

Exercise-induced Hyperthermia (overheating)



Every summer the same question is asked: Why do people choose to commence a running/exercise program on an extremely hot day, at the hottest time of day, with little more than bathers on, and not a water bottle in sight? Obviously these people are not aware of exercise induced heat injury (hyperthermia). Hopefully the following brief review will assist.

Normal core body temperature is around 36.5-37.5 degrees celsius. Maintaining this temperature range is important for normal physiological functions. To do this the body needs to maintain a balance between heat production and heat loss. If heat production exceeds heat loss, then body core temperature will rise, and hyperthermia may result.

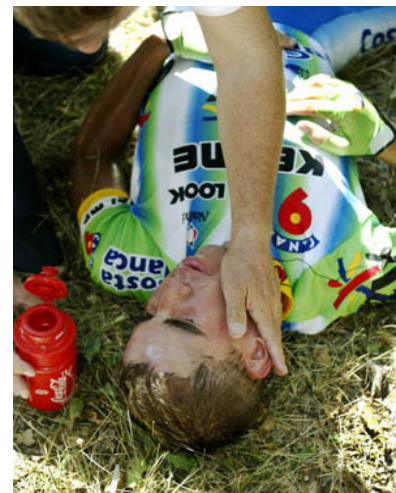
Heat Production: Body heat is produced by both internal and external sources. Exercise can produce large amounts of heat; in fact during maximal exercise up to 90% of body heat can be generated by exercising muscles. This fact is extremely important. Other factors which contribute to heat production include air temp, normal metabolic processes, thermal and solar radiation to mention a few.

Heat Loss: There are several mechanisms by which the body can lose heat. These include radiation, conduction/convection and most importantly (especially during exercise) evaporation. With this latter mechanism there is evaporation of sweat produced to provide body cooling. In warm environments evaporation is the main mechanism for heat loss, and when temperatures rise above 36 degrees it is the only effective mechanism. High air temp and in particular high humidity levels impede heat loss from the body, and the combination of the two is extremely dangerous.

Characteristics an individual may possess that puts them at greater risk of developing hyperthermia include:

- Obesity
- being unfit/unconditioned
- being young (Children have lower sweat rates and cardiac rates than adults = reduced heat loss ability. Additionally they have greater surface area to body mass ratio than adults, and as a consequence absorb more radiant heat = increased heat production)
- being old
- hypohydration or dehydration
- being unacclimatised to heat
- the presence of medical conditions e.g diabetes, hyperthyroidism etc
- the presence of a fever (e.g. from a gastro or a chest viral infection)
- being spinally injured

Heat related illnesses exist on a continuum, with heat exhaustion being an early form and heat stroke being an advanced form of heat illness. In both conditions people may experience nausea, vomiting, headache, weakness,



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shortness of breath, low blood pressure, increased heart rate and clinical dehydration. In heat stroke however, neurological features are much more pronounced. They can be characterised by loss of coordination, bizarre behaviour, confusion, coma and even seizures.

The treatment of any athlete with heat related illness involves cessation of activity; rest in shade; physical assessment; immediate cooling (e.g. ice packs to the arm pit, groin, neck or fan and water spray etc); rehydration (via oral or I.V. fluids); transfer for appropriate medical attention. Rapid cooling, without causing hypothermia (low core body temp), improves the clinical outcome.

Obviously, prevention is better than cure. So all athletes (especially individuals at greater risk of heat illness – as per list) need to take precautions. Some simple techniques involve remaining well hydrated before, during (by drinking at least 250mL of water every 15min during exercise), and after exercise; exercise in lightweight, light coloured breathable clothes; exercise at the coolest times of the day; avoid strenuous, prolonged exercise in very humid and hot conditions; acclimatise; avoid alcohol; be aware of the mechanisms and early features of heat illness.



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