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nutrition *magazine* presents

WATER

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healthy living guides

WATER

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Introduction:

Wonders of Water

Water is nature's most essential nutrient. Two-thirds of the earth is covered with water. At birth, a full-term baby's body is 78 percent water. The brain is made up of 85 percent water, and muscle tissue is about 75 percent water. Our organs and tissues are bathed in water. "Water is the most abundant compound in the human body," explains Susan M. Kleiner, PhD, RD, researcher and author of *The Good Mood Diet* (Springboard Press, 2007). "All biochemical reactions occur in water, and water is an active participant in those reactions."

We use water every day to drink, cook, and clean. We even play in water. And if we are lucky, it's always there when we need it. It is perhaps the most basic, and often taken-for-granted, necessity available to us—second only to oxygen. But can water actually help us prevent and treat illness, live life with vitality, and stay youthful? Some people, even some of those in the scientific community, say it seems too simplistic to believe that something as simple as water could have therapeutic potential. But the fact is, water promotes health. And if it is pure water, it can help us prevent and heal from some of the most serious illnesses of our time.

While water is abundant in most places, our modern challenge is that our water supply does not meet our health and hydration needs.



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Chemicals, pharmaceutical and illicit drugs, solvents, chemicals and heavy metals are all prevalent in most municipal drinking water sources. Sufficient high-quality water is one of the most significant requirements of human health.

Importance of Water

While a baby's body is about 78 percent water, the average water content of an elderly person is only about 50 percent. Could it be that long-term dehydration is a hallmark of aging? Certainly we now know that even marginal dehydration can cause a variety of health issues.

What happens when a plant does not get enough water? It dries up and dies. The same thing happens to the cells in the body. If cells, tissues, and organs are not hydrated properly, they will lose their ability to function effectively. In fact, a person can live weeks without food, but only days without water.

According to Kleiner, severe dehydration acutely affects our health, but so does chronic mild dehydration. "From energy production to joint lubrication to reproduction, there is no system in the body that does not depend on water," Kleiner explains.

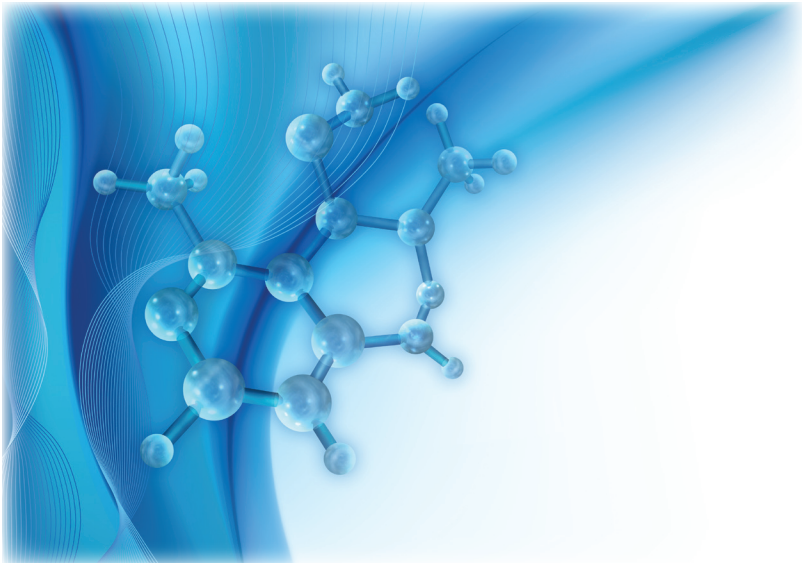
Water does not merely quench our thirst: It plays an important role in a variety of critical body functions, such as the following.

Serves as a solvent for vitamins, minerals, amino acids, and many other nutrients

- Assists with digestion, absorption, transportation, and use of nutrients
- Ensures safe elimination of toxins and waste products
- Contributes to proper body temperature and energy production
- Lubricates joints and enhances enzyme activity

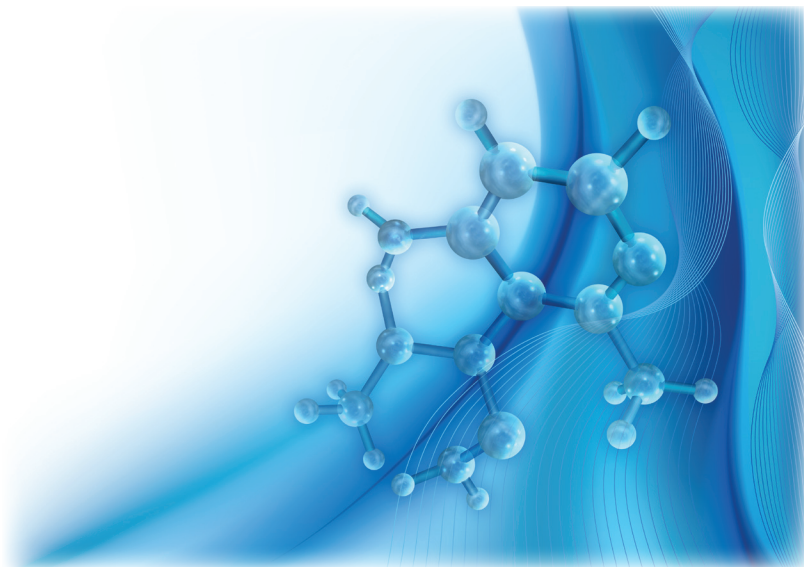
Kleiner believes water is an essential and overlooked nutrient. She says lack of water can increase the risk of a wide variety of illnesses, including kidney stones; cancers of the breast, colon, and urinary tract; childhood and adolescent obesity; and poor health in the elderly.

