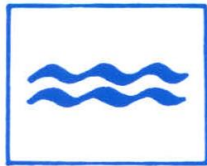


\$4.95



A  
HEALTHY WATER RESEARCH  
PUBLICATION

# *Healthy Water*



MARTIN FOX, PH.D.

Martin Fox is an environmental researcher and nutritionist. His full length book, *Healthy Water For A Longer Life*, has been called "the best book on the subject".

*Here's what reviewers are saying about*

## **HEALTHY WATER FOR A LONGER LIFE**

*"Excellent book...I think you have done a good job in trying to put this all together in one single source."*

Jeffrey Bland, Ph. D., Director  
Laboratory for Nutritional Supplement Analysis  
Linus Pauling Institute of Science & Medicine

*"...Your book appears to probably be the most concise, authoritative summary work yet on the subject."*

Robert T. Williams, President , General Ecology, Inc.

*"Its the best I've read on this subject..."*

W. Marshall Ringsdorf, Jr., D.M.D.  
Author of: The Vitamin C Connection

*"I read your excellent book, Healthy Water For A Longer Life with great pleasure! I recommend it's thoughtful, informative contents ...*

Gene Rosov, President, WaterTest Corporation

*"The best documented water book yet for the average citizen to read."*

Warren Clough, Analytical Chemist  
Ozark Water Service and Analytical Laboratory

*"An easy-to-read and very up-to-date compendium of much of the present literature, scientific and otherwise, regarding drinking water."*

Joseph M. Price, M.D.  
Author of: Coronaries/Cholesterol/Chlorine

*Copyright 1990*  
*Revised 1996*

ISBN #: 0-9617432-3-9

Printed in the United States of America



# INTRODUCTION

This booklet briefly summarizes the main ideas and research in Healthy Water For A Longer Life, which discusses both the beneficial and harmful substances commonly found in our drinking water.

Although **Healthy Water** is not a book about water pollution, it's smart to be reminded, however briefly, of the on-going extent of this problem. For example, recent reports from two different major environmental organizations (the National Resources Defense Council and the Environmental Working Group) claim that 53 million Americans or roughly 1 out of 5 are drinking polluted water. (29)

**Healthy Water** tells you about both the beneficial and harmful substances commonly found in our drinking water and what you can do to protect your family and yourself to enjoy a healthier life.

## WATER: THE ESSENTIAL NUTRIENT

We can go without food for weeks but without water we die of dehydration in a few days. Over two-thirds of our body is water, yet most of us don't clearly understand the importance of drinking plain water.

Water is the most abundant compound in the human body and is necessary for: the digestion of food, for the transport of food to the tissues, for the elimination of body wastes, for the circulation of body fluids (like blood and lymph), for a lubricant in the joints and internal organs — keeping them moist permitting the passage of substances between the cells and blood vessels — and for the regulation of body temperature. **Water is part of the blood system holding dissolved minerals, like calcium and magnesium in solution, making them available to body tissues where they are required for proper health.**

Most of us have heard or read about these many functions of water yet ironically most of us are suffering from dehydration. We have been led to believe that only when we experience a “dry mouth” must we be lacking adequate water. This medical misunderstanding

has resulted in pervasive, chronic dehydration with subsequent health problems.

A recent book, Your Body's Many Cries for Water, by Feereydoon Batmanghelidj, a medical doctor, thoroughly explains the forgotten physiological importance of plain water and the body's many signals of dehydration.

When plain water is plentiful, blood viscosity, joint cartilage, blood capillaries, digestion, the ATP energy system and the spinal column, all work in an efficient, easy manner. However, when water consumption is limited, the body robs some areas to protect different tissues and organs, which results in pain, tissue damage, and a variety of common health problems.

**Some of the problems treated and alleviated with adequate water intake are: asthma, allergies, hypertension, high cholesterol levels, headaches, migraines, low back pain, rheumatoid arthritic joint pain, angina pain and intermittent claudication pains (cramp like pain in the legs due to insufficient blood supply).**  
(56)

As people age, they lose their thirst sensation and become gradually, chronically dehydrated. All too frequently we tend to confuse thirst with hunger and instead of drinking water we eat, leading to weight gain.

Also, peak performance is dependent on water, the essential nutrient. One example I read about several years ago illustrates this. Two European mountain climbing teams were competing. One team was in far better physical condition than the other team, but was unable to win. After awhile the frustrated defeated team started to carefully study the other team's every move. The only thing that they found was that after so many minutes of climbing each team member drank water. Copying this water drinking habit now resulted in victory. No longer were they lacking the sustained energy needed. Optimum water consumption was the key.

The physiological effects of drinking plain water is not the same as drinking beverages that contain water like: juices, sodas, coffee and tea. In fact, some of these liquids, coffee and tea, contain dehydrating agents (caffeine and theophylline) which stimulate the central ner-



vous system while at the same time creating a strong diuretic action on the kidneys.

**Your body needs a minimum of 6 to 8, 8 ounce glasses of water each day. Remember, alcohol, juice, sodas, coffee, and tea don't count as water.** Dr. Batmanghelidj recommends one glass a half hour before each meal and a similar amount 2-1/2 hours after each meal with an extra glass taken before the heaviest meal or before going to bed. As an experiment, record the number of glasses of water you drink over a normal 3 day period. You'll be amazed. Most of us think we are drinking far more water than we actually do. In fact 3 to 4 glasses at most is what people usually find; far short of the 6 to 8. Try it for yourself and see.

**Thirst should be satisfied at all times with water. The more we pay attention to the body's constant need for water the healthier we will be.** Having a "dry mouth" is the last outward sign of extreme dehydration which can easily be avoided by following the above advise. Many medications actually dehydrate the body leading to more severe problems.

Keep in mind, the human body is roughly composed of 25 percent solid matter and 75 percent water. Brain tissue is said to consist of 85 percent water and the blood is 90 percent water.

**Water — plain, properly filtered water — is an overlooked and essential nutrient and may be your missing ingredient to a healthier, more vibrant, and longer life.**

## **THE WATER STORY & HEART DISEASE**

Over the years many studies have been published on the relationship between drinking water and cardiovascular mortality. Two beneficial factors continually stand out - hardness and total dissolved solids. Both have been associated with lower mortality from heart disease. Hardness refers to the amount of calcium and magnesium, or calcium carbonate in the water. The more calcium carbonate, the harder the water; the less, the softer the water.

