

Water - The essential nutrient

Water is *the* essential nutrient as life cannot exist without this substance. Human beings can survive only a few days without water whilst they can survive much longer without food.

Water is the largest single component of the body and makes up between 45-75% of total body mass, depending upon factors such as age, gender, and the proportion of adipose (fat) tissue and lean muscle tissue. In lean adult males water contributes about 60% of total body mass, whilst for lean adult women water is responsible for about 55% of total body mass. Water in the body is the fluid in which all life processes occur.

The functions of water in the body

Water has many important functions in the body, including:

- Acts as a lubricant and a 'cushion' around joints, inside the eyes, around the spinal cord, and around the foetus
- Acts as the solvent in which other substances are dissolved (including minerals, amino acids, vitamins, glucose etc)
- Maintains blood volume and therefore, blood pressure
- Maintains the structure of large molecules such as proteins and glycogen
- Participates in metabolic reactions
- Regulates and maintains body temperature
- Transports nutrients and waste products around the body

Water balance and recommended intake

To perform and support the functions outlined above, the body must maintain a state of water balance, this means that the body actively regulates both the intake and excretion of water as needed in response to any changes in need or body composition.

Water loss and gain

It is important to acknowledge that water intake (gain) and water (loss) excretion needs to remain constant. Let's review some of the ways we gain and lose water. Please note that the approximate water loss and gain is an **equal** amount - 2,500 mL (or 2.5 litres).

Water gain

Water may be obtained by the body either by ingestion, or through metabolic synthesis. The main sources of water for the body are ingested liquids (provides about 1600 mL per day) and water-containing foods (about 700 mL) such as beverages, fruits, vegetables, meats, dairy products, and bread. Water may also be generated via certain chemical reactions during metabolism (about 200 mL). Together ingested water and metabolic water contributes to a total daily water gain of about 2500 mL (or 2.5 litres).

Water loss

Water may be lost via the following ways:

- Urine – Approximately 1500 mL is lost in urine each day.
This amount is regulated by the kidneys and changes according to fluid intake.
- Skin – Approximately 600 mL is lost from the skin via evaporation.
- Lungs - Approximately 300 mL is lost as water vapour during exhalation.
- Faeces - Approximately 100 mL is lost from the gastrointestinal tract in faeces.
- Other – Individual circumstances such as menstrual blood, diarrhoea and heavy sweating will cause greater water loss.

Thirst and dehydration

Thirst, or the desire to drink, is initiated when changes are detected by the mouth, the nerves, and a part of the brain called the hypothalamus. When the amount of fluid in the blood falls (and blood becomes more concentrated), the hypothalamus instructs us to drink. It is important that the desire to drink is not ignored and that fluids are promptly consumed, particularly in those that are most at risk of dehydration such as athletes, children and the elderly.

Interestingly, what you may consider to be a sense of hunger may actually be thirst. Our brains tend to confuse the signals quite easily so before you grab a snack, have a glass or two of clean, pure water and then reassess your sense of hunger.

Dehydration may occur due to inadequate intake of water, or from excessive water loss. Symptoms may include weakness, dry mouth, reduced production of urine, concentrated urine, poor concentration, exhaustion, delirium, and if not corrected, death. One of the most common symptoms of dehydration are headaches. In our busy schedules drinking enough water is easily forgotten. Next time you have a headache, drink a glass or two of water. You should feel relief within 20 minutes.

Recommended water intake

An individual's water requirements vary depending upon factors such as level of activity, humidity, temperature, and diet. It is estimated that the average adult requires approximately 2-3 litres of water per day.

Drinking adequate water helps us to produce urine with a low concentration of dissolved substances, and reduces the time that urine spends in the bladder. These factors are associated with a decreased risk of cancer of the bladder.