Water is the foundation of optimal health and vitality. It is an intimate partner and participant in every biochemical reaction that occurs within every cell and tissue in the human body. Water is definitely the most important nutrient to human survival. It is the most undervalued part of the human diet. Water is also the most underused tool in healthcare. But before we can explore how water can help us stay healthy, we must first understand how water works.



Chapter One

Understanding Water



We are basically water beings and occupy a planet covered mostly with water. Because water is so much a part of who we are as physical beings, our bodies require optimal, continual replenishment of water, which escapes through daily metabolic processes.

Throughout the day, we lose water from our bodies through sweat, urine, feces, tears, nasal discharges, and exhalation, to name a few. Losses are increased by the consumption of beverages containing the natural diuretic caffeine found in coffee, tea, soft drinks, and elsewhere. Drinking alcohol is also very dehydrating. In fact, it's dehydration that causes hangovers. We lose an estimated nine to 12 cups of water even on a cool day without exercising. For optimal health, these losses must be replaced by adequate hydration. Food is also important because it contains water.

Our bodies exert tremendous amounts of energy to maintain adequate hydration. Any deviation from an ideal state of hydration can have profound adverse effects throughout the body. Less than adequate hydration forces the entire body, and every cell in it, into exhaustive and wasteful modes of compensating behavior in order to survive. This effort to make up for less than optimal hydration wastes vital energy and biochemical resources.

Unnecessary expenditure of precious reserves strains body systems and accelerates aging. It also leaves us more susceptible to diseases that may be part of our genetic inheritance, but are preventable and/or controllable through conscientious attention to the nutritional needs of each cell in our bodies. Although water is not typically thought of as a nutrient, it is perhaps the most important nutrient of all. But what exactly is water?

Water defined

Water plays an important role in our health. On the cellular level, proteins, enzymes, and even our DNA and RNA depend on water. In order for cells to be healthy and efficient, they need to be properly hydrated. Each small water molecule has significant influence.

Water is one of the smallest and simplest compounds in existence. It consists of two hydrogen and one oxygen atoms (H₂O). This V-shaped molecule may not be complicated, but the dynamic interplay of water and our cells can be complex. The symmetrical arrangement of atoms generates all kinds of interesting interactions as water molecules do their liquid dance.

Water molecules share an intricate electromagnetic attraction with cells

in our body. The large bioactive molecular structures such as proteins, cellular membrane, chromosomal DNA, polysaccharides, and other molecules are attracted to water. The intimacy between these molecular structures and water creates an interaction that is key to all biochemical activities in the body. In addition, water acts as a surrounding insulator for macromolecules against electromagnetic interactions from neighboring electrically charged entities. The polarity of charge on water molecules allows them to adapt readily to local molecular environments. The importance of water at the cellular level cannot be overstated.

Cellular hydration

Our physical health requires optimal functioning of each cell in the body in harmony with all other cells. And optimal functioning of these cells requires effective cell hydration. We often don't think of our health from a cellular perspective—in fact, we sometimes don't even think of our health at all until something goes seriously wrong. However, if we support the body at the cellular level, we are far more likely to live vibrant, healthy lives.

About 90 percent of the internal makeup of every single cell in the body is water. That means each cell contains billions of water molecules. With trillions of cells in the human body, we're blessed with a lot of water molecules! Our cells utilize and interact with the water we consume and the water we excrete. The daily quantity of water output from our gastrointestinal tract alone is amazing. Every day we expel about a quart of water through saliva, gastric juices, bile from the liver, and intestinal and fecal secretions. It is absolutely vital that we replace all expelled fluids. Unfortunately, replacement is not as simple as merely drinking fluids.

Optimal hydration of cells does not occur as efficiently and effortlessly as previously thought. Water must overcome several obstacles before it can reach the inner parts of the cell. Recent discoveries have shed new light on what is really required to optimally hydrate the human body at the cellular level.

A fatty membrane surrounds every cell in the body. This membrane keeps intracellular water in place and also carefully selects what is allowed in and out of the cell. This membrane also helps dictate the water content of the cell.

Until recently, the exact means by which water enters the cell had not been precisely identified. Scientists assumed that water simply passed through the membrane because the membrane was somehow semi-permeable. Then, in 1992 a Johns Hopkins researcher discovered protein water channels that he named aquaporins.

Aquaporins are tiny water-bearing protein channels in the cell membrane. Different kinds of tissues have different types of aquaporins for optimal management of water flow. Water has a clustered molecular structure that determines absorption and hydration. Water in its liquid state is a network of fairly large clusters. Aquaporins only allow single-file water molecules to enter into the cell, so our bodies must break down larger water clusters into smaller, more manageable molecules for optimal absorption. Age, toxin exposure, weakened immunity, stress, and many other factors impede our body's ability to do that.

How do we optimize cell hydration if water is clustered in units too large to be easily absorbed through the water channels? The answer lies in the microclustering of water molecules. We can restructure water into microclusters that are more easily broken down to the single-file water molecules accepted by aquaporins. (Look to chapter 3 for a more in-depth discussion.)

Water molecules can traverse cell membranes in three ways: diffusion, osmosis, and protein-assisted transport. We have all observed examples of diffusion in action whenever we detect a spray of perfume dispersing through the air of a room. Perhaps your high school science teacher once illustrated the diffusion concept by showing a drop of dark ink plunging and dispersing into a beaker of water. This diffusion movement demonstrates how molecules in high concentration move to a place where they are in lower concentration.

