

Travel and Trek

A Guide to Trekking To Altitude

Many of my treks attain a significant altitude, enough to warrant some serious consideration prior to travelling. These notes are therefore provided to inform you of the potential dangers of high altitude, how you can reduce the risk of Acute Mountain Sickness (AMS, more commonly known as Altitude Sickness) and what should be happening if you do become a victim.

Be clear that these notes are provided in good faith, have been compiled from numerous sources and personal experiences and are neither exhaustive nor definitive.

The effects of altitude have never been proven to be directly related to factors such as age, gender, physical condition or indeed previous experience at altitude although the latter is an advantage. Most personnel can ascend to approx 2500m with minimal effect. Should you go higher than 2500m, your awareness of the symptoms may well save yours or someone else's life.

What Is High Altitude?

In general terms most sources agree on the definitions of high altitude as:

- High Altitude 2500 - 3500 metres
- Very High Altitude 3500 - 5800 metres
- Extremely High Altitude - beyond 5800 metres

Why Does AMS Occur?

Our bodies rely on the supply of oxygen. As we ascend, barometric pressure decreases and with it the amount of oxygen available to our bodies. At the summit of Mont Blanc (4810m) only about 50% of the normal supply is available to us and at the summit of Everest (8848m) a mere 33% (approx). This relative lack of oxygen is referred to as hypoxia. For trekkers venturing above 2500m, this hypoxia may cause illness that is potentially life threatening.

Acclimatisation

During an acclimatisation period, the body will make a series of adjustments that increase the delivery of the available oxygen to cells, and increase the efficiency by which that oxygen is used.

Some people acclimatise rapidly, whilst others develop mild AMS and require longer to fully acclimatise. It is rare for someone not to be able to acclimatise, given sufficient time. Initially most trekkers will experience a little fatigue, possible light-headedness, loss of appetite, nausea, insomnia and headache. These are the more common symptoms of mild AMS.

Generally speaking most trekkers will have ascended and descended before full acclimatisation has occurred, which would mean that all of the mild symptoms have disappeared. It takes longer than just a few days.

Adults can fully acclimatise to about 5000 - 5800m. Above this there is a trade off between adjustment to altitude and deterioration due to prolonged hypoxia. Above 8000m, no acclimatisation occurs at all and a prolonged stay at that altitude is incompatible with life, hence the use of oxygen through cylinders on many Everest summit ascents.

High Altitude Illness

Before describing the illnesses, it is useful to know what drugs and equipment are available as they are referred to in the text for illnesses:

- Acetazolamide (DIAMOX®). Commonly used with those ascending to altitude, this drug assists the body in acclimatising faster by adjusting the body's internal chemistry so that the rate of breathing is stimulated to increase. It therefore improves oxygenation and therefore the level of oxygen within the blood is maintained at an adequate level. Side effects include an increased need to pee, intense tingling (but short lived) in the fingers, toes and sometimes cheeks and making carbonated drinks taste flat.
- Nifedipine. Used to treat HAPE.
- Dexamethasone. Used to treat HACE.
- Gamow Bag. A Gamow Bag is the generic and most common name for a cylindrical fabric bag (within which the casualty is placed), that when pressurised by a hand or foot pump increases the internal air pressure thus effectively providing more oxygen to the casualty. It has the same effect on the casualty as a descent. It weighs about 7Kg, it is portable and can undoubtedly save lives. One or two hours in this bag are probably enough to then allow the casualty to descend but this must be repeated at intervals until a safe altitude is reached.

All three of the drugs mentioned above are prescription drugs and should be prescribed for each individual by a medical professional such as your GP. It is not legal or appropriate to have a 'group' pack of these drugs. If you do travel to other countries with these drugs you should seriously consider keeping a detailed record of the drugs in your luggage. Clearly label your drugs and you can also obtain a licence from the Home Office.

There are three levels or types of illness: AMS, High Altitude Pulmonary Oedema (HAPE) and High Altitude Cerebral Oedema (HACE). If AMS is allowed to develop, it is likely to end up as either HAPE or HACE with HACE being considered the extreme end of the scale. Both can kill.

AMS

AMS is quite common and will develop between 6 – 12 hrs after arriving at altitudes above 2500m. Provided that further ascent does not occur within 2 – 3 days, the symptoms should disappear. Studies have shown that over 80% of people flying directly into locations that are already in the high altitude category (such as Cusco, Peru) develop AMS.

Signs and Symptoms

- Headache. The most common symptom, it is likely to be throbbing, worse at night and early morning.
- Sleep disturbance. Not quite insomnia but there are likely to be periods where you simply cannot sleep. Do not be overly concerned, the fact that you are resting is more important.
- Nausea
- Vomiting
- Fatigue
- Loss of appetite
- Dizziness
- Periodic Breathing. This is a breathing pattern that begins with a few rapid shallow breaths, but progresses to deep sighing breaths, which may fall off rapidly. Breathing may cease momentarily and then the pattern commences over again. Frequent waking with a sensation of suffocation may be experienced. This usually settles with successful acclimatisation, but the drugs used in the treatment of AMS will reduce periodic breathing and promote restful sleep.

