

Guide To Trekking At High Altitude

Travel and Trek believes that you should be well informed of the dangers of trekking at high altitude. In extreme cases, altitude sickness can lead to death. Please take the time to read these notes and ask any questions you feel necessary relevant to your trek.

Even if you do not travel with us, ensure that the company you are travelling with has a tried and tested acclimatization programme for the trek. If necessary, ask to see the altitudes of the night stops.

Many of our 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. The vast majority 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.

Through experience, we know that the most trekkers will begin to experience symptoms in the range 3500m - 4000m. Acclimatization in this zone is extremely important. Failure to do so will bring on AMS very quickly as soon as you ascend further.

Initially most trekkers will experience a little fatigue, possible light-headedness, loss of appetite, nausea and insomnia. These are the common symptoms (the affects) of being at altitude, which will occur anyway. It is important to understand that clinically, you must have a headache to be suffering from AMS. All or just some of these symptoms may occur.

Many inexperienced trekkers are unduly worried when they experience the affects (without the headache) when there is no need to do so. Without the headache, you do not have AMS and are therefore under no threat from HAPE or HACE.

Treks To Watch For Safe Ascent Profiles

Most treks that go to high altitude have been pretty much tested in terms of where the night stops should be.

Kilimanjaro is an exception.

Look carefully at the number of days you are inside the Park. Anything less than 8 days is, in our opinion, insufficient to allow proper acclimatization and reduces your chances of summiting.

See page 5 for a graph of **safe ascent profiles**

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 5800m. Above this there is a trade off between adjustment to altitude and deterioration due to prolonged hypoxia. Above 8000m, no acclimatisation occurs 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.

The Illnesses

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 and Ladakh, India) 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 is 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).



A gamow bag being demonstrated

AMS or Affects of Altitude?

Clinically, you must have a headache to be suffering from AMS.

The other symptoms that you may be experiencing are the 'affects' of being at altitude and will occur anyway. If you are experiencing these symptoms but do not have a headache, you do not have AMS and are therefore under no threat from HAPE or HACE.

Many inexperienced trekkers are unduly worried when they experience these affects when there is no need to do so.

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 HACE or HAPE.

- 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. Several Doctors in the Everest region that we consulted all agreed that you cannot overdose on Diamox although four 250mg tablets were considered sufficient. In addition, you can also take paracetamol simultaneously at the usual dosage. If they are not assisting, descend.
- 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 HACE or HAPE, 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) require 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 will be acceptable for most people on the odd day, but not successive.
- Take a rest day after every 1000m of overall ascent, or every third day. This is important.
- 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. Sources vary as to the amount but between 3 and 4 litres is good, or as much as you can.
- Avoid alcohol and drugs with a depressant action as breathing will be suppressed during sleep, inhibiting the acclimatisation process.

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.