The word "osmosis" refers to the passage of water from a region of high water concentration through a semipermeable member to a region of low water concentration. Osmosis requires open aquaporins.

Given adequate water supplies, the body's hydration systems are very efficient. Far too often, however, we unwittingly thwart the body by ingesting substances that impede hydration. For example, adding any substance to water—coffee, tea, sugar, flavorings, colors, proteins—decreases the



concentration of the water molecules and lessens osmotic pressure, thereby reducing absorption. That's why it is so important to drink pure water. Pure water with the least amount of additional substances and the highest osmotic drive will most effectively hydrate the body at the cellular level.

How much do we need?

Thirst is not a good indicator of the need for water. By the time we are thirsty, our cells could already be dehydrated. In addition, our thirst sensation and ability to determine water needs declines as we age.

Water requirements vary according to individual needs and circumstances. The exact amount of water a person needs is a topic of hot debate. It seems as though every month a new study or opinion emerges about the value of drinking water and how much water we need. Researchers from the University of Pennsylvania recently went so far as to say there is little benefit to drinking water.



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The claims from the University of Pennsylvania are “incredibly irresponsible,” according to Kleiner, who has researched this topic extensively. “For a global public growing more overweight and obese by the minute, telling them that they don’t need to drink the single most natural non-caloric beverage on the planet that may actually have health benefits is beyond comprehension,” she argues.

The average individual should drink eight to 10 eight-ounce cups of water each day.

Most health experts agree that under ordinary conditions an average individual living in an environment with moderate temperature and humidity should drink about eight to 10 eight-ounce cups of water daily. To be more precise, you can take the number of pounds your body weighs and divide that number in half. The result is the number of fluid ounces of water you should drink each day. For example, a 200-pound person should drink 100 ounces of water a day, which is about 12 eight-ounce cups.

People who may have a need for an even greater intake of water because of special circumstances need to take particular care.

These people include

- infants fed high-protein formulas (*be careful not to over-hydrate infants*)
- those with symptoms of fever, vomiting, diarrhea, respiratory discharges, and other water loss issues
- people taking diuretic medicines
- people on high-protein diets
- people who drink a lot of caffeine and/or alcohol
- those living in high atmospheric environments and dry climates
- athletes, physical laborers, and anyone engaging in strenuous physical activity.

Pure water is the beverage of choice for optimal hydration of the body. Plenty of data indicates that drinking enough pure water can help prevent and treat many illnesses.



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Chapter Two Healing Power of Water

Nearly half of the American population unknowingly suffers from some degree of dehydration.

Water is perhaps the most overlooked and under-rated healing remedy of all. This can be a costly oversight. The primary medical condition directly linked to water consumption is dehydration.

Dehydration is a deficiency of optimal water levels within the body and its cells. Clinical dehydration is the result of inadequate water intake to match water losses. This serious medical condition must be resolved quickly, so it's important to be aware of the symptoms:

- Fatigue and weakness
- Headaches
- Rough, dry skin
- Dry mucous membranes in nose, mouth, or throat
- Nosebleeds
- Dark, concentrated, strong-smelling urine
- Infrequent urination
- Irritability
- Irrational behavior
- Constipation
- Nausea
- Intestinal cramps
- Weak, irregular pulse
- Low blood pressure
- Shallow, rapid breathing

One-third of
Americans
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water daily.

Nearly half of the American population unknowingly suffers from some degree of dehydration. One-third of Americans drink three or fewer servings of water daily. Many people are suffering from what Michael Lam, MD, calls "subclinical dehydration," which is dehydration without the overt symptoms. In other words, you may be dehydrated and not even know it. A three percent loss in body water volume causes fatigue and organ dysfunction. A ten percent loss can be life-threatening. According to Lam, by the time people experience a dry mouth, the body has already begun to suffer the effects of dehydration.

Dehydration inhibits every one of the body's organs in ways we are just beginning to recognize. One of the main reasons for this is that the cells inside the body become dehydrated long before we notice the overt



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signs and symptoms of dehydration.

Loss of water from the interior of the cells, where life-sustaining biochemical activity occurs, leaves the cells in a state that impairs all cell functions. The results can be catastrophic. Dehydration impairs the entire process of life by disrupting structural integrity and functional efficacy of all cell components everywhere in the body and causing long-term consequences, such as

- cell structural disintegration
- impaired flow of nutrients into the cell due to a compromised membrane
- chronic fatigue due to poor enzyme production
- free-radical damage of cell structures including DNA
- inadequate repair of nuclear DNA damage due to faulty enzyme repair activity

- reduced production of hormones, digestive enzymes, neurotransmitters in the brain, and other key bioactive systems.

In addition, toxins accumulate in the body due to a lack of sufficient water for adequate elimination of waste materials. Dehydration can have a detrimental effect on nearly all of our organ systems.

Dehydration and disease

The stress of dehydration forces the body into a mode of desperate reactivity for survival. Long-term subclinical dehydration can contribute to accelerated aging and life-threatening illness. This is why proper hydration is so critical. Water cures nothing except dehydration, but once dehydration is corrected at the cellular level, healing is possible.

According to author and researcher Fereydoon Batmanghelidj, MD, the suffering associated with many disorders is triggered or worsened by dehydration. The reason for this is that under the stress of dehydration the body takes desperate measures to conserve water, which disrupts many areas of our physiology, including the immune system, inflammatory response, hormonal balance, and even blood pressure.