The first major study on drinking water and heart disease was in 1960 by Schroeder. In his paper, "Relation Between Mortality from

Cardiovascular Disease and Treated Water Supplies,” the water in 163 largest cities in the United States was analyzed for 21 constituents and correlated to heart disease. He concluded that “some factor either present in hard water, or missing or entering in soft water is associated with higher death rates from degenerative cardiovascular disease.” (41)

In 1979 after reviewing fifty studies, Comstock concluded, “there can be little doubt that the associations of water hardness with cardiovascular mortality are not spurious. Too many studies have reported statistically significant correlations to make chance or sampling errors a likely explanation.” (15) He suggests that the reason for this association is due to a “deficiency of an essential element or an excess of a toxic one.” Certainly a combination of both is also possible.

Today after thirty years of research we are left with Schroeder’s initial conclusion-drinking hard water results in less cardiovascular disease than drinking soft water.

Yet over the years there have been several published reports analyzing specific elements in drinking water and their possible relationship to heart disease. One researcher studies zinc, another - copper, another selenium, and so on. And as you read this material, you find an inconsistent and confusing picture. But, if you look at the broader picture, if you look at the studies on hardness, you will find very consistent results: namely, the harder the water, the less heart disease deaths.

Before highlighting some of the major studies, let’s discuss TDS, total dissolved solids. TDS is a measurement of all the minerals in drinking water. TDS not only includes calcium and magnesium (the hardness factors), but also zinc, copper, chromium, selenium and so on. Sauer analyzed 23 drinking water characteristics in 92 cities (“Relationship of Water to the Risk of Dying”) and found people who drank water higher in TDS had lower death rates from heart disease, cancer, and chronic diseases than people who drank water with low amounts of TDS. (40)

Frequently, where the water is hard, the water is also high in TDS. Although most studies on heart disease have not looked at TDS



but at hardness, this factor has been ever present and may be playing a very significant role.

The more we try to isolate and study the effects of individual minerals the more we can lose sight of the unifying, comprehensive, beneficial factors present in water like hardness, TDS, and pH. Perhaps one of the main reasons there are inconsistencies in the water story is simply because we are obsessed to locate a specific isolated element that is responsible for the beneficial effects of healthy drinking water.

Let's look at some of the major studies. In Great Britain, the British Regional Heart Study analyzed 253 towns from 1969 to 1973. They found 10% to 15% more cardiovascular deaths in soft water areas than in hard water areas. They suggest that the ideal amount of hardness is approximately 170 mg/L (or ppm-parts per million). (43)

In the United States, Greathouse and Osborne studied 4200 adults, ages 25 to 74 in 35 different geographic areas. Their findings? Again, less heart disease mortality in hard water areas than in soft water areas. (24) A report by the Oak Ridge National Laboratory found that the calcium and magnesium in hard water reduces the risks of heart attacks and strokes. This study compared the health records of 1,400 Wisconsin male farmers who drank well water from their own farms. The farmers who drank soft water suffered from heart disease, whereas, the farmers who drank hard water were, for the most part, free of the problem. (55)

Sometimes, the best experiments are those nature has been silently conducting for years. Some of the most revealing water studies are seen comparing two neighboring towns in which one town alters its hard water to create a softer water. What has been the effects of this action? A higher rate of heart disease mortality. We see this in the English towns of Scunthorpe and Grimsby. Both towns drank the same water with 444 mg/L of hardness and had identical heart disease mortality rates. Scunthorpe soften its water to 100 mg/L of hardness and within a few years a striking increase in cardiovascular deaths occurred. Whereas in Grimsby the rate was virtually the same as it had been. (44) This pattern has also been reported in the Italian

towns of Crevalcore and Montegiorgio and the Abruzzo region of Italy. (29) (38)

The National Academy of Sciences concluded, "An optimum conditioning of drinking water could reduce the amount of cardiovascular disease mortality by as much as 15% in the U. S."(31)

**When looking at the research, two facts stand out. First, there is a definite relationship, a clear association between water hardness and heart disease mortality. We should try to drink water that has approximately 170 mg/L of hardness; the level found ideal in Great Britain. Second, there is a definite relationship with TDS and heart disease mortality. Higher levels of TDS results in less heart disease. Proper levels of hardness and TDS are two of the beneficial properties in drinking water constituting a healthy drinking water.**

## **SODIUM & HYPERTENSION**

In the last few years several studies have been published on sodium in drinking water and its effect on blood pressure.

Many researchers believe a reduced salt intake can help lower blood pressure. There is evidence that low salt diets could help prevent high blood pressure in humans. However, many factors are involved in high blood pressure besides sodium. Diets high in potassium, rich in vegetables and with less meat consumption have been shown to be effective in reducing or preventing high blood pressure. Also, adequate calcium and magnesium intake are instrumental in lowering blood pressure. And chloride, not sodium, has been found to be a key factor in raising blood pressure. Salt is a combination of sodium and chloride.

Many experts worldwide claim 2 to 5 grams of salt daily does not pose any real problems for most people. However, in Western cultures, dietary intake of salt is between 8 to 15 grams daily. 90% of all the salt we consume is from food; 10% from water. With this background, let's look at the research on sodium, hypertension and drinking water.

Some studies have reported that higher levels of sodium in

drinking water resulted in higher blood pressure. (48) (26) However, most studies have not supported this finding. No correlation was found between high blood pressure and high levels of sodium in the drinking water in Illinois, Michigan, Iowa and Australia. (4) (25) (21) (33) Recently, the EPA has removed sodium from the list of 83 items to be regulated by June 1989.

However, the vital question is: "Are there studies showing a correlation between high levels of sodium in the drinking water and higher mortality rates?" When we ask this question and look at the studies, we come up lacking.

Robinson in England and in Wales and Schroeder, Sauer, Greathouse and Osborne in the United States studied this. Not one of these investigations showed that higher levels of sodium in drinking water resulted in higher levels of mortality. In fact, some of these studies indicate that higher levels of sodium resulted in lower death rates. (39) (41) (40) (24)

What about water softeners? Many people use them for their laundry and drinking water. Is this good? Are they healthy? Some water softening techniques add sodium to the water replacing significant amounts of calcium and magnesium. Other procedures do not add sodium but still reduce the hardness of the water.

