

Acetazolamide for altitude sickness

Most trekkers and climbers do not need, and should not take, acetazolamide tablets.

- Altitude problems are unlikely below 2,500 metres (8,000 feet).
- Anybody can suffer from illness caused by altitude. Nobody is immune to it.
- The best way to reduce the risk is to acclimatise adequately and be prepared to descend.

How to acclimatise to high altitude

- People planning to ascend to over 3,000 metres (10,000 feet) should spend at least one night at 3,000 metres before they start to go higher.
- Above 3,000 metres each new sleep height should be between 300-500 metres (1,000-1,500 feet) higher than the previous night.
- It is possible to go higher during the day but then descend to sleep no more than 500 metres higher than the previous night - **climb high, sleep low**.
- For every 1,000 metres (3,000 feet) of ascent, sleep at that height for two nights before going any higher, preferably also taking a rest day.

Taking acetazolamide to help acclimatisation and to treat sleeping disorder of altitude

If unable to stick to a gradual ascent schedule, the dose of acetazolamide is 125mg (half a tablet) twice daily to help the body to acclimatise.

If significantly troubled by irregular breathing during sleep, a dose of acetazolamide of 125mg (half a tablet) can be taken two hours before sleep. This can be increased to 125mg twice daily if necessary. Acetazolamide is not a sedative.

Symptoms of mild early acute mountain sickness (AMS)

Many people will have mild symptoms of AMS when they get above 2,500 metres (8,000 feet). It can feel like a bad hangover with:

- A headache that is not caused by dehydration (dehydration headache should settle by taking paracetamol and drinking a litre of water).
- Fatigue and weakness.
- Dizziness and light-headedness.
- Difficulty sleeping and irregular breathing during sleep.
- Loss of appetite, nausea and vomiting.

Do not continue to ascend with these symptoms. Stop going higher until the symptoms resolve or preferably descend. Descending will usually help the symptoms to improve more quickly. Ascent can be continued again after the symptoms have settled, usually after 24-72 hrs.

To treat mild AMS

The severity of AMS can be assessed using the Lake Louise Score (see next page) and it is a good plan, when at altitude, to check symptoms against the score each day.

- Stay at height already reached or if possible descend 300-1,000 metres.
- Drink plenty of fluids (3-4 litres per day).
- Avoid alcohol and sedatives.
- Take ibuprofen for the headache.
- Acetazolamide 250mg (one tablet) twice daily can be used, but there is still a need to wait for symptoms to settle before going any higher.
- A doctor may also prescribe anti sickness medication or dexamethasone, if there are more severe AMS symptoms.

Emergencies requiring immediate descent

A Lake Louise score of over 6 indicates severe AMS which can very quickly develop into HAPE or HACE. Descent is strongly recommended with a score of 6 or more.

With any symptom indicating possible HAPE or HACE, immediate descent is vital to prevent potential loss of life. **DESCEND NOW!** Not in an hour, or later, or in the morning. The patient should be carried or stretched to reduce their exertion, as exercise will worsen their symptoms.

Symptoms of HAPE (fluid on the lungs) requiring immediate descent

- Trouble breathing, breathless at rest, breathing rate taking a long time to recover after physical exertion.
- Coughing.
- Frothy spit, becoming bloody.
- Lips, tongue, nail beds become blue.
- Fast pulse and fast breathing at rest.

Symptoms of HACE (fluid on the brain) requiring immediate descent

- Severe headache
- Becoming clumsy - unable to walk heel to toe in a straight line or to touch finger to nose with eyes closed.
- Odd behaviour - unhelpful, violent, lazy, unable to think straight, or to do simple sums.
- Non-stop vomiting.
- Blurred or double vision.
- Confusion.
- Seeing haloes around objects, hearing or smelling odd things, hallucinations.
- Reduced consciousness, coma..

WARNING: If a person cannot get their breath when everybody else has regained theirs or if a person is behaving strangely or cannot walk in a straight line this is a medical emergency.

If any of the above symptoms of HAPE or HACE develop, treat it as an emergency requiring immediate descent, **even if this is during the night**. The descent needs to be at least 500-1,000 metres (1,500-3,000 feet) and as soon as possible. **Delay can be fatal.**

Notes about HACE and HAPE

- Can come without any warning.
- Can develop rapidly over a period of hours.
- Often starts at night, although can come on during the day.
- There may be no preceding symptoms of AMS or warning.
- Can affect people who have ascended previously to the same height without problems.
- Can affect people who have followed the guidelines for acclimatisation.
- Can affect people who are taking acetazolamide.
- Can affect fit and unfit people, and local people including porters.

Treatment of HAPE and HACE

Ideally any expedition/trek to altitude will have a medically trained member, who will initiate other treatment alongside descent.

HAPE is usually treated with oxygen and immediate descent by at least 1,000 metres. A drug treatment regime for HAPE may include: nifedipine 10mg immediately, followed by 20mg three times a day for 3 days; sildenafil (Viagra) 50mg every 6 hours; and salbutamol/salmeterol inhaler 2 puffs every 2 hours.