“Chronic cellular dehydration painfully and prematurely kills,” Batmanghelidj says. “Its initial outward manifestations have until now been labeled as diseases of unknown origin.”

According to Batmanghelidj recurrent, noninfectious conditions associated with pain and discomfort in various parts of the body that cannot be explained by other identifiable causes should be interpreted as expressions of water deficits at the site of the tissue and cells manifesting the symptoms. Batmanghelidj calls this the “local thirst.” Symptoms are relieved when “local” water needs are met.

The range of chronic illness that can benefit from proper hydration is diverse and expansive:

- Peptic ulcers
- Arthritis
- High blood pressure
- Low-back pain
- Poor circulation
- Migraine headaches
- Colitis
- Constipation
- Obesity



We have only just begun to discover the applications of pure water for the prevention and treatment of illnesses. In the future, water will be regarded as the safest, most cost-effective natural tool for preventive medicine and healing. Already, research is showing it can provide numerous health benefits.

Hydration for seniors

Dehydration is one of the most common causes of hospitalization among people over the age of 65, costing the Medicare system an estimated \$450 million annually and taking an even greater toll in human life. It is estimated that half of these seniors will die within one year of admission. Yet there are simple, effective ways to avoid this tragedy that can also increase vitality, slow the aging process, and make our later years much easier.

Many factors lead to clinical and sub-clinical dehydration of seniors:

- Lower body water percentage
- Lack of awareness of hydration needs
- Decline of thirst sensation
- Lack of mental clarity and attentiveness to personal needs
- Illness and medications that can accelerate water loss

Dehydration is also associated with cognitive decline. Some studies have shown that patients with Alzheimer's may have a significant impairment of their thirst mechanism, which leads to subclinical dehydration. "The consequences of dehydration in the elderly are serious and range from constipation and fecal impaction to cognitive impairment, functional decline, and death," reports Kleiner in the *Journal of the American Dietetic Association*.

Vigilance regarding hydration by seniors and the people who assist them is critical. As indicated previously, the ideal daily intake of pure water is the number of fluid ounces equal to one-half the number of pounds of body weight. This amount should be consumed throughout the day, preferably small amounts every 20 minutes or so. This kind of continuous hydration helps prevent fainting and collapse due to dehydration commonly seen among the elderly.

Boosting athletic performance

A university study showed that proper hydration with pure water increases stamina in endurance athletes. Under the supervision of Jeff Baker, MD, with the Department of Health and Human Performance,



University of St. Thomas, St. Paul, MN, a study was conducted using highly conditioned endurance athletes to determine whether pure water could enhance athletic performance and endurance.

The 10 participants included cyclists, cross-country skiers, marathon runners, and triathletes. Some of the participants admitted that they were skeptical as to whether or not a pure water product could have any significant impact on their performance.

The pre-test questionnaire, interview, and exam identified each athlete's individual hydration status and habits, exercise routine, state of recovery, dietary and medical history, and sleep status. The researchers controlled the environment, date to be measured, amount of water consumed, hydration, exercise performed, diet, amount of sleep, and circadian effects (consideration of the way a participant's sleep cycle may influence test results at any given time of day).

The test included a 12-minute, maximum-effort endurance ride. First, a baseline run was completed. Then, for each of the next three days, the athletes consumed six bottles of Penta brand water daily. The test was repeated to determine if the water had any effect on performance.

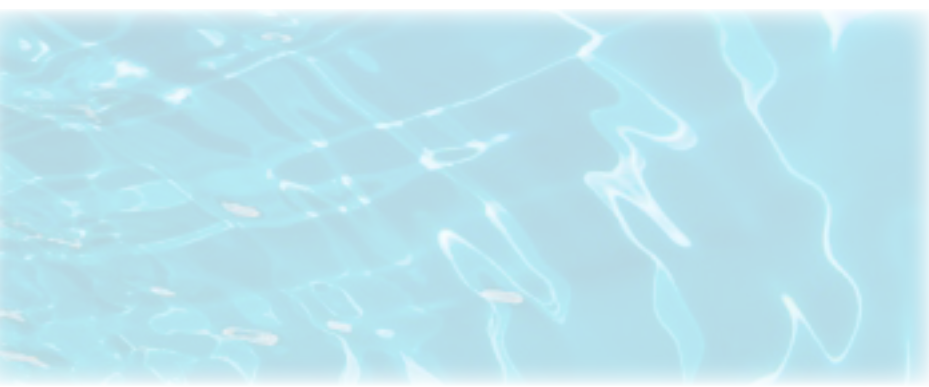
The results were exciting. Compared to baseline, the athletes displayed the following improvements in endurance at maximal output after thoroughly hydrating with Penta water:

- Increased energy output
- Decreased heart rate
- Increased physical output
- Increased velocity
- Increased velocity adjusted for effort
- Decreased time on effective 40-kilometer time trial

The researchers concluded that the Penta water improved performance and endurance, and increased power and energy. Baker's study achieves the results that athletes, trainers, and coaches are looking for. And it was all done with one simple tool—pure water. Note: This study had not yet been published at the time this booklet was being completed.

According to a report by Kleiner featured in the Journal of the American Dietetic Association, "it is well established that dehydration of as little as 1 percent decrease in body weight will impair physiologic and performance responses during continuous exercise." Kleiner recommends drinking about 17 ounces of water before exercise and about 4 to 8 ounces every 15 to 20 minutes during exercise. She warns that athletes working out in environments with extreme cold or heat, low humidity, or high altitude have increased fluid needs.

