high altitude health advice

The following notes are provided by THE ALTITUDE CENTRE™

Healthy people may travel to altitudes up and above the height of Kilimanjaro (5,895m) as long as they are properly acclimatised. Un-acclimatised individuals suffer from hypoxia, meaning lack of oxygen. Mild hypoxia is not normally a risk factor for altitude trekking. Moderate or severe hypoxia can lead to a condition called acute mountain sickness which needs to be identified and managed to ensure a safe and enjoyable trip.

acclimatisation

The human body is an adaptive organism that has the ability to adjust to the changing environment around it including changes in altitude. Charity Challenge trips provide adequate acclimatisation time where the majority of healthy individuals will be able to function unhindered.

Sufficient acclimatisation is imperative to avoid altitude illnesses. The speed of the ascent and the susceptibility of an individual are the two main determining factors in developing an altitude illness. When going too high too fast, the body is unable to adapt sufficiently. When trekking as a group the acclimatisation process is always tailored to ensure the health of the individual who is slowest to acclimatise is maintained.

As you ascend you will notice an increase in pulse rate and breathing rate as your body works harder to get available oxygen to the muscles. Later you may notice an increased need to urinate as your body makes adjustments to the blood to help deliver more oxygen. A whole host of other adaptations will occur to enable you to deal with the reduction in oxygen.

acute mountain sickness (ams)

The most common illness associated with travel to altitude is termed acute mountain sickness (AMS). AMS develops in climbers ascending to high altitudes who are not sufficiently acclimatised. The condition usually develops within 6-12 hours of reaching a critical altitude and peaks at approximately 24 hours. Although some incidences of AMS have been reported at as low as 1000m the condition is usually experienced at an altitude of approximately 3,000m and above.

The incidence of AMS increases with altitude. When trekkers ascend rapidly to 2,500 m, about 10% will suffer from AMS, and when ascending to 4,500 m, the AMS incidence will exceed 60%. Therefore an individual climbing Mount Kilimanjaro (5,985m), should expect to develop at least some of the symptoms associated with AMS and therefore take precautions for both the prevention and treatment of such symptoms.

The common symptoms for ams are:
- Headache.
- Nausea (feeling sick).
- Vomiting (being sick).
- Fatigue (feeling tired).
- Poor appetite (not hungry).
- Dizziness.
- Sleep disturbance.

how to treat ams

During slow ascents to altitude you acclimatise and minimise the effects of AMS. However, virtually all climbers will experience some of the symptoms of AMS when trekking at high altitude.

The occurrence of AMS does not necessarily spell the end of a climb; it does however mean that certain measures should be taken in order to prevent the development of AMS in to more serious conditions. Such measures include;

- Sufficient fluid replacement
- The use of Paracetamol/Ibuprofen in order to combat headaches
- The cessation of any further ascent for at least 1 day (or until symptoms are reduced)
- The use of acetazolamide (Diamox)
- If symptoms persist to descend, descend, descend.
- Administration of supplemental oxygen in severe cases

severe ams

If AMS is not properly treated and is allowed to develop, more serious conditions may arise. Two such conditions are **high altitude pulmonary oedema (hape)** and **high altitude cerebral oedema (hace),** both of which can be life threatening.

high altitude pulmonary oedema (hape)

Approximately 2-3% of individuals travelling to altitudes above 2,500m will develop HAPE, with this incidence increasing with both altitude and rate of ascent. HAPE is caused by the build up of fluid in the lungs due to vascular leaking, and results in the prevention of efficient gas exchange, which means increased hypoxia. HAPE can lead to coma and even death if left untreated. Symptoms of the condition usually occur within 24 to 72 hours of a critical altitude being reached (higher than 2,500m).

Symptoms include;

- Rapid breathing and HR
- Chesty cough
- Bringing up frothy fluid and blood in spit
- Extreme difficulty breathing
- Very weak and fatigued
- May have a fever
- Lips, tongue and nails become slightly blue in colour

Treatment of HAPE;

- Immediate descent
- The use of the drug Nifedipine
- The use of acetazolamide (Diamox)
- Administration of supplemental oxygen

Descent provides the quickest and most definitive recovery for the condition HAPE and it should therefore occur as soon as the symptoms of the illness have been spotted.

high altitude cerebral oedema (hace)

HACE is caused by swelling of the brain due to fluid shifts, and can follow on from untreated AMS. Although the incidence of HACE is low (5% of individuals travelling above 2,500m); the condition can develop very quickly with little or no other previous symptoms. Similarly to HAPE, if left untreated the condition can lead to fatality and again incidence is increased with both increasing altitude and speed of ascent.

