

# ALTITUDE SICKNESS

## 1 General

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Any lowland inhabitant may be confronted with acute altitude sickness when staying even for a short time above 4000 meters. There is a 20% chance of getting altitude sickness when residing in areas above 2000 – 2500 m, and a 40% chance in areas of 3000-3500 m. People who fly directly to high areas, such as Cusco (Peru, 3225 m), La Paz (Bolivia, 3658-4018 m), Lhasa (Tibet, 3685 m), Leh (Ladakh, 3505 m) etc. should certainly be alerted to the possibility of altitude sickness. They are best advised to quietly rest at their destination for the first few days, and especially avoid sleeping pills (sedatives, narcotics) and excessive use of alcohol (in exceptional circumstances and in discussion with the doctor the combined ingestion of 125 mg Diamox® and 10 mg temazepam may be considered for severe sleeplessness). Sensitivity to altitude sickness varies from individual to individual, and is not dependent on the degree of physical fitness, nor on the previous number of visits to high altitude areas. The individual sensitivity is reasonably constant: if there were problems on a previous visit, these are likely to return on subsequent trips. Patients with heart and lung diseases run more risk at high altitude. The symptoms can persist for up to 72 hours after arrival and may continue for 2-5 days when remaining at high altitude. At first the symptoms of acute altitude sickness are mild: the patient complains of **headache**, fatigue and shortness of breath (dyspnoea) upon exertion, lack of appetite, nausea, insomnia, dizziness, general malaise, and sometimes swelling of hands, feet and face (first of the eyelids). The severity of symptoms depends on the altitude, the rapidity at which this altitude was attained, the effort expended in getting there and whether the visit is prolonged there overnight. The complaints can get worse (vomiting, dry cough and increasing shortness of breath), and can sometimes eventually develop into life-threatening conditions (this seldom occurs below 3000 m) due to high altitude lung oedema (fluid in the vesicles of the lung, with a worsening dry cough, fever and shortness of breath even when resting) and/or high altitude cerebral oedema (swelling of the brain, with headache that no longer responds to analgesics, unsteady gait, increasing vomiting and gradual loss of consciousness).

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## 2 Prevention

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Prevention is important and consists of the following measures:

- Staying for a few days at an intermediate altitude (about 2000 m); ideally, until the heartbeat-rate (pulse rate) when resting is reduced to less than 100 per minute.

- Once above 3000 m, daily ascent should be restricted to a maximum of 300-500 m (depending on the individual's symptoms).
- Above 4500 m altitude further ascent should be at most 150 m per day.

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### 3 Treatment with medication

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- If symptoms of altitude sickness do occur, it is better to rest for an extra day or longer, if possible. For headache 1 gr acetylsalicylic acid (aspirin) or paracetamol or 600 mg ibuprofen and for nausea metoclopramide or domperidone can be taken. Diamox® one 250 mg tablet, b.i.d. for 2-3 days can be started. These medications are prescribed by a doctor. If the complaints persist or get worse, descent by at least 500 m is absolutely essential, and overnight stays at higher altitude are forbidden. Diamox® does not mask the serious symptoms of altitude sickness!
- People who have suffered from altitude sickness before or who ascend in one day to over 3000 m should take Diamox® prophylactically, ½ to 1 tablet of 250 mg b.i.d., starting 1 day before the ascent and continuing for 2-3 days. Diamox® is not routinely given to everyone who goes on a high altitude hike, though it is advisable to carry some when hiking above 3000 m, so that it can be taken as soon as symptoms occur (250 mg, b.i.d. for 2-3 days or less if descent is imminent). Oxygen deficiency (hypoxia) at high altitude leads to acceleration of the respiration (tachypnoe) and thus to "respiratory alkalosis" (the blood becomes somewhat less acidic); the carbon dioxide level in the blood (pCO<sub>2</sub>) decreases, slowing the respiratory automatism, which worsens the oxygen deficiency still more. After a few days the kidneys begin to compensate the alkalosis and symptoms disappear. Diamox® should counteract the respiratory alkalosis and permit the accelerated respiration to be maintained. There is possibly also a direct effect on the respiratory centre. Tingling sensations in the limbs and around the mouth and taste disturbances (e.g. when drinking beer) are frequent side effects. Diamox® must not be taken if there is allergy to sulphonamides or in pregnancy; it is seldom given to children (5mg/kg per day in two doses).
- An **adequate fluid intake** (at least 3 litres, though often even more; the urine should remain clear!) is absolutely necessary, even if you do not feel thirsty, as fluid loss via respiration increases substantially (e.g. through hyperventilation in a dry environment with a low atmospheric pressure). The use of Diamox® also leads to extra fluid loss (dehydration).
- Dexamethasone (Decadron® 4 mg every 12 hours) can be given prophylactically for an ascent above 2500 m, from one day before the climb until after return to below 2500 m, and in exceptional circumstances, nifedipine (Adalat® 10 mg 4 x per day), but only after consultation with a specialist in this field (it reduces the risk of pulmonary oedema).

## 4 Treatment of life-threatening altitude sickness:

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- A rapid descent is necessary for the survival of the affected person.
- It is also useful for medical personnel accompanying parties in high mountainous areas to have the following medications to hand: dexamethasone [Decadron® ] for life-threatening cerebral oedema, 8 mg as starting dose, then 4 mg every 6 hours (or 32 mg in one dose in emergencies) and nifedipine [Adalat®] for life-threatening lung oedema, 10 mg sublingually together with Adalat® Retard 20 mg as a loading dose, followed by Adalat® Retard 20 mg every 6 hours. All this should **in no way delay a fast and life-saving descent to below 2500 m**. All the more so if the sick person is vomiting.
- The administration of oxygen is advisable, though oxygen is obviously difficult to carry around. Portable inflatable hyperbaric “chambers” (pressurised sack with footpump) exist for use at high altitude. These offer a temporary solution as the effect diminishes after a few hours. That is why this must always be combined with the administration of Diamox®, Adalat® and dexamethasone and it must always be ensured that a rapid descent is made.

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## 5 Other problems at high altitude:

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There is also a risk of hypothermia, freezing, frostbite, sunburn and snow blindness at high altitude. Any one of these is in itself sufficient reason for ensuring that you have made suitable medical preparation for high-altitude trips (consult experts for this). A well-stocked travel pharmacy/portable medical kit is of vital importance on trips through remote areas.