Be aware that sugary sports drinks are not typically recommended before, during, or directly after exercise. These drinks rapidly increase



blood sugar and can cause problems associated with high insulin levels. A sugary beverage consumed immediately before exercise may actually impair performance. According to the Textbook of Natural Medicine, the large insulin response induced by a rapid increase in blood sugar may cause low blood sugar during exercise.

Proper hydration with pure water can also help optimize muscle recovery. One of the most important issues for the athlete to address is exercise-induced accumulation of lactic acid in muscle tissue. Lactic acid, a byproduct of metabolism, is produced and accumulates when muscle tissue is pushed into anaerobic levels of exertion. Inefficient removal of lactic acid can be a source of muscle soreness and fatigue that limits long-term athletic performance.

In order to efficiently flush lactic acid out of muscle cells, those cells must be optimally hydrated. Only pure water has the ability to enter

the cells in molecular numbers great enough to meet this challenge. Thus, following glycogen restoration, the athlete should thoroughly and continuously rehydrate with pure microclustered water to accelerate post-workout recovery. Some experts recommend you weigh yourself before and after a workout, wearing the same clothes. For every pound of weight lost, drink two 8-ounce cups of water to ensure adequate rehydration.

Beauty and beyond

The skin is the largest organ of the human body and often the first to feel the effects of dehydration. We all want that youthful, radiant skin we were born with. Unfortunately, through a combination of factors, our skin often pays the price of our neglect. The skin will become dry and wrinkled if we are dehydrated.

In her book *Return to Beautiful Skin* (Basic Health, 2008), author and skin care expert Myra Michelle Eby asks the question: What's the difference between a wrinkled prune and a smooth plum? Answer: Water. "Even the most oily skin can be dehydrated," explains Eby. She says that dehydration of the skin leads to a lackluster tone and accelerated aging. "Drinking plenty of fresh, purified water will help prevent dehydration of the skin," she says.

A recent cellular study by German researchers presented in the journal *Skin Pharmacology and Physiology* demonstrated that Penta water protects the skin cells from aging. The researchers believe that pure water "may thus exert antioxidative and antiaging effects." Penta water extends skin cell life and may play an important role in photo-aging of the skin (changes in the appearance and function of the skin due to repeated sun exposure). Subsequent reports by the same German researchers demonstrated that the water helped prevent collagen degradation of the skin and provided significant protection against ultraviolet damage.

Stanley W. Jacobs, MD, a cosmetic surgeon with the Center For Facial Cosmetic Surgery in San Francisco is presently doing a human clinical trial involving Penta water. At the time this booklet was being completed, Jacobs had studied the skin of five patients and found that when the structured water was used topically it reduced redness and inflammation. According to Jacobs, this could mean that the healing power of water could be utilized in sunscreens, skin care products, and even for burn victims. Jacobs is waiting to confirm his results on more patients before publishing his study.

Proper hydration is critical to the health and vitality of our skin. It can also help us maintain proper weight.



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Weight loss

Obesity is now at epidemic levels in the United States. It is a complex disorder involving issues of culturally conditioned lifestyle choices, as well as many other factors. Water can be used as a significant component of an integrative regimen to address weight problems.

Increased intake of pure water is beneficial because it

- helps control appetite,
- participates in biochemical processes that metabolize fat
- alleviates fluid retention by relieving the body's desperate need to hold onto water
- flushes out toxins that reside in fat tissue and are released into the bloodstream when fat is metabolized, and
- improves the metabolic activity of cells as a cofactor in energy metabolism.

According to Batmanghelidj, many people, even those who are not

obese, misread body signals and often mistake thirst for hunger. As a result, people continually eat food that their bodies don't need and fail to drink the water their bodies do need. The results are increased fat deposits and unresolved tissue thirst.

In addition to nutritional counseling and in some cases psychotherapy focused on eliminating the use of food as an emotional crutch, pure water should be a pillar of a well-designed weight management program.

Other health applications

Staying properly hydrated will help us prevent many serious health problems. We already know the body requires water to function properly. Here are just some examples of how water can help us heal from individual conditions.

Peptic ulcers and acid reflux. Dehydration can lead to peptic ulcers and acid reflux. The gastrointestinal tract produces a large amount of water-based secretions. When a person is in a state of subclinical dehydration, these materials cannot be secreted in sufficient quantities. This deficit leaves the mucous lining exposed to stomach acid and digestive enzymes that cause inflammation, ulcers, and bleeding. In addition, water deficits reduce the volume of the bicarbonate-containing fluids released from the pancreas that neutralize stomach acid in the duodenum. Water shortage also inhibits the efficient digestion of food because the digestive enzymes of the small intestine are carried in a water-based medium.

Osteoarthritis. Weight bearing joints such as the hips and knees have a synovial membrane that requires water. Water provides the cushioning effect needed to handle the shock of daily weight-bearing joint movements. Because cartilage tissue lacks a direct blood supply, water molecules must diffuse through many surrounding structures if they are to be distributed effectively. Subclinical dehydration can deprive cartilage of water and can shift the distribution of water away from the joints to tissues more vital to our survival. As a result, osteoarthritis can occur.

High blood pressure. As the body becomes dehydrated, blood volume decreases. This can cause a decrease in blood pressure as the body tries to compensate for the decrease. Correcting the underlying dehydration may help reduce blood pressure.

