There are several reasons. First, energetic water displays low surface tension as a direct consequence of its small cluster size. Low surface tension allows water to have greater "wetting" capacity so it does a better job of dissolving other substances and making them available for transport as solutions. This is important for moving nutrients and waste products around in the body – one of water's essential roles in maintaining optimal hydration. Low surface tension and small cluster size water also penetrates membranes more easily. Water moves around the body by passing through membranes. The movement of a cluster of water molecules from the gut to its final point of activity sees the cluster pass through up to a dozen membranes. In some cases there is a specific mechanism to pump the water from one side of the membrane to the other, and in others the

mechanism is passively driven by osmotic gradients or passive diffusion. The variety of mechanisms and the factors that switch between them are beyond the scope of this article but are well reviewed elsewhere.

#### Acid or Alkaline?

One characteristic, pH, the relative concentration of hydrogen ions versus hydroxyl ions, has been touted as an essential characteristic of ideal water. However, a consensus has not been reached as to what the ideal pH of drinking water should be. "Pure" water is neutral and has a balance of free H<sup>+</sup> and OH<sup>-</sup> ions. This equates to a pH of 7.0. Most of the biological fluids in the human body, e.g. blood serum, are pH 7.4 – slightly alkaline – and it is known that in people where this value changes significantly, such as with systemic acidosis where the pH may drop by several units, and remains altered long term, there are many negative health consequences.

For this reason many natural therapists promote diets and activities that promote "alkalinization" or a move to higher pH. Consumption of alkaline water has been promoted as a method of alkalinization. However, it has been suggested that the large volume of acid present in a healthy stomach would quickly neutralize all but the most extremely alkaline water. There are some studies to suggest that the consumption of alkaline water may have significantly deleterious effects such as degradation of heart muscle and effects on cardiac enzyme levels. On the other hand, acidic water has been shown to be useful topically to manage skin diseases and counteract the effect of alkaline detergent and soap products.

Another measure often used to indicate the fitness of water for consumption is its electrical conductivity or resistivity. This is simply a measure of the number of ions present in the water that will allow the water to conduct or resist the passage of electric current. What is probably more important than the actual number is the nature of the ions that are contributing to the conductivity and whether they represent beneficial or dangerous "contaminants." The subject of contaminants in water is an important environmental and wellness topic, but is outside the scope of this paper. A full review of this subject can be found in John Archer's book *The Water You Drink*. Suffice it to say that many substances ranging from metal ions and organic compounds to bacteria contaminate our water supply. Some are beneficial in certain circumstances but others should be avoided. Drinking water should be subjected to purification prior to

consumption.

The presence of contaminants means that tap water falls short of our requirements for purity and energetic integrity. The purity issue must also be considered when using water collected in tanks from streams and rainwater. The potential for contamination is very high despite the fact that these waters may be energetically better than tap water. There have been some questions asked about the purity of bottled water but for the most part they far surpass tap water. Unfortunately, with very few exceptions they are energetically "dead" and therefore contain water with large clusters, which displays high surface tension. The exceptions are some specifically structure-modified waters in which, via a range of techniques, the large clusters are reduced to smaller rings (six or even five water molecules maximum) at the point of production. The long-term stability of these small clusters is in question as is the inherent stability of five-molecule rings, and so whether the water you ultimately drink, following transport and storage, has the ideal properties has yet to be demonstrated.

This leaves us with water purified at the point of final consumption – either at home or at your office – via the use of a water filter. There are a wide variety of filters available but few comprehensively treat water for contaminants and normalize structural and energetic qualities. You need to look for a filter that removes contaminants via depth and activated carbon filtration and energetically restructure the water via electrical or magnetic means. When you finally have your purified, energetically restructured water the important thing to do is make sure you drink enough of it to ensure optimal hydration throughout the day.

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