

The Importance of Minerals in Drinking Water

What is pure water?

Pure is a term which means "free from tainting or polluting matter". Therefore, pure drinking water is fresh water without pollutants and not processed water where all your naturally occurring mineral constituents have been artificially extracted.

What are Total Dissolved Solids (TDS)?

Total dissolved solids (TDS) are a measure of minerals/ trace elements and pollution, not just pollution. A complex mix of naturally occurring elements is present in our water and man has evolved with these elements present and derives benefit from them.

What are the consequences of removing naturally occurring minerals from our drinking water?

We should not underestimate the effects of over-processing the natural resources on which we rely for survival as shown by various recent scares in the food industry. Humans are not designed to live on laboratory pure water. To get healthy water we need to look at both eliminating toxins and retaining healthful minerals (for example, using the 2000 Filtration System).

Your water requirements under normal conditions in a moderate climate:

Adults.....between 35 and 50g of water per kg body weight
Infants.....between 1 00g and 1 50g per kg body weight. (1)

As you drink a reasonable volume of water the concentration of minerals in solution need not be high. There is also the possibility that these minerals work together to enhance their bioavailability and effect on your health.

Assuming your rate of water consumption is 2 litres per day, the **proportion of dietary calcium provided by the water in a study of 21 major European cities was found to be 17%**. If you drink de-mineralised water of any form for any length of time, for instance RO or distilled, you should seek professional advice to ensure no deficiency results. The World Health Organisation (WHO) suggests adding calcium and magnesium to de-mineralised water to confer the health benefits of these two minerals.

In Canada, Neri & Johansen (2) found that **drinking water from areas of high magnesium concentration may contribute up to 20% of the total daily intake**. Again, the WHO recommends reconstitution of de-mineralised water with magnesium. Here also, we recommend you should get professional advice for long term consumption of de-mineralised water. It has been calculated that approximately 22mg per day of zinc is needed to meet the adult requirement if the availability was 10%. Approximately 50% of this daily requirement can be derived from drinking water and it is also possible that the uptake of zinc from water is greater than that from food, though further investigation of this possibility is necessary.

Chromium in water is an essential element (3). It plays a vital role in glucose metabolism through its influence on glucose tolerance. **When you drink water, chromium is absorbed at approximately 5% of the dose as compared to food which is 0.5-1%**. Trivalent chromium is the active ingredient of the glucose tolerance factor and studies in the USA (4) and Jordan (5) all suggest chromium in drinking water is essential for glucose tolerance. In Finland (6) a study showed an association between the chromium content of drinking water and cardiovascular disease.

Your dietary requirement for chromium to compensate for urinary loss is approximately 22-500µg. Drinking water in Europe contains approximately 2µg/l (6) Because of reports associating low chromium levels in drinking water with human pathology you should get professional advice when using a filtration system which removes minerals.



You also need to take care with your diet when using de-mineralised water in both the long and short term as there may be changes in the mineral content of foods during their preparation and cooking, especially when you boil them in waters of very low mineral content.

Which filtration systems leave healthy minerals in water?

The choice of which filtration system is best for you is a matter of personal preference. Many of the nutritionists and practitioners who recommend our systems would recommend the RO unit, 2000 Filtration System, Whole House Units and Shower Filters etc... Distiller units are less popular but probably offer better "purity" than RO, though they tend to be more expensive. Double pass RO systems are available for where filtration above standard RO is required.

Reverse Osmosis and Distillation remove around 98% of Total Dissolve Solids and therefore leave water effectively de-mineralised.

The 2000 Filtration System, uses two mixed media filter candles, and fits under your sink, removes toxins whilst leaving healthful minerals intact. We also supply systems for your whole house which will remove toxins whilst retaining mineral content. Full details are available when you visit our web site on www.itdoesthejob.com or call 020 8539 4707 for further details to be sent to you through the post.

See the following products in your information leaflets:

 2000 Drinking Water Filtration System

 Oasis Whole House Filtration System

 Two Cartridge Gravity System

 Four Cartridge Gravity System

Is there published evidence to support retaining minerals in water?

Yes, hundreds of peer reviewed studies exist. The main points are listed below.

In a study by the Department of Epidemiology and Biostatistics, McGill University, Montreal, Quebec, Canada entitled "Comparison of the mineral content of tap water and bottled waters" the conclusion was that "Drinking water sources available to North Americans may contain high levels of Ca^{2+} , Mg^{2+} , and Na^+ and may provide clinically important portions of the recommended dietary intake of these minerals. Physicians should encourage patients to check the mineral content of their drinking water, whether tap or bottled, and choose water most appropriate for their needs". This shows not only that water is "clinically significant" but that physicians should recommend their patients to drink water with minerals in it.

In the "Relationship between mortality from cardiovascular disease (heart attacks, strokes, high blood pressure etc.) and treated water supplies" by Schroeder, he looked at 163 of the largest cities in the USA and analysed the water for 21 constituents and correlated this to heart disease. His conclusion was that "some factor either present in hard water or missing on entering into soft water is associated with higher death rates from degenerative cardiovascular disease" in the first major study on drinking water and heart disease carried out in 1960.

Since this study, nearly one hundred other studies examining the relationship between cardiovascular risk and water hardness have been carried out in large population areas, mainly in the states and provinces of the USA, and these have supported the possibility that increased water hardness is associated with a decreased risk of heart attacks and strokes.