Back pain. Similar to our weight-bearing joints, the cartilage in our backs requires adequate hydration. The vertical weight-bearing position of the spine during daily activities squeezes water out of the disks, which must be replaced during sleep while the body is in a non-weight-bearing horizontal position. In the absence of adequate hydration, the needed complement of weight-bearing water is not restored during sleep,

causing the disk to become flattened. This may also be why many people report worse pain when they first awake in the morning. Pain occurs when the bony vertebrae in the back are pressed downward against the nerve roots that exit both sides of the spinal cord. This problem is most severe for the disk carrying the most weight—the fifth lumbar disk at the bottom of the spinal column—and is a likely source of low-back pain.

Asthma and allergies. When the body is dehydrated, histamines are generated. Increased histamines can lead to asthma or allergies.

Animal studies indicate that increasing water consumption can decrease histamine and as a result may help reduce asthma and allergy symptoms.

Edema. Swelling, or edema, is associated with many illnesses including heart disease, premenstrual syndrome, and liver or kidney disease. When there is not enough water to flush out toxins, whatever water is available stays in connective tissues and causes swelling. Water, along with physical activity, can help flush the system and reduce the amount of water gathered in connective tissues.

Bladder and kidney stones. Early scientific studies have shown that low fluid intake is directly associated with the development of bladder and kidney stones. Several years ago Russian researchers demonstrated that a microclustered water had three times higher dissolution rate of calcium oxalate monohydrate crystals than distilled water. This led the researchers to speculate that microclustered water could be used as a complementary treatment for bladder and kidney stones.

Cancer prevention. Water may even help us prevent many different types of cancer. Studies have shown a direct link between high water intake and a reduced risk of certain cancers including those of the bladder, prostate, kidney, testicular, colon, and breast. A recent human clinical trial from the Harvard School of Public Health demonstrated that high water intake is associated with a reduced risk of bladder cancer. Preliminary research even shows that pure water can help mitigate side effects of chemotherapy cancer treatment and help normalize liver enzymes.

Please Note: Regardless of symptoms or medical status, you should never self-diagnose and/or self-medicate. If you are experiencing an issue with your health, consult an appropriately educated, well-informed healthcare provider. Also, never discontinue prescription medications without first talking to your doctor.

Chapter Three

Choosing Pure Water



If you ask three different people what their favorite source of water is, you will most likely get three different answers. Oftentimes, we don't put much thought into the source of the water—we just know that we are thirsty. However, the type of water you drink will make a huge difference in cellular hydration and optimal health.

One of the first considerations regarding the water you drink should be safety. Is the water you are drinking nontoxic?

Unsafe water

Few of us take the time to ponder what is lurking in our water as we prepare our morning coffee. Yet hidden among the water molecules is a cast of insidious characters with the power to deplete our health. They are sneaky because we do not experience their adverse effects in the short term, and they can't be seen with the naked eye. Their damaging effects manifest as these poisons accumulate in our tissues, disrupting healthy functioning.

For more information and a detailed discussion on toxins in public water supplies, we recommend the book by Lono Kahuna Kupua A'o, *Don't Drink the Water: The Essential Guide to Our Contaminated Drinking Water and What You Can Do About It* (Kali Press, 1998). Here are some key water toxins to be concerned about.

Arsenic This is a major toxin in many water sources. Arising from natural sources, industrial runoff, and pesticide residues, it is a slow-acting, deadly poison that accumulates in body tissues and can even cause cancer.

Bacteria and parasites There have been numerous reports of bacteria such as E coli and parasites such as giardia in drinking water.

Chlorine Nearly everyone is familiar with this disinfectant bleach. When ingested, it can cause birth defects and cancer, and it also produces poisonous byproducts. In addition, consistently exposing the lower bowel to the antiseptic properties of chlorine can cause disturbance of the bacterial balance in the colon, causing a wide range of health issues.

Fluoride This is one of the most controversial additives in public water systems. Although advocated by dentists to retard the development of tooth cavities, the effects on the rest of the body are unfavorable and include weakening bones, disrupting enzyme function, and even contributing to cancer.

Hydrogen sulfide This is a byproduct that produces a "rotten egg" smell. Although it is not as dangerous as other toxins, it can be harmful in high doses.

Lead This mineral has been a scourge of human health for ages. Although pipes are no longer made of lead, this heavy metal can still be found in water fixtures and solder materials. As it accumulates in the tissues, lead damages brain cells, the nervous system, and the kidneys.

Nitrates and nitrites These farming chemical are found in fertilizers and livestock waste and can seep into the water table, as well as rivers, lakes, and streams. These compounds are toxic and are converted into cancer-causing nitrosamines in the stomach.

Nuclear waste The untenable situation of deadly radioactive material is a recipe for ecological catastrophe. Nuclear waste poses a huge future threat to our water supply and those living near nuclear waste dump sites throughout the country.

Pharmaceuticals A variety of prescription drugs have been found in drinking water. The increased use of pharmaceuticals combined

with the ineffective means to eliminate them from the water supply makes this a growing concern for many areas of the country.

Radon This radioactive gas plagues many parts of the United States. It arises from natural underground radioactive mineral deposits, as well as the nuclear decay of uranium mining residues. Radon is the second leading cause of lung cancer and can cause other cancers as well.

Trihalomethanes (THMs) This group of compounds is formed as a byproduct of the chlorination process in municipal water plants. They are also used in industry as solvents or refrigerants. Many of them are believed to contribute to cancer and cause congenital malformations in the infants of pregnant mothers who consume THMs via municipal water.