Sources of water

The best source of this water are water itself however, water may also be supplied by other beverages including fruit juices. Other beverages also provide water, however it is important to assess them in other ways to determine if they are good choices. For example, soft drinks may be high in refined sugar or artificial sweeteners. Alcohol, tea, coffee, and other caffeinated beverages have a diuretic action (this means that they cause us to manufacture more urine) – these drinks will provide us with water, but we would not retain as much of it as we would when drinking pure water, due to this diuretic action.

Potential problems with the water supply

There is considerable concern about the risk of the water we drink being contaminated by various substances and organisms. There are a number of reasons why the water that comes out of your tap may not be as clean and safe as you might expect, these include:

- Water from dams, rivers, bore, or tanks may be contaminated by microbial or chemical pollutants.
- Treatment plants may fail in their job to clean the water and remove dangerous chemicals or organisms, or may inadequately monitor the levels of certain substances in water.
- Treatment plants add chemicals to water that are designed to improve its quality and safety, however there are questions regarding the safety of some of these substances.
- The pipes that water travels through on the way to your house or once in your house may be contaminated, made of dangerous metals, or in poor condition.

Contamination

During collection in dams and tanks water may be contaminated by fuel emissions, industrial waste, human waste, chemicals, sewage, agricultural waste (including pesticides, fertilisers and animal waste), chemical spills, micro-organisms or drug residues.

Water treatment and processing

Most surface or groundwater needs to be treated in some way before it is suitable for human consumption. This usually involves the addition of chemicals to the water that destroy micro-organisms, or improve its look, smell or taste. Common added chemicals include Chlorine and Chloramine, Aluminium and Fluoride.

Water purification and bottled water

Water purification consists of many different alternatives. Let's review a few of the main options available. Please remember that all have their pros and cons.

Water filters

There are several basic filters available. Deciding which type to buy will depend upon what you need it to remove and how much you can afford to spend. Many filters contain a combination of filter types. The basic types available include:

Carbon filters

Contain activated carbon (charcoal) and are relatively cheap. The filter may require frequent replacement and the expense of this must be considered.

Will remove

Chlorine, trihalomethanes, colour, odour, and noticeable taste

Cannot remove

Metals or Fluoride

Ion exchange filters

Consist of resins that attract positively and/or negatively charged chemicals. These filters do not work very effectively if there are lots of dissolved solids. Filters need to be replaced regularly.

Will remove

Some metals or positively charged chemicals such as fluoride or nitrates

Cannot remove

Organic chemicals, pesticides, or Chlorine

Reverse Osmosis

This method passes the water through a thin membrane under high pressure.. These systems are very slow, waste large amounts of water (for every litre filtered many more go down the drain), and are the most expensive to purchase, run and maintain.

Will remove

Most contaminants and minerals (good and bad ones)

Distillation

This method works by boiling the water, condensing the steam which should leave the impurities behind to enable you to end up with pure water. Distillation can be expensive to purchase and run (uses lots of electricity).

Will remove

Most contaminants

Cannot remove

All volatile organic compounds such as trihalomethanes

Bottled water

Purchasing bottled water is not as easy as it looks. False or misleading advertising can trick you into purchasing treated water and not crystal clear, pure, untouched mountain spring water. Let's review the types of bottled water available in Australia.

Purification or treatment of bottled water

Filtration

Sieves out particles

Ultraviolet (UV)

Uses UV light to kill micro-organisms

Ozone

Uses ozone as a powerful disinfectant to kill bacteria, and have an effect on taste and colour. Process has been shown to generate bromate, a potentially harmful substance.

Types of bottled water

Mineral and spring water

These names are used interchangeably to refer to water that has come from underground. It contains dissolved minerals in its natural state.

This is the best type of water available and can be used as a therapeutic agent as it will supplement minerals.

Table or purified water

Tap water that has been purified in some way

Carbonated water, soda water or mineralised water

Tap water with carbonation (bubbles), salts or minerals added

End note

As you have read, water is crucial for your health and the quality of the water will undoubtedly affect its health potential properties. Most importantly, ensure that your water intake is optimal and aim to purchase a water filter or bottled mineral or spring water for added health benefits.

© Leah Hechtman, 2009