

Too Hot to Trot

By Dave Watt - Rocky Mountain Adventure Medicine
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What do you do when one of the hottest weekends of the year coincides with your ultra? Well, the first thing you need to have is an understanding of how the body regulates its heat balance, or to put it into physiological terms... how it thermo-regulates.

Humans are homeotherms which means that we like to maintain a constant temperature in our core, no matter what the outside temperature is doing. We are constantly making heat, losing heat or maintaining heat to stay within our narrow temperature range. Move 2 degrees up or down from our preferred "normal" and we fall into the range of hypo or hyper-thermia.

We produce heat through muscle movement. The bigger the muscles that we move, the more heat the body produces. Move the biggest muscles the body has, namely the quadriceps and hamstrings, and move them lots (as in an ultra) and the rate of heat production is huge. This heat, the by-product of muscular movement, is redistributed around the body by the circulatory system where our central thermostat (contained within the hypothalamus) can turn up or down our temperature control system.



Humans are one of the few mammals on the planet that have a such a wide distribution of sweat glands that they can actively control their heat loss through increasing the rate of sweating. In extreme situations such as an ultra-marathon as much as 4 litres of sweat per hour can be produced and therefore effective cooling requires that these increased rates can be maintained through the duration of the event. Sweat by itself does not cool the body. It is the evaporation of the sweat that releases the heat and causes cooling. If the surrounding air is too humid or the layers of clothing prohibit the efficient escape of moisture, then evaporation rates may be too slow to effectively cool the athlete.

The other major heat loss mechanism the body uses is radiation, which is the transfer of energy from a hotter surface to a cooler one. The bigger the surface area the greater the amount of heat can be given off and the larger the heat differential the more significant the transfer. On a hot summer's day the temperature difference between athlete and environment can be significantly reduced and therefore the effectiveness of the heat transfer is vastly diminished.

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Here is the ultra dilemma...

- » Running uses the 2 biggest muscle groups in the body and by extension the two biggest heat production furnaces.
- » An ultra means that you are out in the heat for the "long run".
- » The hot environment slows down the ability to radiate heat away from the body and the heat of the sun may be radiating significant heat to the body.
- » Taking on enough water to hydrate and drive an effective sweat producing mechanism can be difficult, as the body will only absorb water at a certain rate. It can also be challenging to find or carry enough water.

This is in part, the ultra solution...

- » Try to acclimatise the body by doing your last few weeks of training by wearing some extra layers or even try running indoors.
- » Experiment with electrolyte mixes and water intake volumes well ahead of race day. There is not a "one-size fits all" answer!
- » Don't over-drink pre race as there is no advantage to being over-hydrated. Your pee should be "champagne coloured and copious". Crystal clear urine is a sign of being over hydrated and scientists have shown that there is no advantage to having extra water on board.
- » Don't "over-drink" during the race as that can be as harmful as "under-drinking". Buffer your plain water with electrolytes, especially sodium. Half a teaspoonful of table salt to a litre of liquid is the right solution.
- » Consider a cotton ball cap (yes.... cotton!) and wet it often! Cotton will keep wet longer than the more usual "tech" material and therefore encourage longer evaporation which is an excellent way to encourage prolonged cooling.
- » Slow down. Don't pick the hottest day of the year to set records.

Remember humans are creatures of balance. Too hot or cold and we don't work well; too dehydrated or over-hydrated and we are in trouble!



Dave Watt is owner of Rocky Mountain Adventure Medicine. He has been leading the medical team for Full Moon Adventure Company for 11 years. Dave is an outdoor educator, Outward Bound staff trainer, leader of management workshops dealing with communication and leadership skills, and a nationally recognized rescue specialist. He has a wealth of outdoor knowledge and experience to share.