In addition to the previously mentioned toxins, asbestos is also an issue. Most people don't realize that the very pipes carrying their municipal water supply are a source of contamination. Until recently, the major concrete conduits that carry large quantities of city water were reinforced with the toxic, fibrous material that is associated with lung and other cancers.

A recent, shocking investigation by the Associated Press found that the municipal drinking water supplying 24 major metropolitan areas contained pharmaceutical drugs such as antibiotics, hormones, mood stabilizers, and other drugs.

According to a CNN report, when people take drugs, some of the drug is absorbed but some of it is also excreted and makes its way to drinking-water treatment plants. "But most treatments do not remove all drug residue," CNN reports.

With all of the pollutants and contaminants we have listed, it's no wonder so many people say they don't like the taste of water.

Bottled water

As indicated, drinking water provided by many municipal water districts can be unsafe. Numerous reports have established that tap water often contains a variety of toxins.

It's obvious that drinking contaminated water is harmful to our health, and water from many municipal sources may fall into that category. Shockingly, an estimated 25 percent of bottled water comes from public water supply sources. It's ironic that one of the reasons bottled water consumption has increased so dramatically is that people are afraid to drink their tap water, and yet the bottled water they consumer may be

from the same source.

Bottled water is the second most consumed commercial beverage in the United States. In 2007 alone, Americans consumed nearly 9 million gallons and spent nearly \$12 million on bottled water.

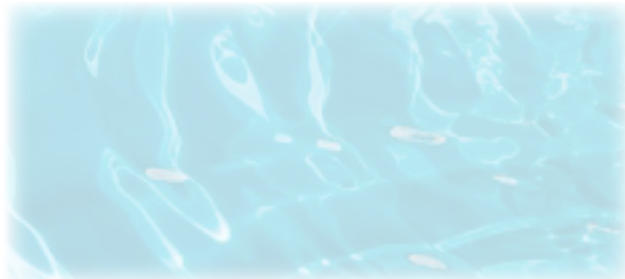
Not all bottled waters are created equal. In fact, as the saying goes, you get what you pay for. Make sure the bottled water you drink is clean and free of toxins, undesirable heavy metal minerals, and bacteria. Investigate the contents of your water and don't be afraid to contact the manufacturer with questions.

Drinking bottled water is still much safer than drinking tap water. According to the Centers for Disease Control and Prevention (CDC), bottled water has never been responsible for an outbreak of waterborne illness, unlike tap water. This spotless record is, no doubt, the result of numerous, well-enforced safety regulations.

Bottled water is strictly regulated by the Food and Drug Administration (FDA) and state agencies. For example, state governments enforce quality standards by inspecting, sampling, analyzing, and approving sources of water. Only approved sources of water can be used to supply a bottling plant. All bottled water sold in the United States must meet stringent standards in addition to the FDA's good manufacturing practices (GMPs). This ensures the safety of all bottled water products from production to packaging to consumption.

In addition, members of the International Bottled Water Association (IBWA), who produce about 85 percent of the bottled water sold in the United States, must meet strict industry standards established by the association. These standards, contained in the IBWA "Model Code" exceed current FDA regulations for bottled water. To ensure all bottled water is as safe as possible and of the highest quality, all IBWA members use one or more of the following practices:

- Source protection
- Monitoring
- Reverse osmosis
- Distillation
- Filtration
- Ozone treatment
- Disinfection



In addition, as a condition of association membership, bottlers must submit to an annual, unannounced plant inspection administered by an independent, internationally recognized third-party inspection

organization. This inspection audits quality and testing records; reviews all areas of plant operation from the sources of materials to the finished product; and ascertains compliance with FDA quality standards, GMPs, and state regulations.

While all bottled water products are held to specific safety standards, they still vary greatly in terms of purity and effectiveness.

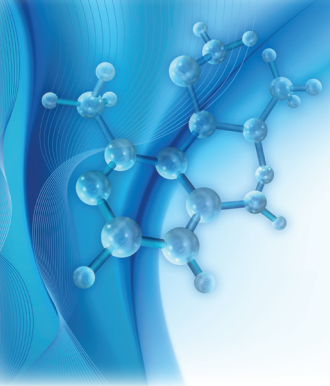
The best choice

We recommend Penta water because of its degree of purity. Penta water is passed through eight stages of filtration and four stages of microbial removal. A process known as ultra-purification removes all chemicals, minerals, pollutants, contaminants, and microorganisms. The only substance added to this water is oxygen, which actually increases osmotic drive, making it more effective. Penta water far exceeds government and industry standards and guidelines for safety, quality, and purity.

The characteristic that makes Penta truly special is its molecular composition. It is one of the only legitimately microclustered water products available. Remember, water molecules naturally gather in large clusters, which our bodies must break down into small clusters and individual molecules that can be more easily absorbed at the cellular level. Age, exposure to toxins, and a long list of other factors can impair our body's ability to break down large water clusters. Applied physics techniques (as opposed to chemical additives) can restructure large macroclusters of water molecules into tiny microclusters. Through a technologically advanced, patented process, Penta provides this advantage.

Many bottled water products are called "microclustered water," but that isn't always what you're getting. Water molecules do not naturally like to remain in small clusters; therefore, microclusters tend to be short-lived. To circumvent this problem, many bottlers actually produce the water with lower surface tension. They do this by adding a surfactant, which is a fancy word for soap-like compound shown to reduce surface tension of water. These products do not represent a true microclustered water. In fact, many surfactants are toxic.

