TOI TE ORA
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Heat

Climate Change is a health issue

The human body is adapted to survive across a range of weather conditions, including humidity and temperature. However, there are limits to this and our ability to cope at the extreme ends of weather varies from person to person. Acclimatisation to different weather conditions is real, but it can take months to really adapt to the point where you're comfortable with the climate of a new place. There's no longer any doubt that the global climate is changing, with one consequence being more extreme weather events. New Zealand is having yet another hot summer and there are plenty of stories of people struggling with a level of heat that we're not used to. As the weather gets hotter we perspire more as part of the body's attempt to stop us over-heating. But this loss of fluid must be replaced; otherwise we don't function as well. Our body works extremely well to maintain a normal hydration balance as this is essential for the everyday running of many of our organs. Dehydration is a very real risk in hot weather, especially for the elderly, adults with some medical conditions, young babies, and particularly when it arrives as an unexpected heat wave. A person with heart failure is usually told to limit how much they drink each day so that their heart does not get overworked. However, advice on just how much to drink must take the weather, especially temperature, into account.

A person's normal body temperature is 37 degrees Celsius, plus or minus no more than 1 degree, depending on the time of the day, and factors such as his or her age. Given humans live in climates that vary from -40 to hotter than +40 degrees the body's ability to keep our internal temperature so close to 37 degrees is amazing. Water is the principal buffer or insulator that helps with this temperature regulation and the body has some fascinating ways of using water to regulate our temperature.

Water makes up about 75% of a baby's body. This proportion reduces to less than 60% for adult males and a little over 50% for females. Most of this water is bound up inside the cells (ie intracellular) of our various organs with less than a third found in-between cells (ie extracellular). Water is the primary building block of all cells. It's needed to metabolize proteins and carbohydrates which are used as food. It is the primary component of saliva, used to digest carbohydrates and aid in swallowing food. It helps lubricate joints. It insulates all of our organs, especially the vital ones such as the brain and spinal cord. Water flushes waste from the body via urine. It is also the principal solvent in the body. It dissolves minerals, soluble vitamins, and certain nutrients. And, of course, water carries oxygen and nutrients to cells.

Associated with the body's ability to keep our temperature close to 37 degrees is its capacity to regulate our water intake and losses. Water intake comes via what we eat and drink. Water loss is largely in urine and what we lose through our skin and in our breath. It's pretty easy to see how much water or fluid is in drinks but what's less obvious is the amount of water in some foods. Three quarters of a banana is water, with an even greater proportion for many other fruit. Not all drinks are as useful for serving our need for water. Alcohol and caffeine are diuretics, meaning

they stimulate the kidneys to leak water which then ends up in urine. So alcohol and so-called energy drinks high in caffeine can actually result in a net loss of water. Our exhaled breath contains water too. That's why any mask you wear over your mouth soon becomes wet.

A healthy kidney works extremely well at filtering out many waste products and retaining water. We don't have much control over the moisture in the air that breathe out so we end up relying heavily on our skin to control a fair portion of our water and temperature balance. When we feel cold the blood vessels in our skin contract and our skin between hair follicles tightens resulting in "goose bumps". This helps to conserve heat. When we start getting too hot the body adjusts by opening up the small blood vessels just under the surface of the skin so that we literally lose heat through the surface of our skin. Plus we start to perspire and sweat which results in a film of moisture on the surface of our skin. Heat is required to evaporate the perspired moisture and so this process helps to cool us down sort of like a radiator in reverse. But while it supports to keep our temperature around 37 degrees it also means we lose water and this needs to be replaced. Once we've lost about 1% of body fluid (ie 800 mls for an 80 kg adult male or just 200 mls for a 20 kg young child) our brain doesn't work as well and our co-ordination begins to be affected. Once we've lost 2% of body fluids we get really thirsty.

As we get older our body's fluid reserve becomes smaller, our ability to conserve water is reduced and our sense of thirst doesn't work as well. These problems are made worse by chronic illnesses such as diabetes and dementia, and by the use of certain medications. Older adults may also have mobility problems that limit their physical ability to get water for themselves. Older people, especially those over 80, are particularly at risk of becoming dangerously dehydrated during spells of extremely hot weather.

The best advice to avoid getting dehydrated on hot days includes:

- Stay out of the sun by staying indoors when you can, or stay in the shade if outside.
- Drink plenty of water. Add a slice of lemon, lime or mint for extra flavour.
- Keep your house cool. Open windows or use air conditioning or fans if you can.
- Eat frozen fruits as a cool snack.
- Stay cool. If exercising or doing outdoor activities choose the early morning or later in the evening when it's cooler.
- Check on your neighbours, especially the elderly.
- Remember, children, older people or those with health concerns may find it more difficult to cope with the heat.

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