

SKILLS & ADVICE



INSIDE THIS MONTH'S SKILLS SECTION:

42 KNOWLEDGE HYDRATION: THE TRUTH

Alun Richardson takes a look at the accepted theories on hydration and comes to some surprising conclusions

44 MASTERCLASS ALPINE SKILLS, PART 1

With summer ahead of us, Alun Richardson begins a look at the basic techniques and knowledge you need for a classic alpine mountaineering

52 TREKKING BASICS PART 3: THE KIT YOU NEED

Will Legon discusses what sort of kit you need when going on a supported trek and, just as importantly, how you

OUR EXPERTS

The Mountain Skills team



**PAUL LEWIS**  
Paul holds the Mountaineering Instructor's Certificate (MIC) and is boss of mountain training specialists Peak Mountaineering (www.peakmountaineering.com).



**WILL LEGON**  
Will is a Mountain Leader, climbing instructor, first aid trainer and expedition leader with his own company, Will4Adventure (www.will4adventure.com).



**ALUN RICHARDSON**  
A British Mountain Guide, Alun has led treks and expeditions around the world for the last 30 years. He has also published a highly-regarded book on mountaineering on A&C Black.

THE KNOWLEDGE

# Dehydration: the truth

'Stay hydrated' is drummed into all of us when in the mountains, but **Alun Richardson** argues that the widely accepted theories are not actually correct...

WORDS AND PICTURES ALUN RICHARDSON

**W**hen asked how much and what should we drink, many of us would probably answer that 2L of water a day is the minimum and that tea, coffee and beer dehydrate us. Health and sports nutrition websites implore us to drink 2-3L or more of water and the European Food Safety Authority (EFSA) recommends an intake of 2 to 3L, but adds that it can come via drink *and* food. The British Nutrition Foundation (BNF) tell us that water is the only fluid which they recommend drinking plenty of, while bottled water suppliers Evian say – surprise, surprise – that in spite of the advice from EFSA and BNF we still don't drink enough.

The creative marketing of the bottled water and sports drink industry would have us believe that we must avoid dehydration and maintain our water content at all cost – after all, doesn't it improve everything from brain and physical performance to making us look younger? This onslaught has developed a palpable fear about not drinking enough, but does the evidence support this message? Didn't we evolve on the hot dry plains of Africa with the capacity to regulate our body temperature and tolerate moderate losses in water, after all?

Ten years ago Dr Heinz Valtin, a kidney specialist, scoured the scientific literature and couldn't find any scientific studies to support the 2 to 3L dictum. In fact, drinking this much or more he says "could be harmful, both in precipitating potentially dangerous hyponatremia (water poisoning) and also in making many people feel guilty for not drinking enough."

A 2013 report from the British Medical Journal (BMJ) and highlighted on BBC's Panorama programme again questioned the validity of the perceived wisdom about hydration and sports drinks. It made the point that 40 years of sports drinks research "doesn't add up to much", especially when the results are applied to the general public. It

concluded that the studies supporting the claims made for sports drinks and how much we should drink were very poorly designed, cherry-picked and irrelevant to 'real life'.

HOW MUCH IS ENOUGH?

Powerade tells us: "Dehydration impairs performance in most events, and athletes should be well hydrated before exercise".

In 2013 Australian scientists tested what really happens as we become dehydrated. They exercised cyclists until they lost 3% of their total body weight (that's over 2kg for a 70kg man!). Performance was then assessed after intravenous rehydration with either no water, enough water to bring them back to 2% dehydration or full rehydration. This study was a double-blind experiment where neither the scientists nor the cyclists knew how much water was being given. The result: there was no performance difference between any of the cyclists!

Although it is frequently misinterpreted, the advice of EFSA is probably not far from the mark, we do need around 2L a day (it differs for each person). The problem is that most of us and the self-confessed experts with something to sell, or have fallen for the hype, miss the point, that approximately 1L a day comes from solid foods and things such as tea, coffee, milk and yogurt. A large dose of caffeine is a diuretic, but in the concentrations found in soft drinks, coffee, or tea, it is definitely not. Even a glass or two of wine or beer with dinner provides a net gain in water.

DRINK WHEN YOU ARE THIRSTY

"Your brain may know a lot, but it doesn't know when your body is thirsty", says the Gatorade marketing spiel.

Manufacturers of sports drinks and bottled water would have us believe that if we are thirsty then we are already dehydrated, yet there is no evidence to support this claim. Being thirsty is part of the sensitive feedback

Drink when you're thirsty, but not for the sake of it



mechanisms that ensure we drink just enough, but not too much. We feel thirsty when the concentration of blood has risen by 2% and dehydration begins at 5%, and we would become unconscious at around 15% (only likely to happen to people stuck in the desert for 48 hours or more without fluid).

The BMJ report couldn't find any instances where dehydration was a direct cause of death in runners. It did, however, find that rapid over-hydration resulting in water poisoning (hyponatraemia) was responsible for several deaths. Although death is rare in the general healthy population, the actors Jeremy Irons and Anthony Andrews both collapsed on stage because they drunk too much water without accompanying electrolytes! Generally speaking, we enter the danger zone when we drink more pure water

than our kidneys can process in an hour i.e. on average ???