Earlier, we discussed people drinking harder water have less heart disease mortality rates than people drinking soft water. Softened water is unhealthy to drink-not because of the sodium, per se, but because of the lack or lower amounts of calcium and magnesium in the water. If you are now using a water softener, have a separate cold water line installed for your drinking water and on this line install a proper filter unit.

Recent statements from the American Heart Association and the World Health Organization recommend limiting the sodium in drinking water to 20 mg/L. In the United States, 40% of all the drinking water exceeds 20 mg/L of sodium. If we were to follow this advice, many people would have to purchase either low sodium bottled water or de-mineralize their own drinking water through reverse osmosis, distillation or de-ionization.

But, if we adopt these procedures, we would create a soft water,

a water low in hardness and low in TDS. The effect of this is to create an unhealthy drinking water.

**Frequently water supplies high in sodium are also high in hardness and TDS. Higher levels of hardness and TDS protect us from potentially harmful substances and have been shown to result in lower heart disease and cancer mortality rates. If we want to lower our sodium intake, we should look to our diets, 90 % of all the sodium we consume is in the food we eat.**

## **THE WATER STORY & CANCER**

It is estimated 60% to 80% of all cancers are environmental in origin. (20) There is a growing consensus that the majority of cancers are caused by chemical carcinogens in the environment, and hence, ultimately preventable. Several studies have demonstrated the presence of chemical carcinogens in surface, ground water and municipally treated drinking water. In addition, trihalomethanes (THM's) can actually be produced during the chlorine treatment of our drinking water.

In short, the amount of chemical compounds discharged in our water, directly or indirectly is staggering. "Over 2100 organic and inorganic drinking water contaminants have been identified in U. S. drinking water supplies since 1974. Out of these 2100, 190 of the contaminants have confirmed adverse health effects, whether carcinogens, mutagens, teratogens or toxic." (16)

Even with the EPA drinking water standards, we cannot be assured, that the tap water we are drinking is not going to weaken our immune system or lead to cancer. Many cancer causing agents take twenty to thirty years before the effects show up. Each of us is metabolically different and reacts to carcinogenic agents in a unique way. Epstein sums it up, "There is no threshold for chemical carcinogens."

Information on a variety of carcinogenic agents in drinking water: fluoridation, chlorination and asbestos will be represented later. However, before looking at these, there is some fascinating research based on positive substances in drinking water that actually

can help protect us from cancer. This research centers on four factors: total dissolved solids (TDS), hardness, pH and silica.

Burton and Cornhill analyzed the drinking water in 100 largest cities in the United States. They found a 10% to 25% reduction in the amount of cancer deaths if the drinking water contained a moderately high level of TDS (around 300 mg/L), if the water was hard, if the water had an alkaline pH (above 7.0) and if the water had 15 mg/L of silica. (12) (13)

Sauer also found a correlation between silica and cancer. Namely, the more silica the less cancer. In addition, he also uncovered that when the water was hard, there was less cancer. Therefore, drinking water with higher levels of TDS and hardness results in lower heart disease and cancer mortality rates.

A comment on the silica observations. In general, as researchers continue to study specific elements in drinking water and their relationship to cancer, we are going to see diverse and conflicting findings.

For example, a report from Seneca County, New York revealed high levels of selenium in the drinking water was associated with a significant decrease in cancer. (28)

When specific elements are analyzed we find diverse and at times confusing or conflicting results. This identical pattern was observed with heart disease studies. But, when we look at the more inclusive water factors such as TDS and hardness, a highly consistent, more meaningful picture emerges.

Burton's work shows water with an alkaline pH is another key factor in lower cancer mortality rates. Very few studies have examined the positive or negative health effects of pH. However, his remarks reminds one of Schroeder's findings. Schroeder observed an alkaline pH resulted in less cardiovascular disease than water with an acid pH. For many years, people have thought that a soft water is a corrosive water, that soft water leeches substances like lead and cadmium from water pipes.

However, it is the pH that causes the corrosive action of water and not the softness, per se. Therefore, an alkaline water should not

leech heavy metals or chemicals from galvanized or PVC pipes into our drinking water.

**The positive picture emerging from this research is: drink water with around 300 mg/L of TDS and drink a hard water with an alkaline pH to reduce the risk of cancer mortality.**

## **ASBESTOS & CANCER**

Asbestos is starting to be discovered in drinking water systems. The research on asbestos inhalation reveals the lengthy process needed to prove that harmful agents in the environment affect our health. Dr. Irving J. Selikoff, painstakingly documented the relationship between occupational asbestos exposure and increased respiratory and digestive cancers.

Selikoff's work began in 1924 and it took him several years before he was able to show convincing evidence that asbestos exposure was causing higher rates of cancer. In fact, he says, "For thirty years, laboratories tried to produce cancer in animals with asbestos and were not able to. We learned in 1963-64 and now every pathologist can produce them with ease. But for thirty years we couldn't." (42)

This inability to detect the cancerous effects of asbestos on animals for thirty years is disturbing. Most tests and subsequent standards on whether or not a substance is harmful to humans and in what dose is first based on animal studies. Clearly, animal studies may not be as reliable as we would like to believe. Also, when animals are tested for potentially harmful substances, only one substance at a time is used. Yet when we drink water, we can be consuming many chemicals at the same time. With over 2100 organic and inorganic contaminants identified in our drinking water since 1974, does anyone know the synergistic effect these substances are having?

Selikoff discovered that most workers with less than twenty years of exposure had normal X-rays, despite the fact that they worked with asbestos fibers nearly every day. However, after twenty years, the X-rays commonly revealed extensive cancer development. Selikoff calls this the twenty to thirty years rule for environmental



disease. It takes that long before we really start to see the harmful effects of many chemicals, but once observed the damage can be too far advanced.

With this background, let's look at the research on asbestos fibers in drinking water. Probably the most publicized case took place in Duluth, Minnesota with the Reserve Mining Company and its dumping of taconite waste and asbestos fibers into Lake Superior. (45)

Although the cancer rates in the cities of Duluth to Minneapolis are similar, Duluth residents have higher cancer mortality rates of the stomach, small intestines, pancreas, gastro-intestinal area and lungs. Remember, it took twenty to thirty years to have cancer from asbestos inhalation, yet we are starting to see cancer from asbestos in drinking water with only ten to fifteen years of exposure.

