

Medicine for Managers

Dr Paul Lambden BSc MB BS BDS FDSRCS MRCS LRCP DRCOG MHSM

Heatstroke and Heat Exhaustion

Recent publicity about soldiers dying of heatstroke on a training exercise has refocused attention on this dangerous condition which involves the body becoming overheated beyond its ability to cool itself. It may become life-threatening very quickly and without prompt management the body structure may start to break down as its intrinsic systems start to fail. Without treatment death may occur.

Under normal circumstances the body has a number of mechanisms for cooling when the surrounding temperature is high and the body starts to warm up.

This is called **homeostasis** (the ability of the body to maintain equilibrium or stability within its **internal** environment when dealing with **external** changes). The word is derived from the Greek: '*homeo*', meaning unchanging, and '*stasis*' meaning standing. In warm conditions the body produces sweat which cools and evaporates from the body, lowering temperature.

In addition heat is dissipated by conduction (where the body contacts a cooler object), convection (where cool air or water passes over the skin causing cooling) and radiation (where heat radiates from the body).

Normal core temperature is about 36-37°C but the skin temperature is lower at 33-34°C. If the external temperature is higher, the body will

start to produce sweat to assist in its cooling. The likelihood that the body will overheat occurs in circumstances where the body's ability to sweat is compromised as, for example, in dehydration, wearing tight fitting clothes or whether the environment is hot and humid inhibiting the ability of sweat to cool and evaporate.

Heat Exhaustion occurs when the body temperature starts to rise above 37°C and towards 40°C. The body's cooling mechanisms will try to lower temperature but, if prolonged, fluid levels will become depleted and salt balance will be disturbed. The affected person will feel nauseated and may vomit, feel dizzy and extremely fatigued. As the overheating progresses, the pulse rate will rise and the person will become confused. Urine output will diminish dramatically and what urine is passed will be very dark in colour.

Such patients should be moved to somewhere cool, given plenty of fluid to drink and be

encouraged to sit quietly. With such measures the condition resolves quite quickly and they may be recovered in an hour or two.

However there are some patients for whom more intensive measures may be required and they include the frail and elderly, the very young, obese people, patients with heart and kidney diseases, patients who are diabetic or who suffer from thyroid disorders, pregnant women and people taking some types of medication such as beta-blockers (which reduce skin blood circulation).

Heatstroke is much more serious than heat exhaustion. Effectively it occurs when the body runs out of its ability to compensate for overheating and the normal temperature regulating mechanisms are either partially or totally out of action. Indeed in heatstroke the patient may stop sweating.

The risk of heatstroke is higher in the same groups for which heat exhaustion is a risk but also for military personnel and athletes who may do strenuous activity in hot conditions. Of course, becoming sunburned, consuming too little fluid or salt and consuming excessive alcohol in hot or humid climates will predispose to the condition.

Heatstroke strikes when the core body temperature rises above 40°C and becomes critical above about 41-42°C. Homeostasis fails and the body heats up. The symptoms of heat exhaustion are accompanied by flushing, dry skin and feeling cold despite the heat. The body's cellular structure starts to break down

and bodily systems such as the brain, liver and kidneys may stop working.

Treatment for heatstroke is urgent. The patient should be placed in a cool environment, most clothing should be removed and the person should be sponged or bathed or showered in cool (not cold) water. The person may be covered in wet towelling and an electric fan will assist in cooling the environment. Such patients will commonly need transfer to hospital for monitoring and for intravenous fluid replacement and in some patients more severely affected by heatstroke there may be permanent consequences.

So, when the beautiful Caribbean beach beckons, prepare properly. Acclimatise slowly, drink plenty of fluids, including sugar and salt. 4-5 litres a day is recommended. Leave the alcohol until you are back in the air conditioned bar in the evening! Take frequent dips in the sea or a swimming pool. Finally, if you start to feel in any way unwell, get to a cool place and drink plenty. Have a good holiday!

paullambden@compuserve.com