The association between water hardness and cardiovascular mortality was reaffirmed from the 1960 study by a study entitled "Studies of water quality and cardiovascular disease in the UK" by Pocock SJ, Shaper AG & Packham RF, (Sci Total Environ 1981 Apr;18:25-34) showing towns with soft water had higher death rates than towns with hard water. This study was statistically significant for both heart disease and stroke.

In a study entitled "Mineral water as a source of dietary calcium: acute effects on parathyroid (PTH) function and bone resorption in young men" (Am J Clin Nutr 2000 Apr;71(4):999-1002) showed that one oral intake of water containing a very moderate dose of calcium (172mg) acutely inhibited 1 PTH secretion and bone resorption. Therefore, **water containing its natural minerals can help reduce the risk of osteoporosis.**

It is not known exactly which elements (though magnesium is a strong possibility), or combination of elements, present in fresh water confer the demonstrable health benefits and, to some extent, is not really relevant, as there is no need to split water into individual components for consumption but to drink it in its whole, mineralised state. Pollutants need to be removed but moderate TDS is associated with health benefits in the research on heart disease and cancer and, therefore, water which is bereft of minerals, such as calcium & magnesium, is not healthy to drink as, in nature, we are designed to live on fresh water which has a natural mineral content.

Dr Joshua Barzilay M.D. et al stated "The chemical form of magnesium that appears in water is more readily absorbed than that derived from food" in his paper entitled "The Water We Drink" (Rutgers University Press, 1999). He further stated that water may play an important role for replenishment of magnesium in people with high blood pressure who are on diuretics as they lose excessive amounts of magnesium in their urine.

Dr John Sorenson, a medical chemist, stated that "minerals in drinking water are well absorbed". He 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. The British Medical Association (BMA) through its "Complete Family Health Guide" lists hard water as a good source of calcium and magnesium.

In the World Health Organisation (WHO) "Guidelines for drinking-water quality" Second Edition, Volume 2, Health criteria and other supporting information, Geneva 1996, 237-241, water hardness is considered and they state "There does not appear to be any convincing evidence that water hardness causes adverse health effects. In contrast, the results of a number of epidemiological studies have suggested that water hardness may protect against disease."

The WHO also states that "water with a hardness less than 100mg/litre has a greater tendency to cause corrosion of pipes, resulting in the presence of certain heavy metals, such as cadmium, copper, lead and zinc, in drinking water". We have also asked some experts in the medical and nutritional fields what their views are concerning minerals in water and they support the view, as does the British Medical Association (BMA), that water is a good source for minerals, especially calcium and magnesium.

Dr Joshua Barzilay M.D. et al, have also stated "A mechanism by which water derived calcium could reduce heart attacks and strokes would be its effects on high blood pressure". **Studies have shown that a low level of calcium intake is associated with high blood pressure.** Conversely, dietary calcium has been shown to lower blood pressure in individuals with high blood pressure.

It is possible that what is being measured as "water hardness" in studies is actually a surrogate for something else that was not measured. For example, calcium and magnesium frequently coexist in water and it is possible that the imputed effect from magnesium is actually due to calcium. There is no measurement for mineral synergy in water.



The formation of kidney stones is often thought to be worse in areas where calcium in drinking water is high. However, this does not seem to be the case! In studies in the USA with hard water, there is lower incidence of kidney stones than in areas where calcium concentrations in water are low. This finding has been corroborated in Japan and Scandinavia, amongst others.

There is no explanation for this at present but various possibilities exist:

- ✓ A high amount of water derived calcium could stimulate the intestines to excrete more calcium than the kidneys, thereby taking the burden off the kidneys.
- ✓ There may be a substance in water other than calcium, that has an effect on the kidneys whereby less calcium is excreted in the urine.

Dr Barzilay M.D, says that the best advice to someone with kidney stones is to drink plenty of water, up to 2 litres, every day so as to maintain a dilute urine and not to worry about the mineral content of the water.

Summary

The position of itdoesthejob.com is that, on balance of evidence, minerals in water are beneficial to your health. If you wish to use a water purification system whereby minerals are removed we advise you to consult your health practitioner for advice before making the choice.

If you decide, at a later date, to change from one system to another we will only charge you for the difference in price between the unit you have and the one you wish to change to. We have a full range of different types of water purification units and are happy to provide the system which best suits your individual needs

References

- 1.Lafontaine, A. Introductory report. In: Hardness of drinking water and public health. Oxford, Pergamon Press, 1976, pp.27-58
- 2.Neri, L.C. & Johansen, H.L. Water Hardness and cardiovascular mortality.
- 3.Annals of the New York Academy of Sciences, 304: 203-219 (1978)
- 4.WHO Technical Report Series, No.532, 1973 (Trace elements in human
- 5.nutrition:report of a WHO Expert Committee)
- 6.National Academy of Sciences. Geochemistry and the environment. Vol 1. The relation of selected trace elements to disease. Washington, 1974,pp. 43-56
- 7.Hopkins, L.L. et al. Improvement of impaired carbohydrate metabolism by CrIII in malnourished children. American Journal of Clinical Nutrition, 21:203-211 (1968).
- 8.Punsar, S et al. Coronary heart disease and drinking water. Journal of chronic diseases, 28: 259-287 (1975)
- 9.Zoeteman, B.C.J. & Brinkman, F.J.J. Human intake of minerals from drinking water in European Communities. In: Hardness of drinking water and public health. Oxford, Pergamon Press, 1976, pp. 173-211.
- 10.Health Effects of the Removal of Substances Occurring Naturally in Drinking Water, with Special Reference to Demineralized and Desalinated water. Report on a Working Group, WHO 1978, Copenhagen.