Studies in Iowa City, Iowa and in San Francisco, California also show the same significant pattern. Again, the locations of cancer are similar to asbestos inhalation. (18)(17)

**Let's hope we don't wait thirty years to realize asbestos fibers don't belong in our drinking water. Proper filtration systems can remove asbestos fibers that may be present in our drinking water.**

## CHLORINATION

Is the chlorine in our drinking water acting as catalyst triggering tumor development both in atherosclerosis and cancer? The addition of chlorine to our drinking water started in the late 1890's and had wide acceptance in the United States by 1920. Joseph Price, M. D., wrote a fascinating, yet largely ignored book in the late 1960's, entitled Coronaries, Cholesterol, Chlorine. Dr. Price believes the primary and essential cause of atherosclerosis is chlorine. "Nothing can negate the incontrovertible fact, the basic cause of atherosclerosis and resulting entities, such as heart attacks and most common forms of strokes is chlorine. The chlorine contained in processed drinking water." (37)

This conclusion is based on experiments using chlorine in the

drinking water of chickens. The results: 95% of the chickens given chlorine added to distilled water developed atherosclerosis within a few months.

Atherosclerosis, heart attacks and the resulting problems of hardening of the arteries and plaque formation is really the last step in a series of biochemical malfunctions. Price points out it takes ten to twenty years before symptoms in humans become evident. In many ways, this is reminiscent of cancer which can take twenty to thirty years to develop.

Can chlorine be linked to cancer too? In the chlorination process itself, chlorine combines with natural organic matter, decaying vegetation, to form potent, cancer causing trihalomethanes (THM's) or haloforms. Trihalomethanes collectively include such carcinogens as chloroforms, bromoforms, carbon tetrachloride, bischloroethane and others. The amount of THM's in our drinking water is theoretically regulated by the EPA. Although the maximum amount allowed by law is 100 ppb, a 1976 study showed 31 of 112 municipal water systems exceeded this limit. (30)

According to some studies by 1975, the number of chemical contaminants found in finished drinking water exceeded 300. (52) In 1984 over 700 chemicals had been found in our drinking water. The EPA has targeted 129 as posing the greatest threat to our health. Currently the EPA enforces federal standards for 34 drinking water contaminants. In July, 1990 they proposed adding 23 new ones and expects this list increasing to 85 in 1992. (2)

Another report claims the picture is much worse. According to Troubled Waters on Tap "over 2100 contaminants have been detected in U. S. drinking water since 1974 with 190 known or suspected to cause adverse health effects at certain concentration levels. In total, 97 carcinogens and suspected carcinogens, 82 mutagens and suspected mutagens, 28 acute and chronic toxic contaminants and 23 tumor promoters have been detected in U. S. drinking water since 1974...The remaining 90% of the organic matter present in drinking water has not been identified by testing to-date.

Compounds in these concentration could pose serious toxic effects, either alone or in combination with other chemicals found in

drinking water...Overall, available scientific evidence continues to substantiate the link between consumption of toxins in drinking water and serious public health concerns. Studies have strengthened the association between ingestion of toxins and elevated cancer mortality risks.” (16)

Studies in New Orleans, Louisiana; Erie County, New York, Washington County, Maryland, Ohio County, Ohio reveal high levels of haloforms or THM's in drinking water. The result - higher levels of cancer. (34) (23) (14) (51)

“The continued use of chlorine as the main drinking water disinfectant in the United States only adds to the organic chemical contamination of drinking water supplies. The current federal standard regulation of trihalomethanes do not adequately protect water consumers from the multitude of other organic chlorination by-products that have been shown in many studies to be mutagenic and toxic.” (16)

**“Chlorine is so dangerous,” according to biologist/chemist, Dr. Herbert Schwartz, “that it should be banned. Putting chlorine in the water is like starting a time bomb. Cancer, heart trouble, premature senility, both mental and physical are conditions attributable to chlorine, treated water supplies. It is making us grow old before our time by producing symptoms of aging such as hardening of the arteries. I believe if chlorine were now proposed for the first time to be used in drinking water, it would be banned by the Food and Drug Administration.” (18)**

Many municipalities are experimenting with a variety of disinfectants to either take the place of chlorine or to be used in addition, as a way of cutting down on the amount of chlorine added to the water. However, these alternatives such as chlorine dioxide, bromine chloride, chloramines, etc., are just as dangerous as chlorine. We're replacing one toxic chemical with another.

On the positive side, some cities are starting to use aeration, carbon filtration, ultraviolet light and ozone as safe alternatives to chemical disinfectants. But the number of cities and the number of people getting water from these methods is minimal.

How can chlorination be linked to heart disease and cancer? In

Super Nutrition for Healthy Hearts Dr. Richard Passwater shows how “the origin of heart disease is akin to the origin of cancer.” Chlorination could very well be a key factor linking these two major diseases. Chlorine creates THM’s and haloforms. These potent chemical pollutants can trigger the production of excess free radicals in our bodies. Free radicals cause cell damage. Excess free radicals can cause normal smooth muscle cells in the arterial wall to go haywire, to mutate. The fibrous plaque consequently formed is essentially a benign tumor. (35) Unfortunately, this tumor is linked with the origin of heart disease.

**If your drinking water is chlorinated, don’t drink it. You can purchase very effective filters which will remove 99% of the THM’s or purchase proper bottled spring water. Just this simple safeguard may save thousands from heart disease and cancer - the two major degenerative killers in the United States.**

## ANIMAL EXPERIMENTS

The research discussed so far has been based mainly on human studies. They have led me to recommend drinking a hard water, a water moderately high in total dissolved solids with an alkaline pH as being a healthy water.

Because of the general nature of human studies, experiments were designed to verify and expand the water story and health. A variety of animals have been studied: rats, horses, rabbits, pigeons and chickens. Most experiments have used artificial hard water and artificial demineralized soft water to which potentially harmful agents have been added. To my knowledge, the effects of different amounts of total dissolved solids or pH has not been studied on animals.

Animals given hard water, spiked with a harmful substance, like cadmium, lead, chlorine or fluoride, have been compared to animals given soft water spiked with the same substance. What is usually found is: **animals drinking the hard water have less of the harmful substances in their tissues than the animals drinking the soft water!** (6) (36) (19) (32) (27)

Dr. Joseph Price did a series of experiments on chickens adding

a chlorine solution to distilled water to one group and none to the control group. In a very short time, 95% of the chickens drinking the chlorinated water developed atherosclerosis. He then divided the original control group, conducted the exact same experiment and found the exact same results. (37)

Richard Bull of the EPA studied pigeons and the effects of chlorinated water. His findings support Price's work and go a step further. Pigeons given chlorinated water with only 80% of the RDA for calcium had serum (blood) cholesterol levels 50% greater than pigeons drinking unchlorinated water. A follow-up study revealed that when the pigeons were given 100% of the RDA for calcium there was no increase in the cholesterol levels of the chlorinated group. (1) Proper calcium levels protected the pigeons from some of the harmful effects of chlorinated drinking water.