Symptoms include;

- Severe headache
- Severe weakness
- Impaired decision making/ clumsy behaviour
- Loss of consciousness
- Confusion
- Irrational behaviour
- Drowsiness/ vomiting

Treatment of HACE;

- Immediate descent
- Administration of supplemental oxygen
- The use of a high pressure bag (Gamow bag) if descent is impossible
- The use of acetazolamide (Diamox)
- The use of dexamethasone

If a climber develops either of the conditions HAPE or HACE a guide will remain with the individual at all times and not leave them on their own under any circumstance. **Descent is the best treatment for HACE and should always occur if at all possible.**

general advice whilst at high altitude

- Keep an eye on fellow trekkers, especially making sure they are well hydrated and protected from the sun.
- Be honest regarding how you are feeling, do not lie about, or undersell any symptoms you may have
- Be prepared before you leave
- Remember that a slow even pace with a gradual ascent profile is the most important measure to prevent the onset of altitude illness
- If you have any existing health conditions prior to departure i.e. diabetes, asthma etc, ensure you see a doctor or specialist to find out the risks your condition may pose to high altitude travel and ensure you have taken all precautions necessary

acetazolamide (trade name: diamox)

Charity Challenge itineraries are designed to acclimatise you to altitude without the need for Diamox. However Diamox can help speed up the process of acclimatisation and can also aid the sleep condition of periodic breathing, subject to the essential approval from your doctor, it is a personal decision as to whether to take the drug or not. NB: Acetazolamide is a sulfonamide medication, and persons allergic to sulfa medicines should not take it. We do recommend Diamox in the following cases:

- Treatment of persons with AMS
- Treatment of persons bothered by periodic breathing at night
- Prophylactically for persons on rapid forced ascents (such as flying into Lhasa, Tibet)
- Prophylactically for those persons who have repeatedly had AMS in the past

Although the drug works to reduce the effects of AMS it does not mask the symptoms and climbers should be aware that individuals can still suffer from AMS as well as the more serious conditions of HAPE and HACE whilst taking the drug. Whether or not one takes Diamox is obviously a matter of personal choice - travel to high altitudes is quite possible without it.

how to take diamox:

If you decide to use the drug, we suggest 125mg (half of one tablet) is taken twice daily as a trial at sea level for two days several weeks before a visit to altitude. Assuming no unpleasant side effects are experienced, take the drug in the same dose for three days before staying at 3500m and thereafter for two or three days until you feel acclimatised, for about five days in all.

side effects

Like all drugs, Diamox may have unwanted side effects. Tingling of the fingers, face and feet is the commonest, but this is not a reason for stopping the drug unless the symptoms are intolerable. Dizziness, vomiting, drowsiness, confusion, rashes and more serious allergic reactions have all been reported but are unusual. In exceptional cases, the drug has caused more serious problems with blood formation and /or the kidneys. Those who are allergic to the sulphonamide antibiotics may also be allergic to Diamox. More commonly, the drug makes many people feel a little off colour, fizzy drinks can also taste strange when you are taking Diamox.

further possible health problems at altitude

- Blocked nose and sore throat
- Sun burn
- Dehydration
- Heat stroke
- Hypothermia/hyperthermia
- Exhaustion
- Diarrhoea
- Constipation

A number of health issues, big and small, are possible to occur when travelling to high altitude, the most important thing is to be informed of the risks and prepare sufficiently to ensure a safe and enjoyable trip.

acknowledgments

These notes were compiled by experts at The Altitude Centre. Further information, advice and acclimatisation services are available at www.altitudecentre.com

References

- Kupper, T ., Milledge, J., Et al. (2011). Work in Hypoxic Conditions-Consensus Statement of the Medical Commission of the Union Internationale des Associations d'Alpinisme (UIAA MedCom)
- Burtscher, M. (2007). Arterial oxygen saturation during ascending to altitude under various conditions: Lessons from the field.
- Burtscher, M., Brandstatter, E., Gatterer, H. (2007). Preacclimatisation in simulated altitudes.
- Burtscher, M., Szubski, C., Faulhaber, M. (2007). Prediction of the susceptibility to AMS at simulated altitude.
- Maggiorini, M., Melot, C., Pierre, S. Et al. (2001). High altitude pulmonary edema is initially caused by an increase in capillary pressure.
- Roach, R.C., Hackett, P.H. (2001). Frontiers of hypoxia research: acute mountain sickness.
- Strote, J., Prutkin, J. (2006). High-altitude pulmonary edema presenting 18 hours after descent.
- Tannheimer, M.A.J., Albertini, A., et al. (2009). Testing individual risk of acute mountain sickness at greater altitudes.