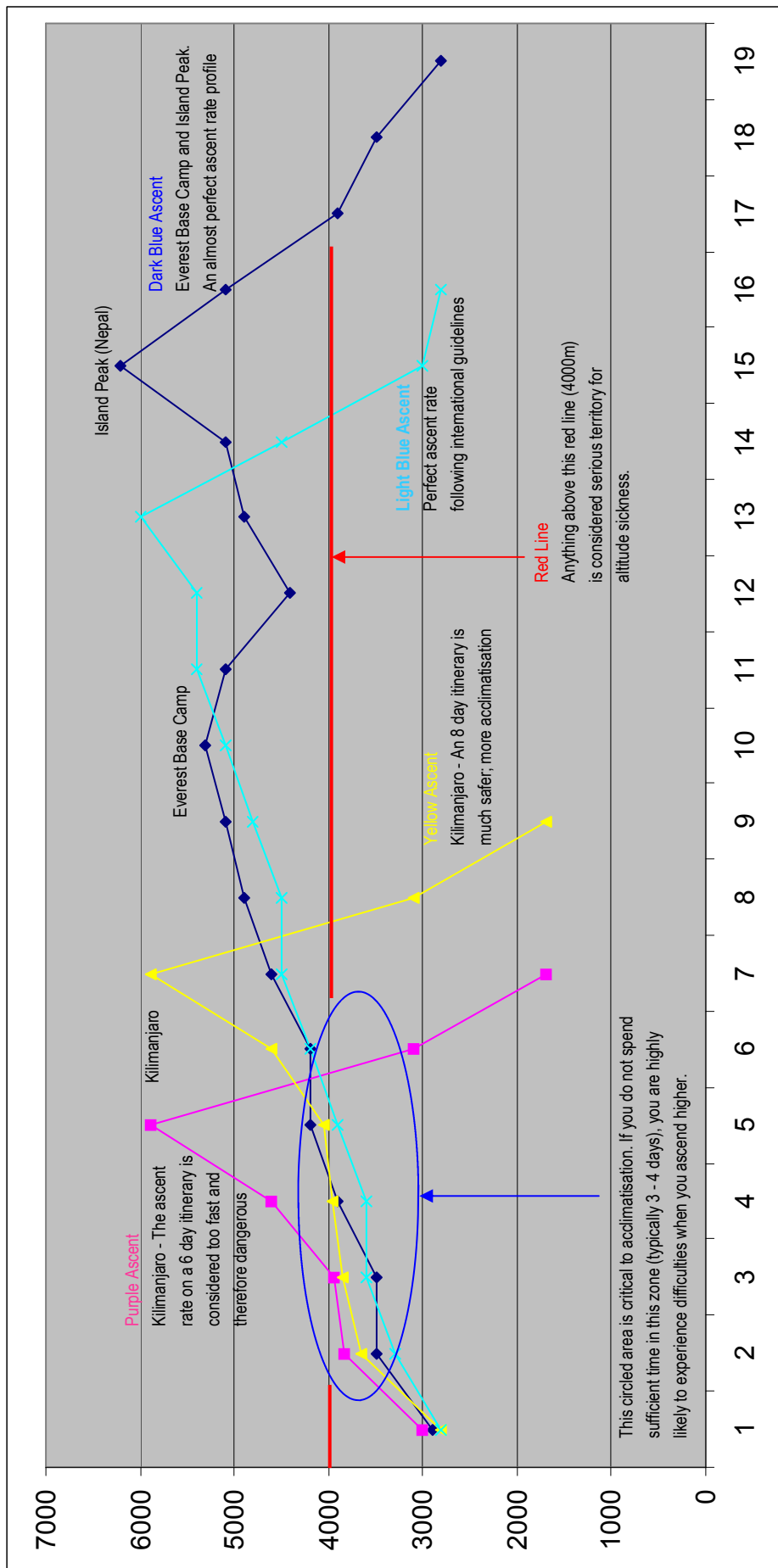
Travel and Trek Example Trek Profiles

- Everest Base Camp (EBC) - we have an excellent long, slow ascent with 2 full acclimatization days built in to the 9 day ascent to Base Camp.
- Annapurna Circuit - a 7 day ascent to 3500m (excellent acclimatization period) and then a hop over the high pass with a rapid descent over the other side.
- Kilimanjaro - We use an 8 day itinerary inside the National Park providing good acclimatization prior to the summit attempt. Watch for the 6 day itineraries that are on offer; they are attractive because they are cheaper but vastly reduce your chances of summiting (the ascent rates are too fast).
- Island Peak (Nepal) - this trek goes through EBC first and therefore the acclimatization is excellent.
- Toubkal (Morocco) - at 4167m, this has no real serious AMS threat.
- Markha Valley (Ladakh, India) - the arrival airport (Leh) is one of the highest commercial airports in the world (over 3000m) and therefore immediate acclimatization for a few days in the town is essential. Once that is complete, the trek (which crosses a Pass of over 5000m) is fine.

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Comparative ascent rates between Kilimanjaro (6 and 8 day itineraries) and Everest Base Camp



The above table provides a graphical view of the ascent rates of Kilimanjaro (2 ascents), Everest Base Camp and Island Peak. The graph emphasizes the importance of thorough acclimatisation at the right time (lower altitudes) before ascending higher.

The Everest Base Camp profile is almost perfectly in line with the international guidelines for safe ascent.

Whilst not shown, other treks conducted are within these guidelines.