Hard water is high in calcium and this may explain why people drinking hard water have lower heart disease mortality rates than those drinking soft water. A full account is in Healthy Water for a Longer Life.

**The animal experiments dramatically and clearly support the main conclusions observed from the human studies. Namely, hard water is healthier than soft water. Either hard water ties up harmful agents (like lead, cadmium, chlorine, fluoride) and thereby, lowers their absorption, and/or the minerals found in hard water provide needed nutrients which prevent the deleterious effects of toxic substances.**

## **DEMINERALIZED WATER**

Demineralized water contains little or no minerals. This can be accomplished by distillation, reverse osmosis, ion exchange or a combination of these methods.

The research on heart disease and cancer shows a healthy water is hard and moderately high in TDS. Therefore, demineralized water which is an artificial soft water without calcium and magnesium, and very low in total dissolved solids is not healthy to drink.

Yet, many people drink it because of their concern. Usually, their

thinking goes something like this. “I know I should drink water, but its so polluted with chlorine, chemicals and toxic metals, its not safe. So I’ll buy a distiller or a reverse osmosis unit that claims to remove everything from the water and now the water should be okay to drink.” Sound familiar?

When we act like this we are looking at only part of the story and not the whole picture. We are focusing on the harmful agents and not understanding the beneficial properties in drinking water. To drink healthy water we need to look at both aspects. We need to greatly reduce or eliminate harmful substances and still have beneficial minerals in our drinking water. In most cases, proper filtration systems or proper bottled spring waters will achieve this - demineralized water will not!

Advocates of demineralized water claim the inorganic minerals in drinking water (such as calcium, magnesium, silica, etc.) cannot be metabolized and therefore lead to health problems. (7) (5) (22) (50) However, this is not true! (44)

In fact, minerals in drinking water may be more easily and better absorbed than minerals from food! A leading authority of mineral metabolism, Dr. John Sorenson, medical chemist, states, “**minerals in drinking water are well absorbed.**” He has found that the metabolism of essential versus non-essential metallic elements is greatly affected by the amount of essential elements in the water. If the needed essential element is present, there will be little or no absorption of the non-essential element — it will simply be excreted. (46)

For example, if high amounts of calcium and magnesium and low levels of lead are in our drinking water, the body will select the essential elements (calcium and magnesium) and excrete the non-essential element (lead). If, however, there are low levels of calcium and magnesium, the cells could select the non-essential lead which would result in a dysfunctional protein or enzyme. If this occurs, the protein or enzyme could become toxic.

Distillers and reverse osmosis units provide soft, demineralized water without any protective minerals. The effects of any harmful substance in this softened water will be greatly amplified. A small



amount of a harmful substance in demineralized water can have a more harmful, negative effect on our health than the same amount in hard water.

**So, for very different reasons both polluted water and demineralized water can be harmful to our health.**

## **BOTTLED WATER**

Bottled water is big business. In 1989 sales were \$2 billion. Its the fastest growing beverage in the marketplace. One out of 18 families in the US buys bottled water. In pace setting California one out of three indulge. Florida, Illinois, California, New York and Texas account for 87% of the total sales; with Californians buying over a half.

But is bottled water a healthy water? It depends. Ask yourself: Is the water hard? Is it moderately high in TDS? If the answers are “yes” then you probably have selected a healthy water. With bottled water the pH is not as important as it is with well-water or municipal treatment systems, because of the potential pipe leaching problem.

However, many bottled waters are simply processed water using distillation, reverse osmosis, de-ionization or filtration. Frankly, you can do this yourself and save money. With over 700 brands of bottled water available in the US, around 80% are processed waters. (47) Laboratory tests have discovered that some bottled waters contained more THM's than surface and ground waters. Needless to say, bottled waters should be totally free of contaminants and chemical pollutants. This is not always the case.

**If you decide to purchase bottled water, request a complete lab analysis from the company. Purchase only natural spring waters that comes closest to the criteria outlined in this booklet for a healthy water.**

## **WATER FILTERS**

Another alternative is water filtration systems. Naturally, this

approach assumes the water meets the healthy water criteria for hardness, TDS and pH.

Water filters in this country are a big business, a billion dollar a year market, growing by leaps and bounds. Water today, looks like the oil business of the 1950's.

One of the problems with water filters is understanding whether they are really doing a good job. Trying to evaluate a lab report from a water filter company can be very difficult, if not impossible.

A filter should be tested for twice its rated life. If it's good for 1000 gallons, the tests should be for 2000 gallons and not just 100 g or 10 g. Studies have shown that for many filters not tested/rated in this manner, after 75% of "their rated" life, they can become much less efficient in removing harmful chemicals. Once you purchase a filter, make sure you change the unit regularly. Don't just wait till it clogs up or for the water flow to decrease before changing the cartridge. Most units will make the water taste and smell better for a considerable time after they have ceased being effective in reducing chemicals. For all practical purposes most carbon units cannot reduce chemicals for longer than 12 months, regardless of how much water goes through them. Replacing your unit yearly is sound advice. Each morning it's a good idea to run the water for a couple of minutes to flush away any toxic buildup that may be in the pipes, before running the water through the filter unit for consumption.

Recently, several States have passed strict guidelines regarding the testing of filters to protect consumers from inferior products. In some cases, having your water tested by a reliable water testing laboratory can be useful. However, for most of us on municipal water systems, extensive testing is sometimes over done, expensive and is unnecessary.

Those on well water, however, should have a complete water analysis performed once a year by a state certified laboratory. This is because of the threat that our under ground water supplies can become contaminated at any time.

Basically, water treatment units fall into four categories: Granular Active Carbon (GAC), Special Blended Media Filters (carbon plus other media), Reverse Osmosis (R/O), and Distillation.

