

# Water



## The flow of life

Water is vital for good health, a fact we all know well. It is the body's main chemical constituent and makes up about 60% of your body weight and every body system depends on it.<sup>1</sup>

It has numerous functions in the body such as flushing out toxins, regulating temperature, protecting organs and tissues, dissolving minerals and other nutrients to make them accessible and carrying nutrients and oxygen into the cells.<sup>1</sup> Vital to each and every one of us, it goes without saying that good hydration is essential. However, not all waters are equal and so how do we know that we are getting the best for our health for something we consume and are exposed to so much of?

## Tap water's ingredients

As "clean" tap water is provided free into our homes, it seems the most obvious choice but clean water certainly doesn't mean pure water.

Many toxic chemicals are added to tap water before it arrives with us in this "clean" state. Disinfection of drinking water through processes such as filtration and chlorination was one of the major public health achievements of the late 1800s and early 1900s, however in 1974, chloroform and other chlorination by-products (CBPs) were first found in drinking water.<sup>2</sup> There is growing epidemiological evidence of these CBPs having a causal role in cancer.<sup>1</sup>

Since then, hundreds of other disinfection by-products (DBPs) from the use of various disinfectants such as chlorine, ozone, chlorine dioxide or chloramines have been identified. These include haloacetic acids, haloacetonitriles<sup>3</sup>, halonitromethanes and the list goes on. Some of these DBPs in drinking water have been shown to have the toxicological characteristics of human carcinogens such as bromate, formaldehyde and acetaldehyde. Various others have been highlighted as genotoxic.<sup>4</sup>

DBPs are not the only concern. Other contaminants are also present in our drinking water such as herbicides affecting hormone levels<sup>5</sup>, persistent antibiotics<sup>6</sup>, general pharmaceuticals<sup>7</sup> and some water-borne pathogens which may affect those with long-term immunosuppression<sup>8</sup>.

And this is all before we mention the controversial debate around the fluoridation of water. Fluorine and chlorine are both within the halogen group on the periodic table and both electronegative. In fact, fluorine is the most electronegative of all the elements with an oxidation number of -1 meaning that it has a great potential for oxidative damage.<sup>9</sup> Some studies report fluoridation not to be linked to cancer<sup>10</sup>, yet others state that fluoride consumption increases the general cancer death rate.<sup>11</sup>

It seems that "clean" tap water isn't so clean after all and given all of the aforementioned uncertainty, it seems wise to look for purer sources of water.

## The best choices of water

Simple steps can be taken to reduce DBP exposure and in one study looking at the effects of common household methods for processing tap water, it found that by simply kettle boiling water, it reduced certain DBPs by 85.8% and jug filtering reduced their levels by 92.6%. For jug filters we recommend selecting ones that are Bisphenol-A (BPA) free as this may leach from the plastic into the water.<sup>12</sup> Two good options are Bobble jugs like the one shown here or Dream Tree Pitchers which not only filters the water, but also adds minerals to it. For a complete home water filtration system, these are available and can be fitted onto your mains which filters all water coming into the home.



Water is big business and with a myriad of advertising for various bottled waters how do we know what to choose when out of the home? When it comes to bottled mineral waters, always ensure to choose those in glass bottles rather than plastics, again to avoid BPA potentially leaching into the water.



Water distillation is also an option and we recommend the Waterwise 4000 which is shown here for completely purified water.

However, as well as removing all of the contaminants, it also removes the water's energetic content. We therefore recommend that the water is then optimized, that is re-energised and oxygenated to improve bioavailability. We recommend the Nikken Pi-Mag Optimiser for this. It can

then be stored in dark glass bottles for drinking. When taking water with you, BPA free stainless steel containers are a good idea such as those available from One Green Bottle.



Finally, don't forget to consider when else you may be exposed to DBPs from tap water such as when bathing, swimming or showering and breathing in the steam. Shower filters are also available to help reduce overall exposure to DBPs.

<sup>1</sup> MFMR (2011) *Water: how much should you drink everyday?* Available at: <http://www.mayoclinic.com/health/water/NU00283>. (Accessed: 12 November 2011)

<sup>2</sup> Wigle DT (1998) Safe drinking water: a public health challenge. *Chronic Diseases in Canada*. 19(3) pp. 103-7

<sup>3</sup> Moudgal CJ, Lipscomb JC, Bruce RM (2000) Potential health effects of drinking water disinfection by-products using quantitative structure toxicity relationship. *Toxicology*. 147(2) pp. 109-31

<sup>4</sup> Richardson SD, Plewa MJ, Wagner ED, Schoeny R, Demarini DM (2007) Occurrence, genotoxicity, and carcinogenicity of regulated and emerging disinfection by-products in drinking water: a review and roadmap for research. *Mutation research*. 636(1-3) Epub.

<sup>5</sup> Cragin LA, Kesner JS, Bachand AM, Barr DB, Meadows JW, Krieg EF, Reif JS (2011) Menstrual cycle characteristics and reproductive hormone levels in women exposed to atrazine in drinking water. *Environmental research*. Epub ahead of print.

<sup>6</sup> Le-Minh N, Khan SJ, Drewes JE, Stuetz RM (2010) Fate of antibiotics during municipal water recycling treatment processes. *Water research*. 44(15) pp 4295-323

<sup>7</sup> WHO (2011) *Pharmaceuticals in drinking water*. Available at: [http://www.who.int/water\\_sanitation\\_health/publications/2011/pharmaceuticals\\_20110601.pdf](http://www.who.int/water_sanitation_health/publications/2011/pharmaceuticals_20110601.pdf). (Accessed: 12 November 2012)

<sup>8</sup> Von Baum H, Bommer M, Forke A, Holz J, Frenz P, Wellinghausen N (2010) Is domestic tap water a risk for infections in neutropenic patients? *Infection*. 38(3) pp. 181-6

<sup>9</sup> Royal Society of Chemistry (2011) *Visual elements: group 17 – the halogens*. Available at: [http://www.rsc.org/chemsoc/visualelements/pages/data/intro\\_groupvii\\_data.html](http://www.rsc.org/chemsoc/visualelements/pages/data/intro_groupvii_data.html). (Accessed: 13 November 2011)

<sup>10</sup> NCI (2005) *Fluoridated water: questions and answers*. Available at: <http://www.cancer.gov/cancertopics/factsheet/Risk/fluoridated-water#r4>. (Accessed: 12 November 2012)

<sup>11</sup> Gupta SK, Gupta RC, Gupta AB (2009) Is there a need of extra fluoride in children? *Indian paediatrics*. 46(9) pp. 755-9

<sup>12</sup> Cooper JE, Kendig EL, Belcher SM (2011) Assessment of bisphenol A released from reusable plastic, aluminium and stainless steel water bottles. *Chemosphere*. 85(6) pp. 943-7