The most important issue is to understand why you are experiencing AMS. The simple fact that you have risen to such an altitude will be obvious but what is important is the rate of ascent and your sleeping altitude in relation to the previous night (see Safe Ascent Profile below).

Treatment

It should be emphasised that AMS is a mild altitude illness and is more of a nuisance than a killer. What is important is the ability to identify AMS so that it does not progress to the life threatening HAPE or HACE.

- If you are not using Diamox, then aspirin, ibuprofen or paracetamol may relieve headache and antiemetics (drugs that reduce nausea and vomiting) may be useful in addition to rest.
- If you do not have an experienced hand with you that can advise or assist you, then you should stop any further ascent until the symptoms subside or disappear altogether.
- Descend immediately if there are symptoms or signs of HAPE or HACE.
- Oxygen and drugs may be required, and treatment in a Gamow Bag may assist prior to descent. A casualty with AMS should never be left alone as the condition may progress to HAPE or HACE, and descent should be to an altitude lower than that where the symptoms began.

High Altitude Pulmonary Oedema (HAPE)

HAPE is the leakage of fluid into and around the substance of the lungs. The lungs become engorged and soggy and the effective exchange of oxygen from the air that we breathe into the bloodstream is compromised. Cold air and physical exertion can exasperate the condition. Death occurs when the lungs are unable to extract sufficient oxygen from the air to sustain vital functions such as brain activity. HAPE is usually provoked by very rapid ascent to high altitude and can happen in isolation from AMS.

Signs and Symptoms

- Shortness of breath, even at rest
- Reduced exercise tolerance
- Dry, hacking cough (early stages)
- Wet sputum which may become bloodstained (latter stages)
- Crackles are heard in the lungs with a stethoscope
- Possible mild fever
- The lips and nail beds take on a bluish tinge (cyanosis)

Treatment

- Descend immediately (even if you have to carry the casualty)
- Keep casualty warm
- Use of oxygen and/or Gamow Bag if available (followed by descent)
- Prolonged use of Gamow Bag/oxygen and possibly drugs (if available) if immediate descent is not possible
- Consult a medical practitioner as soon as possible.

Note, re-ascent may be perfectly feasible provided the casualty has made a full recovery and advice has been sought from a medical practitioner.

High Altitude Cerebral Oedema (HACE)

HACE is rare but life threatening. It is usually preceded by AMS. HACE is an accumulation of fluid in and around the substance of the brain and if this is left unabated, the pressure that builds up will have such a compressive effect on the brain that death will occur.

Signs and Symptoms

Ataxia

- Early signs
 - Lack of co-ordinated movement

- Clumsiness
 - Disorientation
 - Confused
 - Irrational
 - Unusually quiet
- Later signs
 - Inability to walk
 - Falling over
 - Hallucination
 - Lethargic
 - Sleepy, falling into a coma

Treatment

- Immediate descent, or death is a likely consequence
- If available, oxygen, drugs (dexamethasone) and/or Gamow Bag.
- Prolonged use of Gamow Bag/oxygen and possibly drugs (if available) if immediate descent is not possible
- Consult a medical practitioner as soon as possible.

Activity at Extreme Altitudes

Prolonged activities at extreme altitude (above 5800m) need more detailed coverage and as only a few of my treks go above that altitude and even then just for a few days, there is little point in covering this in any more detail.

Prevention of Altitude Illness

Any altitude illness is undoubtedly best prevented by the adoption of a sensible and controlled ascent profile that allows acclimatisation. The use of Diamox too has proven to minimise the symptoms of AMS.

Safe Ascent Profile

With very few exceptions, the reality is that it is not always possible to follow the recognised guidelines for a safe ascent for acclimatisation purposes due to the nature of the terrain, the starting altitude and even the time factor. Armed with the guidelines however, the risk can be calculated and measures taken to minimise that risk.

Key points in choosing an ascent profile:

- 'Climb high - sleep low' - above 3000m, try not to sleep any more than 300m above the previous night's altitude although an ascent rate of 400 to 600m per day will be acceptable for most people.
- Take a rest day after every 1000m of overall ascent, or every third day.
- Be extremely cautious about further ascent for anyone experiencing AMS; HAPE or HACE may not be far behind. If in doubt, descend.
- Remain well hydrated with water.
- Avoid alcohol and drugs with a depressant action as breathing will be suppressed during sleep, inhibiting the acclimatisation process.

As previously mentioned, be wary of locations that have a high 'fly in' altitude such as Cusco in Peru and Leh in India. Both are in excess of 3000m and due consideration should be given to acclimatisation prior to moving on to trek at higher altitudes.