It is difficult to estimate an exact amount of fluid you will need, so if you are thirsty, drink, and if you're not thirsty, don't force yourself to drink simply because you believe it to be a healthy practice... it may not be. This is supported by studies comparing areas of naturally-occurring hard water (higher salt content) and soft water, which have found fewer occurrences of cardiovascular diseases, cancer, diabetes, respiratory diseases or other health problems in hard water areas. Drinking lots of pure water in excess of your thirst may actually be doing harm over the long term.

CLEAR AND COPIOUS

For years I have told my clients at altitude

that clear and copious urine is a good sign. But evidence is lacking to suggest that urine colour is a useful or accurate assessment of hydration. Many things such as vitamins, medicines, diet etc. can change the colour or urine and if large volumes of liquid are quickly consumed, the body simply gets rid of it! The problem is that you may have clear urine before normal hydration has been achieved. Drinking till we have clear urine, all the time, may mean we are drinking too much, too quickly.

There is, however, some evidence that if your urine is dark yellow in the morning and the volume reduced then you may be dehydrated. For strenuous multi-day trips where you sweat a lot it is possibly a very rough guide – with the above caveats – but for normal mountaineers it is probably not a



You can make up your own 'sports drink' with orange juice and salt

useful tool. For most people thirst is a sufficient indicator that you are hydrated.

## ARE SPORTS DRINKS BETTER THAN WATER?

Powerade was the 'official sports drink' of the 2012 Olympics, plus Jessica Ennis drinks it, so it must be better than water, right? But hang on... endurance cyclist Graeme Obree broke three world records on nothing more than water and jam sandwiches, so how does that tally? Let me explain...

As we sweat we lose very small amounts of sodium and potassium salts and research has shown that people who work out 'vigorously' for an hour or more, without food, may lose enough electrolytes to warrant replacing them. There is also some evidence that carbohydrates aid water absorption in the small intestine. Currently, the prevailing

opinion is that plain water is adequate for rehydration if exercise lasts less than 60 minutes, and/or perspiration is not excessive.

Is a liquid source of carbohydrate (i.e. in a sports drink) better than a solid source? The Centre of Evidence Based Medicine at Oxford University says that there is no substantial evidence to suggest that liquid is any better than solid carbohydrate intake to provide energy or help with rehydration. For those of us that can take the time to drink and eat, water, tea, fruits, chocolate, vegetables, nuts and grains will provide adequate hydration, electrolytes and carbohydrate.

So as long as you can eat on the hill, then sports drinks are simply an unnecessary addition to the hydration strategy of most mountaineers. The evidence that they are required before, during and after exercise to replace lost salts, energy and protein, as the

manufacturers would have us believe, is a best circumspect and for mountaineers and climbers who can eat solids is non-existent. If you are moving so fast that you can't eat solids then there is a case for drinks with carbohydrates in – but why not make up your own sport drink with orange juice and a pinch of sea salt at a fraction of the price – and you will also be saving the planet another plastic water bottle.

Some sports drinks contain caffeine, which has been shown to temporarily improve mental focus and increase metabolism. It has however, no proven effect on running performance, so it is unlikely to affect climbing or mountaineering performance. Beware of low-sugar alternatives as they often contain artificial sweeteners that in moderate amounts can result in diarrhoea, reversing the benefits of drinking.

## THE BOTTOM LINE

Most climbers and mountaineers with a varied healthy diet don't need 2L of water a day on top of everything else. So don't worry about dehydration during normal climbing or days in the hills or at the climbing wall. Let thirst be your guide and drink what you want, be that water or tea combined with food containing electrolytes and carbohydrate. ■ **T&M**

The views in this article are those of Dr Alun Richardson, an IFMGA Mountain Guide and Biochemistry PhD.

**Next month: In next month's article we will look at nutrition for the hills and whether gels and energy bars are useful.**

## DEHYDRATION AND ALTITUDE

Three points from the Institute for Altitude Medicine, that are supported by research

Drink more with Diamox, but not too much



We are told that staying hydrated is a key factor for avoiding AMS, so the following points from the Institute of Altitude medicine are very pertinent:

- Concerns about tea and coffee are unfounded. In reality, caffeine stimulates the brain, kidneys and breathing, all of which are helpful at altitude. Stopping drinking coffee abruptly can cause a headache.

- Drinking extra water does not protect you from altitude illness. Staying hydrated is, however, important at altitude because the symptoms of

dehydration are similar to AMS. In reality, you only need an additional 1L or so at altitude, whereas too much water is harmful and can dilute your body's sodium levels resulting in water poisoning. Check

your urine in the morning.

- Diamox at the appropriate dose does not make you urinate more – if you take 250mg 3 x a day increased urination will occur, but the effective dose for most people is 125mg once a day and that doesn't increase urine flow.

- Dr Peter Hackett, an expert in altitude research, has said: "There's evidence that the people who do best at altitude are dehydrated. My own thinking is that this is good for the body because it keeps the brain a little bit drier and softer. So that if it does start to accumulate a little water or get a little swelling, it can be tolerated better".