Both Distillation and R/O unfortunately remove the essential minerals found in our drinking water (calcium and magnesium). GAC filters is by far the most widely sold number of units in the U.S. and is adequate for the reduction of taste odor and chlorine. However, very few GAC filter units can effectively remove the full range of harmful chemicals and other contaminants commonly found in our drinking water. Whereas, Special Blended Media Filters are designed to treat a wide range of problems. You need to read and compare the test data for each product carefully before buying a filter.

**The major problems in most of our drinking water are chlorine, organic chemical compounds, THM's and lead. The optimum filter to choose is a filter proven effective in the reduction of these major problems and still leave in the beneficial elements, like calcium and magnesium in the drinking water for our good health.**

## **SKIN ABSORPTION**

Preliminary research suggests that the ingestion of harmful chemicals from drinking water may not be the primary route of exposure. Both skin absorption and inhalation exposure have been studied.

Skin versus oral absorption rates for the toxic chemicals - toluene, ethylbenzene, styrene - were studied in adults and children. These absorption rates appear to be similar to the rates of other chemicals commonly found in our drinking water. The following chart is derived from this research. (9)

### **Average Skin Absorption Versus Oral Ingestion**

	Skin Absorption	Exposure Time	Oral Ingestion	Water Consumed
Adult bathing	63%	15 min.	27%	2 liters
Infant bathing	40%	15 min.	60%	1 liter
Child swimming	88%	1 hour	12%	1 liter
Overall average	64%		36%	

Skin absorption rates are tremendous. People with pools and hot tubs especially take note! These calculations are based on hand skin absorption rates. The hand is a much better barrier against harmful substances compared to other skin areas, which are much more sensitive. This means the true absorption rates are significantly higher.

Are we at risk when we bathe or shower from the inhalation of chemical pollutants? Field studies using a model shower with water contaminated with TCE (trichloroethylene) show that the inhalation exposure from such chemicals has the potential for being much greater than by direct ingestion. In fact, a person could take in 6 to 80 times more of the chemicals through inhalation. (3)

Based on skin absorption and inhalation exposure, having a proper water filter on the tap or drinking healthy bottled water may not adequately protect you and your family from the many harmful chemicals commonly found in water supplies.

Paying attention to the quality of our drinking water is not enough. "You can now envision a situation where the total body burden of volatile chemicals will be distributed roughly one third from inhalation during showering, one third from oral ingestion and one third from washing/bathing. In effect, this easily doubles or triples our exposure to the harmful chemicals found in water." (8)

**Ideally, one should consider a whole house filtration system to remove the organic volatile chemicals from bathing water. In many cases a whole house system will also solve your drinking water problems too. Another option is shower filters for bathing and tap water filters for drinking.**

## **CONCLUSION**

**The quality of drinking water (whether it is bottled or from the tap) is important to our health and may be a missing and vital link in our overall health program.**

**We can create a healthy water for drinking and bathing. For drinking water follow the guidelines on hardness (ideal around 170 mg/L), total dissolved solids, TDS (ideal around 300 mg/L), and pH (alkaline - above 7.0 for wells or municipal water).**

**In addition, evaluate your situation for a whole house filtration system, drinking water and shower filters.**

**By combining both approaches for drinking and bathing, we will be “drinking” a healthy water for a longer life and greatly lessen our daily toxic overload from the many chemicals commonly found in our water supply.**

• Healthy Water Research •  
Studies the Beneficial & Harmful Agents in Drinking Water  
• P. O. Box 173 • Portsmouth, NH 03802 • (207) 439-7647 •

---

Michael Pedersen, President  
Western Water International  
7715 Penn Belt Drive  
Forestville, MD 20747

February 19, 1996

Dear Michael,

Thank you for sending me the laboratory reports from the National Testing Laboratories on the AquaspaceSaver and H2OME water filters. These tests were for the removal of volatile organic chemicals (VOCs) and for lead.

As you know, I feel that most consumers are totally baffled by lab reports - finding it difficult, if not impossible to interpret correctly. With this in mind, I find that your test results are excellent.

The standard for health claims was developed by NSF (National Sanitation Foundation) and is now called ANSI/NSF Standard 53. National Testing Laboratories followed this protocol for testing your filters. Many times companies use Standard 42, the removal of taste and odor, namely chlorine, to show consumers. This test is a poor excuse for showing anything meaningful. Harmful chemicals, like VOCs, are typically tasteless and odorless. In my opinion, any filter that does not at least pass Standard 53 is useless to buy and leads to a false sense of safety.

Volatile organic chemicals (VOCs) are more common in our drinking water than most people would like to admit and dangerous to our health. The best test to determine if a filter is doing a good job in removing these harmful chemicals is to test for "chloroform." If a filter is able to remove this carcinogen, it's able to remove a host of other harmful chemicals.

Chloroform is one of the common chemicals found in water treated with chlorine. When chlorine is added to water it interacts with the natural organic matter found in water. The result is that harmful substances are created called trihalomethanes (THMs). Chloroform is one of these THMs. If a filter removes chloroform it will also remove the other THMs as well as numerous chemicals, herbicides and pesticides.



Page 2 of 2

Many filter companies, instead of having their filters tested for chloroform under Standard 53, elect to substitute other chemicals, like lindane or alachlor, that are much easier to remove, but will still qualify for most state regulation approvals. I find this attitude very misleading. A wise consumer should see how well a filter does against the most difficult, not the easiest chemical to remove.

The prevalence of lead in drinking water has become ubiquitous. Everyone knows how harmful this can be for young children and who knows what long term health effects it's having on adults. I'm glad to see your special blended Aquaspace media removes this too.

Your filters were tested for at least twice the rated gallons for the removal of VOCs and lead. This is part of Standard 53 and gives the consumer added protection in the event that they are tardy in replacing the filter at the stated interval.

The Aquaspace saver is rated for 700 gallons and was tested for 1,500 gallons for chloroform removal and 2000 gallons for lead removal. The results were 99% removal for its rated gallons - both for chloroform and lead. The H2OME is rated for 2,000 gallons and was tested for 4,000 gallons for chloroform removal and 5,000 gallons for lead removal. The results were 99% removal for chloroform and 98% removal for lead for its rated gallons.

It's extremely important to note that these excellent test results were achieved without taking out the healthy essential minerals, like calcium and magnesium. Significantly removing the harmful agents, keeping the beneficial minerals intact and doing this for a high volume of water is truly unique.

I find your test results to be outstanding and to my knowledge I don't know of any filter doing a better job. Perhaps this is due to the special, patented, blended media that constitutes the Aquaspace compound.