Sodium meta-silicate and potassium carbonate are two of the most common additives found in surfactant-based clustered water. Continued ingestion of these substances may cause health issues in some people. The body views surfactants as contaminants. Because aquaporins are extremely sensitive to toxins, they will shut down if surfactants are present, actually decreasing cellular hydration. Water that is microclustered without the use of surfactants enhances cellular



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hydration.

There are many good water products available. Don't be afraid to do your homework before choosing one. It's an important choice. For example, find out if the product is stable in heat and cold and during shipment. Also, avoid undesirable additives. If the product has chemical additives, it is not a pure water product.

There is also a difference between microclustered water and spring or mineral water. You cannot have a stable, microclustered water that contains dissolved minerals. The mineral ions act as a focus point for the reclustered water.

The best way to make sure a product is pure and free of contaminants, including minerals, is to request a complete laboratory analysis from the manufacturer. Any reputable manufacturer will be happy to send you this important information. The lab should also be able to verify that the testing was done accurately. If the manufacturer or bottler does not provide the necessary information from an independent lab, try another water company. Web site lab reports, unless unedited, are not credible. When you receive the analysis, pay close attention to chlorine, fluoride, arsenic, mercury, lead, aluminum, and other heavy metal contaminants. Be especially concerned about comments regarding trace amounts of toxins, such as arsenic or mercury. Find out how much is meant by "trace amounts." If it can be measured on a consistent basis within or below report limits, it is not truly a trace amount and it could cause health problems.

The creator of Penta water is AquaPhotonics, Inc, a technology-based company that develops and licenses innovative and technologically advanced aqueous products. Penta water is created using a patented process with a hydrodynamic chamber. Medicinal grade oxygen is also added. AquaRx is the non-beverage brand of this patented water; its applications include laboratory, industrial, cosmetic, nutraceutical, pharmaceutical, and agricultural processes. The patented technology includes a multistep filtration process that ensures the purity of the

water.

AquaPhotonics can be likened to Intel Corporation as a concept and use of technology. Intel is a technology company that improves the information processing within a computer. AquaPhotonics has a similar relationship with the Penta Water Company.

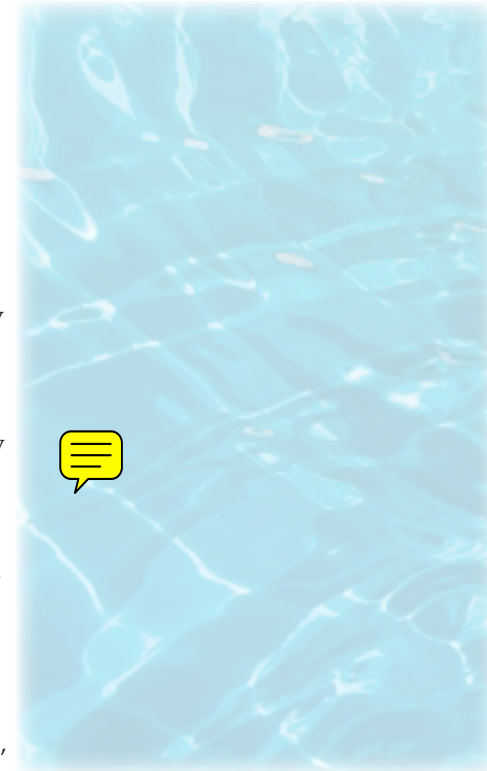
Penta and AquaRx are presently being studied in a variety of applications to evaluate the extent of their health-promoting potential. The purity, effectiveness, and safety of this pure water has been scientifically confirmed.

Drink up!

The body relies on an adequate supply of pure water. In addition to its vital functions, the very fact that water comprises such a large percentage of our physical being makes it a mainstay of our existence. Just as surely as a lack of water can result in illness, an abundance of clean, fresh water, restructured for maximum absorption, improves health beyond normal expectations.

The water you choose should be ultra-purified for absolute safety, microclustered for optimal absorption, and free of chemicals and toxins. Choosing the right water for optimal hydration is important because when it comes to water, it works!

We wanted to make this booklet as easy-to-read as possible in presenting the facts and clinical data regarding proper hydration with pure water. This is not intended to be a comprehensive clinical review of water. For more information, please visit AquaPhotonics.com.



Terms to Know:

Aquaporins Small protein channels in the cell membrane that are conduits that manage water flow

Cell membrane Fatty substance surrounding the cell

Chlorination Treatment of water with chlorine or ammonia to kill disease-causing organisms

Contaminated water Polluted water that is unfit for consumption

Dehydration A medical condition characterized by a deficiency of optimal water levels within the body and its cells

Filtration A process that removes particles and toxins from water to make it safe to drink

Hydration The process of providing water to someone in order to reestablish or maintain correct fluid balance

Microclustered water Water whose molecules have been altered to include smaller clusters for better absorption

Municipal water district A public water provider owned and operated by the city government

Osmosis The passage of water from a region of high water concentration through a permissive semipermeable membrane to a region of low water concentration

Pollutant A substance that contaminates the air, soil, or water

Reservoir A pond or lake in which water is collected and stored until it is needed

Subclinical dehydration A state of having inadequate water intake to match water losses without causing overt symptoms

Surfactant Surface active agent used to reduce the surface tension of water; often used in detergents and soaps

Trihalomethanes A group of toxic compounds sometimes found in drinking water

Water One of the smallest and simplest compounds in existence, consisting of two hydrogen atoms and one oxygen atom (H₂O)

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