



B 4 ALTITUDE SICKNESS

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WHY IS ALTITUDE IMPORTANT?

As we climb, the atmospheric pressure surrounding us decreases. At relatively low altitudes, this has little effect on the body, but this changes as the height increases. The body requires oxygen to survive. Although oxygen always accounts for 21% of the air, as the atmospheric pressure decreases, then the comparable amount of oxygen also drops.

THE BODY'S RESPONSES TO ALTITUDE

Altitude illnesses

Altitude illness comprises a continuum of conditions which can range from a mild headache to unconsciousness and death. They are usually associated with rapid ascents above 2500m and are caused by a reduction in available oxygen to the body. They can be confused with other non-altitude related illnesses and there is great diversity of opinion on how to prevent and treat these conditions.

Acute Mountain Sickness (AMS)

This is the commonest of the altitude illnesses, the symptoms of which gradually occur during the first few hours following arrival at a higher altitude, and usually resolve within a couple of days. If not recognised and managed appropriately, this may progress to **H**igh **A**ltitude **C**erebral **O**edema (HACE) or **H**igh **A**ltitude **P**ulmonary **O**edema (HAPE).

Symptoms of AMS include headache, nausea, vomiting, fatigue, poor appetite, sleep disturbance, and irregular breathing. Other conditions such as dehydration, sunstroke, hypothermia, migraine, gastrointestinal upset and viral infections can easily be confused with AMS. If there is any doubt, always assume AMS and prevent further altitude gain until resolved.

The best way to prevent AMS is to ascend slowly to allow the body to adapt to the reduction in oxygen (acclimatisation). It is generally recommended that each night should be spent no more than 300m above the previous campsite with a rest day every 1000m. This need not stop one climbing much higher during the day, as long as one returns to a lower altitude at night (climb high, sleep low). Obviously, on some climbs, it is impossible to follow this formula, in which case a period of rest should follow any significant height gain. The pace should never be pushed at altitude - something young people find difficult to understand. It is also necessary to drink much larger volumes of non-alcoholic liquid to help prevent AMS and stave off the dangers of dehydration due to sweating and breathing. This can be as much as 4-5 litres per day on some expeditions. Pale or clear urine is a good indicator that sufficient fluid is being consumed. The drug Acetazolamide (Diamox) is often used to help prevent AMS. This drug alters the body's metabolism, improving breathing and increasing fluid loss through urine production. There are mixed views among the mountaineering medical fraternity over the need to use this drug. If a decision is taken to use the drug, then the normal dosage is 250 mg twice daily, normally starting a day or so before going to altitude. The commonest side effect is a tingling in the fingers and toes. Fizzy drinks often taste flat and food can have a metallic taste. Anyone who is allergic to sulphonamide antibiotics should not use acetazolamide.

Treatment of AMS is simple - stop any further ascent. The commonest symptoms can usually be treated with Paracetamol, re-hydration and an anti-emetic (Stemetil or Maxolon), if

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necessary, for the nausea. If the symptoms do not resolve or, indeed, worsen, then serious consideration should be given to descent to a lower altitude. Sometimes this need be no more than a few hundred metres (often to the previous camp). An individual suspected of having AMS should not be left alone because of the risk of progression to a more severe altitude illness (HACE or HAPE). Acetazolamide (250mg every 8 hours) is helpful in relieving the symptoms and improving breathing.

High Altitude Cerebral Oedema (HACE)

This is a rare life-threatening altitude illness which is often a progression from AMS. This is swelling of the brain resulting in confusion, disorientation and poor co-ordination (ataxia). It is usually preceded by AMS and the individual will have a blinding headache. If untreated it will rapidly result in coma and possibly death. The ataxia is one of the earliest signs and should be suspected in anyone who is having difficulty with balance, or is clumsy with their hands. Simple tests to assess for ataxia include the finger-to-nose test, and the heel-to-toe test.

Treatment is immediate descent under supervision. Dexamethasone should be given to help reduce brain swelling (8mg initially then 4mg every 6 hours). Oxygen should also be given, if available. The use of portable hyperbaric chambers can improve the patient's condition prior to descent.

High Altitude Pulmonary Oedema (HAPE)

This is a rare life-threatening condition in which fluid accumulates in the lungs. It usually occurs following rapid ascent or a high level of exertion. AMS normally precedes most cases, although this can be very mild. Persistent breathlessness and reduced exercise tolerance are the earliest symptoms. A dry cough (not uncommon at altitude) may proceed to a bubbly wet cough with frothy pink sputum (blood-staining) and be associated with gurgling breath sounds.

As for HACE, the most effective treatment is immediate descent. This can be aided with oxygen, if available, and the drug Nifedipine (20mg initially followed by 20mg slow release every 6 hours). As before, the portable hyperbaric chamber may help improve symptoms.

SUMMARY

Altitude illness can affect any individual, young or old, fit or unfit, male or female with little respect for previous abilities or exposure to altitude. The mainstay of prevention is gradual relaxed ascent, allowing 300m per day. The use of Acetazolamide is controversial but probably of benefit on short rapid climbs (eg: Kilimanjaro). Any symptoms of AMS which do not resolve, or any symptoms of a more serious illness should be managed by rapid descent to a lower altitude.

[NB: see recent 2002 BMC advice as to length of time necessary for a safe ascent of Kilimanjaro – much longer than that allowed by most commercial firms!]

See YET Good Practice Guidelines for Altitude Acclimatisation on Youth Expeditions.

FURTHER READING

The High Altitude Medicine Handbook.
Andrew Pollard, David Murdoch.
Radcliffe Medical Press.

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