Sincerely,



Martin Fox  
Healthy Water Research

## Footnotes & Bibliography

1. Science News. Calcium, Chlorine and Heart Disease. August 13, 1983: 103.
2. U.S. Water News. EPA Seeking to Expand Number of Drinking Water Contaminants to 34. August, 1990: 8.
3. Andelman JB. Inhalation Exposure in the Home to Volatile Organic Contaminants of Drinking Water. *Science of the Total Environment* 1985;47:443-460.
4. Armstrong BK, McCall MG, Campbell NA, Masarei JRL. Water Sodium and Blood Pressure in Rural School Children. *Archives of Environmental Health* 1982;37(July/August):236-245.
5. Banik AE. The Choice is Clear. Raytown, MI: Acres USA, 1975:
6. Borgman RF, Lightsey SF. Effects of Synthesized Hard Water and of Cadmium in the Drinking Water Upon Lipid Metabolism and Cholelithiasis in Rabbits. *Am. J. of Veterinary Research* 1982;43(August):1432-1435.
7. Bragg PC, Bragg P. The Shocking Truth About Water: The Universal Fluid of Death. Santa Barbara, CA: Health Science, 1977:
8. Brown HS. Phone Conversation. July 16, 1986:
9. Brown HS, Bishop DR, Rowan CA. The Role of Skin Absorption as a Route of Exposure for Volatile Organic Compounds (VOCs) in Drinking Water. *American J. of Public Health* 1984;74(5):479-484.
10. Burk D. Fluoridation: A Burning Controversy. *Bestways*, April, 1982: 40-44.
11. Burk D. Personal Communication. May 13, 1983:
12. Burton AC, Cornhill F. Correlation of Cancer Death Rates with Altitude and with the Quality of Water Supply of 100 Largest Cities in the United States. *J. Toxicology and Environmental Health* 1977;3:465-478.
13. Burton AC, Cornhill JF, Canham B. Protection From Cancer by 'Silica' in the Water Supply of U. S. Cities. *J. Environmental Pathology and Toxicology* 1980;4:31-40.
14. Carlo GL, Mettlin CJ. Cancer Incidence and Trihalomethane Concentrations in a Public Water System. *Am. J. Public Health* 1980;70(May):523-525.
15. Comstock GW. Reviews and Commentary: Water Hardness and Cardiovascular Diseases. *Am. J. Epidemiology* 1979;110 (October): 375-400.
16. Conacher D. Troubled Waters on Tap: Organic Chemicals in Public Drinking Water Systems and the Failure of Regulation. Wash., D. C.: Center for Study of Responsive Law, 1988: 114.
17. Conforti PM, Kanarek MS, Jackson LA, Cooper RC, Murchio JC. Asbestos in Drinking Water and Cancer in the San Francisco Bay Area: 1969-1974 Incidence. *J. Chronic Diseases* 1981;34:211-224.
18. Donsbach KW, Walker M. Drinking Water. Huntington Beach, CA: Int'l Institute of Natural Health Sciences, 1981.
19. Elinder C, Stenstrom T, Piscator M, Linnman L, Jonsson L. Water Hardness in Relation to Cadmium Accumulation and Microscopic Signs of Cardiovascular Disease in Horses. *Archives of Environmental Health* 1980;35(March/April):81-84.
20. Epstein SS, Zavon M. Is There a Threshold for Cancer? In: Manners DX ed. Int'l Water Quality Symposium: Water, Its Effects on Life Quality. Wash, D. C.: Water Quality Research Council, 1974: 54-62.
21. Faust HS. Effects of Drinking Water and Total Sodium Intake on Blood Pressure. *Am. J. Clinical Nutrition* 1982;35(June):1459-1467.
22. Fry TC. The Great Water Controversy. Yorktown, TX: Life Science, N. D.:
23. Gottlieb MS, Carr JK, Morris DT. Cancer and Drinking Water in Louisiana: Colon and Rectum. *Int'l. J. Epidemiology* 1981;10 (June): 117-125.

24. Greathouse DG, Osborne RH. Preliminary Report on Nationwide Study of Drinking Water and Cardiovascular Diseases. *J. Environmental Pathology and Toxicology* 1980;3:65-76.
25. Hallenbeck WH, Brenniman GR, Anderson RJ. High Sodium in Drinking Water and Its Effect on Blood Pressure. *Am. J. Epidemiology* 1981;114:817-825.
26. Hoffman A, Valkenburg HA, Valkenburg GJ. Increased Blood Pressure in School Children Related to High Sodium. *J. of Epidemiology and Community Health* 1980;34(1980):179-181.
27. Ingois RS, Craft TF. Analytical Notes-Hard vs. Soft-Water Effects on the Transfer of Metallic Ions from Intestine. *J. Am. Water Works Assoc.* 1976;68(April):209-210.
28. Jansson B. Seneca County, New York: An Area With Low Cancer Mortality Rates. *Cancer* 1981;48:2542-2546.
29. Lee G. Reports Say 53 Million-Plus Drink Contaminated Water, month date, year: page.
30. Leoni V, Fabiani L, Ticchiarelli L. Water Hardness and Cardiovascular Mortality Rate in Abruzzo, Italy. *Archives of Environmental Health* 1985;40:274-278.
31. Maugh TH. New Study Links Chlorination and Cancer. *Science* 1983;211(February 13):694.
32. National Research Council. *Drinking Water and Health*. Vol. 1:477. Wash., D. C.: National Academic Press, 1977:
33. Neal JB, Neal M. Effect of Hard Water and  $MgSO_4$  on Rabbit Atherosclerosis. *Archives of Pathology* 1962;73(May):58-61.
34. Ohanian EV, Cirolla DM. Sodium in Drinking Water as an Etiological Factor in Hypertension. 1983: 28-36.
35. Page T, Harris RH, Epstein SS. Drinking Water and Cancer Morality in Louisiana. *Science* 1976;193:55-57.
36. Passwater R. *Supernutrition for Healthy Hearts*. NY:Jove, 1978:
37. Perry HM, Perry EF, Erlanger MW. Possible Influence of Heavy Metals in Cardiovascular Disease: Introduction and Overview. *J. Environmental Pathology and Toxicology* 1980;3:195-203.
38. Price JM. *Coronaries/Cholesterol/Chlorine*. NY: Pyramid, 1969:
39. Puddu V, Signoretti P. Drinking Water and Cardiovascular Disease. *Am. Heart J.* 1980;99(April):539-540.
40. Robertson JS, Slaterry JA, Parker V. Water Sodium, Hypertension and Mortality. *Community Medicine* 1979;1:295-300.
41. Sauer HA. Relationship of Water to Risk of Dying. In: Manners DX ed. *Int'l Water Quality Symp: Water, Its Effects on Life Quality*. Wash., D. C.: Water Quality Research Council, 1974: 76-79.
42. Schroeder HA. Relation Between Mortality from Cardiovascular Disease and Treated Water Supplies. *J. Am. Medical Assoc.* 1960;(April 23):98-104.
43. Selikoff IJ. Asbestos in Water. In: Manners DX ed. *Int'l Water Quality Symposium: Water, Its Effects on Life Quality*. Wash., D. C.: Water Quality Research Council, 1974:
44. Shaper AG, Pocock SJ, Walker M, Cohen NM, Wade CJ, Thomson AG. British Regional Heart Study: Cardiovascular Risk Factors in Middle-aged Men in 24 Towns. *British Medical J.* 1981;283(July):179-186.
45. Sharrett AR, Heyden S, Masironi R, Greathouse D, Shaper A, Hewitt D. Panel Discussion: The Relationship of Hard Water and Soft Water in CVD and Health. *J. Environmental Pathology and Toxicology* 1980;4:113-141.
46. Sigurdson EE, Levy BS, McHugh R, Michienzi LJ, Jagger H, Pearson J. Cancer Morbidity Investigations: Lessons from the Duluth Study of Possible Effects of Asbestos in Drinking Water. *Environmental Research* 1981;25:50-61.
47. Sorenson J. Personal Communication. November 3, 1983:

48. Studlick J, Bain R. Bottled Water: Expensive Ground Water. July, 1980: 75-79.
49. Tuthill RW, Calabrese EJ. Elevated Sodium Levels in the Public Drinking Water as a Contributor to Elevated Blood Pressure Levels in the Community. *Archives of Environmental Health* 1979;34(July/August):197-203.
50. Waldbott GL, Burgstahler AW, McKinney HL. Fluoridation: The Great Dilemma . Lawrence, KS: Coronado Press, 1978:
51. Walker N. Water Can Undermine Your Health . Phoenix, AZ: Woodside, 1974:
52. Wilkins JR, Comstock GW. Source of Drinking Water at Home and Site-Specific Cancer Incidence in Washington County, Maryland. *Am. J. Epidemiology* 1981;114:178-190.
53. Wilkins JR, Reiches NA, Kruse CW. Organic Chemical Contaminants in Drinking Water and Cancer. *Am. J. Epidemiology* 1979;114:178-190.
54. Yiamouyiannis JA. Everything You Wanted to Know About Fluoridation-But Were Afraid to Ask: A Discovery Deposition . Monrovia, CA: National Health Federation, 1977:
55. Yiamouyiannis JA. Fluoride: The Aging Factor . Delaware, OH: Health Action Press, 1983:
56. Zeighe EA. Drinking Water Inorganics and Cardiovascular Disease: A Case-Control Study Among Wisconsin Farmers. In: Calabrese EJ, Tuthill RW, Condie L ed. *Inorganics in Drinking Water and Cardiovascular Disease*. Princeton, NJ: 1985:
57. Batmanghelidj F. Your Body's Many Cries for Water. Falls Church, VA; Global Health Solutions, 1992:



*Here's what reviewers are saying about*

## HEALTHY WATER FOR A LONGER LIFE

*"This is truly a fabulous, as well as informative work."*

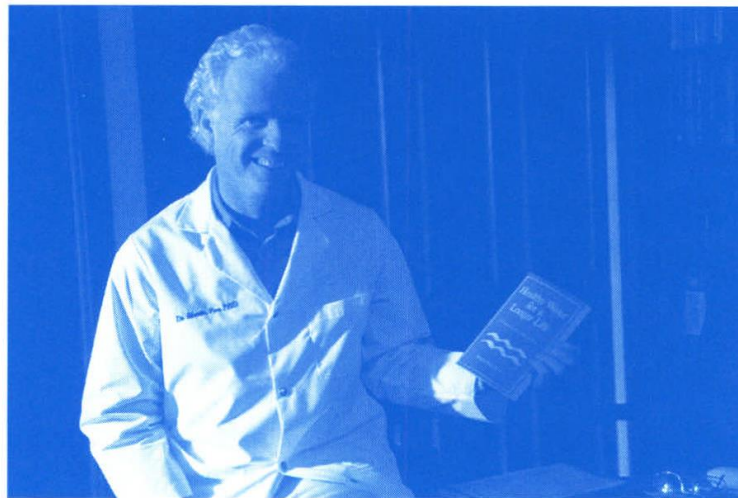
Multi-Pure Drinking Water Systems

*"This is a researched and well documented informational book. Long overdue, it tells the story of how bad our drinking water is to our health. Virtually all other books on drinking water have been based on opinions and Dr. Fox has done an excellent job of 'telling it like it is' in regard to our health."*

Clinical Nutritionists Newsletter

*"Here, at last, is a comprehensive book that cuts through the hearsay in answering intelligently the water question...This is a 'must read' for anyone who cares what he is putting into his body."*

June Peterson, Health World



**Dr. Martin Fox**

Martin Fox, PhD, is a nutritionist and noted water expert. Dr. Fox has been regarded as a leader in water research for over 15 years. He is the author of [Healthy Water For a Longer Life](#).

### Healthy Water Research

All rights reserved. No part of this book may be reproduced or transmitted in any form, electronic or mechanical, including photocopying, recording, or by any information storage and retrieval system, except by a reviewer, without written permission from the author.



## ABOUT THIS BOOKLET

---

This booklet has been written by a water expert and nutritionist, Martin Fox, Ph.D., a specialist in his field. You will learn:

- WATER: MAY BE YOUR MISSING INGREDIENT TO A HEALTHIER AND LONGER LIFE.
- HOW THE WATER YOU DRINK CAN HELP PREVENT HEART DISEASE
- WHICH MINERALS IN DRINKING WATER HELP PREVENT CANCER
- WHY CHLORINATION IS NOT SAFE
- WHY DISTILLED WATER IS UNHEALTHY
- CARBON FILTERS & BOTTLED WATER
- AND MUCH MORE .....



*Healthy Water Research*