

High altitude can mean anything above the height 1500m, but in the medical field it is more defined and based on alterations in human physiology. From 1500m to the summit of Everest (8850m), there are three different altitude levels with different physiological reactions occurring at each. As low-level dwellers, we are optimally equipped for existence at normal air pressure of 760 mm of mercury, with an oxygen concentration of 21%. With increasing altitude, the concentration of oxygen remains the same, but the atmospheric pressure decreases and with this the partial pressure of oxygen falls. This means that the number of oxygen molecules per breath is greatly reduced and this in turn reduces the amount of oxygen available to the blood and tissues in the body. At the summit of Mont Blanc (4807m), the highest mountain in Western Europe, the partial pressure of oxygen is about half of that at sea level and on the summit of Mount Everest (8850m), it is one third of sea level pressure (See figure 2). For climbers and trekkers at such altitudes, the lack of oxygen may cause illness that is potentially life threatening. Reports from Nepal have revealed that the mortality of trekkers is about 14 per 100,000, with 25% of these attributed to altitude illness.

Acclimatisation; On arrival at altitude, there are a number of physiological changes that occur, which enable the body to function optimally in the low oxygen environment. This process by which individuals gradually adjust is known as acclimatisation. The initial and most important adjustments are an increase in the frequency and depth of breathing. This begins to occur at altitudes of about 1500m. The heart pumps faster and blood pressure rises. Red blood cell production increases, resulting in an increased haemoglobin concentration, which is required to pick up oxygen and transport it around the body. These mechanisms are to ensure increased oxygen delivery to cells and efficiency of oxygen use. At sea level our blood is 98% saturated with oxygen and this decreases to 89% at 3000m and reaches as low as 40% on the summit of Everest.

## > SOME BASIC GUIDELINES FOR ACCLIMATISATION; GUIDELINES FOR THE PREVENTION OF AMS:

- If possible, don't fly or drive to high altitude. Start below 3,000 metres (10,000 feet) and walk up.
- If you do fly or drive, do not overexert yourself or move higher for the first 24 hours.
- If you go above 3,000 metres (10,000 feet), only increase your altitude by 300 metres (1,000 feet) per day, and for every 900 metres (3,000 feet) of elevation gained; take a rest day to acclimatise.
- Climb high and sleep low! You can climb more than 300 metres (1,000 feet) in a day as long as you come back down and sleep at a lower altitude.
- If you begin to show symptoms of moderate altitude sickness, don't go higher until symptoms decrease.
- If symptoms increase, go down, down, down!
- Keep in mind that different people will acclimatise at different rates. Make sure everyone in your party is properly acclimatised before going any higher.
- Stay properly hydrated. Acclimatisation is often accompanied by fluid loss, so you need to drink lots of fluids to remain properly hydrated (at least four to six litres per day). Urine output should be copious and clear to pale yellow.
- Take it easy and don't overexert yourself when you first get up to altitude. But, light activity during the day is better than sleeping because respiration decreases during sleep, exacerbating the symptoms.
- Avoid tobacco, alcohol and other depressant drugs including, barbiturates, tranquillisers, sleeping pills and opiates such as dihydrocodeine. These further decrease the respiratory drive during sleep resulting in a worsening of symptoms.
- Eat a high calorie diet while at altitude.
- Remember: Acclimatisation is inhibited by overexertion, dehydration, and alcohol.

*Understand the concept of altitude acclimatization and recognize the symptoms of altitude illness. Don't ignore the symptoms - successful treatment is based on early detection.*

## > SYMPTOMS OF HIGH ALTITUDE SICKNESS

Symptoms generally associated with mild to moderate altitude illness include:

- Headache
- Difficulty sleeping
- Loss of appetite
- Nausea or vomiting
- Fatigue
- Dizziness or light-headedness
- Rapid pulse (heart rate)
- Shortness of breath with exertion

Symptoms generally associated with more severe altitude illness include:

- Cough
- Shortness of breath at rest
- Chest tightness or congestion
- Bluish discoloration of the skin
- Coughing up blood
- Inability to walk in a straight line, or to walk at all
- Decreased consciousness or withdrawal from social interaction
- Confusion
- Gray or pale complexion (cerebral edema)

### *Diamox or not?*

*The drug Acetazolamide (Diamox) can facilitate acclimatization, prevent acute mountain sickness, and treat mild cases of mountain sickness. It is also very helpful for altitude insomnia and should be used in preference to sleeping pills or Valium, which are dangerous at altitude. Diamox produces faster, more regular breathing with higher oxygen levels during sleep. However, most people do not need to use this medication routinely at altitude if their trip allows adequate time for ascent. Diamox can be very helpful, but it must not be used as a substitute to push through symptoms of altitude sickness. There have been cases of high altitude cerebral and pulmonary edema in people taking Diamox. So, if you consider using this drug, make sure to discuss its pro and cons in detail with your doctor and with your trip leader once you're on the trek.*

## > FITNESS;

What can one do before a trip into get into shape; The short answer is to get in shape! If you smoke - well, here's a good reason to quit. This improves both heart and lung function. Trim off extra fat. Exercise to improve your cardiovascular endurance, muscular strength, and balance.

We recommend that you start a moderate training program. The level of fitness needed for a high-altitude adventure requires regular aerobic exercise for at least one hour 4-5 times a week. This may include aerobic fitness classes, power walking, running, cycling on hills and swimming.