



## ALTITUDE SICKNESS

Acute altitude sickness is caused by insufficient adaptation to the low oxygen pressure at high altitude. Any lowland inhabitant can encounter acute altitude sickness when staying for 4 to 8 hours above 2000 meters. There is a 25% chance of getting altitude sickness when staying in areas above 3500 – 4000 m, and 45 % chance in areas above 5000 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 aware of the possibility of acute altitude sickness. Sensitivity to acute 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 a greater risk at high altitude. The symptoms can begin within 3 days after arrival and may continue for 2-5 days when remaining at the same altitude rather than move higher.

**Acute altitude sickness:** At first the symptoms of acute altitude sickness are mild: the patient complains of **headache**, fatigue, lack of appetite, nausea, insomnia, dizziness and general malaise. The severity of symptoms depends mainly on the altitude and the number of days having acclimatised at about 2000m, the effort expended in getting there and whether the visitor stays overnight. The complaints can get worse (vomiting, dry cough and shortness of breath in rest, “it becomes impossible to finish a sentence without gasping for breath”), and can in some cases develop into a life-threatening condition (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 headaches that no longer respond to analgesics, unsteady gait, increasing vomiting and gradual loss of consciousness).

**Prevention** is important and consists of the following measures:

- Stay a few days at an intermediate altitude (between 1500 and 2500 m); the heartbeat-rate (pulse rate) when resting must stay under 100 beats per minute. During the day you can climb higher to encourage acclimatisation.
- Make a flexible travelling schedule with extra resting days once you are above 3000 meter.
- Avoid sleeping pills and alcohol abuse.
- An **adequate fluid intake**; 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 Acetazolamide (Diamox<sup>®</sup>) also leads to extra fluid loss (dehydration).
- People who have suffered from acute altitude sickness before should take **Azetazolamide (Diamox<sup>®</sup>)** preventively, **1 tablet of 250 mg twice a day** (about 7 mg per kg body weight), starting 1 day before reaching 3000m and continuing for 2 days after reaching the final height. It is best to take the (second) tablet round about 4 o'clock in the afternoon, in order to reduce the diuretic effect by bedtime to a minimum. Azetazolamide (Diamox<sup>®</sup>) stimulates the acclimatization and does not mask symptoms. This medication is only available on doctor's prescription.

Tingling sensations in the limbs and around the mouth and interference with the taste buds (e.g. when drinking beer or other carbonated drinks) are frequent side effects. Acetazolamide (Diamox<sup>®</sup>) must not be taken if there is a known allergy to sulphonamides or during pregnancy. It is seldom given to children (5mg/kg per day in two doses).

- 250 mg of Acetazolamide (Diamox<sup>®</sup>) before bedtime is also very effective against insomnia at high altitude (there is a possibility that one has to urinate one time during the night).
- Persons hiking above 3000m may take acetazolamide (Diamox<sup>®</sup>) and start taking this medication when the first symptoms of altitude sickness appear (see further).

#### **Treatment of mild acute altitude sickness:**

- If symptoms of altitude sickness do occur, rest for an extra day or longer, if possible go 500 m lower and stay there.
- Take **Diamox<sup>®</sup> - 1 tablet of 250 mg, twice daily for 2-3 days**, or less in case of descent, when the first symptoms of altitude sickness like headache or other complaints appear. This improves acclimatisation.
- Take **1 gr acetylsalicyl acid (aspirin), paracetamol or 600 mg ibuprofen** for headache and metoclopramide or domperidone for nausea.
- If the complaints persist or get worse, you will absolutely **have to descend by at least 500 m!**
- As soon as the symptoms have completely disappeared, climbing may be continued.

#### **Treatment of acute life-threatening altitude sickness:**

- A rapid descent to below 2500 m is necessary for the survival of the person affected.
- Administer oxygen if possible. If not, use a portable inflatable hyperbaric “chamber” (pressurised sack with footpump). These however offer only a temporary solution as the effect diminishes after a few hours. That is why this must always be combined with the administration of Diamox<sup>®</sup>, Adalat<sup>®</sup> and/or corticosteroids and a rapid descent must be made.

*It is also useful for medical personnel accompanying groups in mountain areas to have the following medication to hand:*

- For (life-threatening) cerebral oedema: **corticosteroids** (1) dexamethasone 8 mg as initial dose, then 4 mg every 6 hours (or 32 mg in one time in case of emergency); dexamethasone is no longer commercially available in Belgium as Decadron<sup>®</sup>, but the product can be prepared by your pharmacist on prescription (2) methylprednisolone (Medrol<sup>®</sup>) 48-64 mg as initial dose, then 24-32 mg every 6 hours (there are no scientific specifications concerning the precise dosage).
- For (life-threatening) pulmonary oedema: **Adalat<sup>®</sup>** (nifedipine) 10 mg sublingually together with Adalat<sup>®</sup> Retard 20 mg as a loading dose, followed by Adalat<sup>®</sup> Retard 20 mg every 6 hours. Lasix<sup>®</sup> does not do anything in case of pulmonary oedema at altitudes.

**All this should in no way delay a fast and life-saving descent to below 2500 m!**

#### **Other problems at high altitude:**

Staying at high altitude often causes shortness of breath (dyspnoea) and sometimes swelling of hands, feet and face (eyelids first).

There is also a risk of hypothermia, frostbite, sunburn, snow blindness and eye problems at high altitude (such as UV-keratitis). Extremely dry air and dust can hinder the wearing of contact lenses. In case of keratotomy (corneal incisions), the cornea will unregularly swell at high altitude which can change the sight with 3 dioptres (take along glasses). This is not the case in laserkeratotomy. When staying in remote areas, the access to necessary medical care is often limited!

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 is of vital importance on trips through remote areas.