HACE is usually treated with oxygen, and immediate descent by at least 1,000 metres. A drug treatment regime for HACE would be acetazolamide 250mg (one tablet) twice daily, dexamethasone 8mg immediately, followed by 4mg every 6 hours for at least 3 days,

In all cases of AMS, HAPE, and HACE, the patient should also be kept warm and given sugary drinks and food.

If there are difficulties arranging immediate descent the same effect can be provided by using a pressurised Gamow bag. This is a portable hyperbaric chamber 'bag' which increases the pressure of available oxygen in the air. The patient is put inside the bag for several hours and the pressure inside it is increased, using a foot pump. Oxygen from a cylinder can also be fed into the bag. The Gamow bag can buy time but descent as soon as possible is still recommended.

About acetazolamide

Acetazolamide is a carbonic anhydrase inhibitor diuretic which increases the amount of urine produced and changes the acidity of the blood. The effect is to improve breathing.

Acetazolamide is not licensed in the UK and Europe to prevent and treat altitude sickness, although it is approved in the USA for altitude effects, and has been used worldwide for this for many years. There is a UK licence for acetazolamide to treat glaucoma, epilepsy and as a diuretic (water tablet). Prescription for altitude, by Dr Fox is 'off label' and doctors take responsibility for the prescribing. There is no information about altitude in the manufacturer's patient information leaflet.

Acetazolamide cautions and possible side effects

Acetazolamide is a 'sulpha' drug so should not be taken by anyone with a severe sulphonamide allergy. It should not be taken by anyone with severe kidney or liver disease, or abnormalities of blood chemistry.

Commonly reported side effects include: a 'tingling' feeling in the fingers, toes and extremities, some loss of appetite and taste disturbance. Depression may occur if taken long term.

There is more information on side effects in the manufacturer's Patient Information Leaflet.

Other medicines and acetazolamide

Acetazolamide may interfere with the action of some other medication.

It should not be taken at the same time as aspirin, lithium, sodium valproate, or zonisamide.

If you are taking any other routine medication then it is recommended to discuss a trip to altitude and use of acetazolamide with your regular GP prior to travel. More information about acetazolamide and other medications is found in the manufacturer's patient information leaflet.

Acetazolamide dosage

Acetazolamide tablets should be swallowed without chewing, with a drink of water, before or after a meal.

| Condition | Acetazolamide dose | When to stop |
|---------------------------------------|---|--|
| Acclimatisation | 125mg (half a tablet) twice daily | 2-3 days after highest altitude |
| Sleep disorder of altitude | 125mg (half a tablet) 2 hours before sleep increasing to 125mg twice daily if necessary | Once sleeping has improved, or once descended. |
| Mild Acute Mountain Sickness (AMS) | 250mg (one tablet) twice daily | Once symptoms have settled |
| Severe Acute Mountain Sickness (AMS) | 250mg (one tablet) twice daily | Until no longer at altitude |
| High Altitude Pulmonary oedema (HAPE) | No longer recommended for treatment of HAPE | |
| High Altitude Cerebral oedema (HACE) | 250mg (one tablet) twice daily | Until no longer at altitude |

Notes

Stopping acetazolamide does not cause a rebound in symptoms. The symptoms will not be worse than they would have been if acetazolamide had not been taken in the first place.

Taking acetazolamide for early symptoms does not mean it is OK to keep ascending. Do not ascend until symptoms resolve completely, usually 24-72 hrs.

Acetazolamide does not mask serious underlying symptoms. It treats the cause, not the symptoms. If a person feels better on acetazolamide it is because their condition has improved. *[continued]*

Take a trial dose of half a tablet 3-4 days before travel to check for possible adverse reactions.

Treat altitude with respect. Do not imagine that a strong person can simply battle through. People who climb and hike in high places have a reputation for pushing themselves. When it comes to altitude; planning ahead, taking one's time and responding to one's own body are virtues.

Always read the Patient Information Leaflet supplied in the tablet medicine pack.

Lake Louise score (AMS symptoms)

Add together the individual scores for each symptom to get the total score.

| Symptoms | Severity | Points |
|----------------------------|--------------------------------|--------|
| Headache | No headache | 0 |
| | Mild headache | 1 |
| | Moderate headache | 2 |
| | Severe headache | 3 |
| Gastrointestinal symptoms | None | 0 |
| | Poor appetite or nausea | 1 |
| | Moderate nausea &/or vomiting | 2 |
| | Severe nausea &/or vomiting | 3 |
| Fatigue &/or weakness | None | 0 |
| | Mild fatigue/weakness | 1 |
| | Moderate fatigue/weakness | 2 |
| | Severe fatigue/weakness | 3 |
| Dizziness/light-headedness | Not dizzy | 0 |
| | Mild dizziness | 1 |
| | Moderate dizziness | 2 |
| | Severe dizziness | 3 |
| Difficulty sleeping | Slept as well as usual | 0 |
| | Did not sleep as well as usual | 1 |
| | Woke many times, poor sleep | 2 |
| | Could not sleep at all | 3 |

Total score

Rise in altitude within last 3-4 days and headache and total Lake Louise score of:

- 3-5 = mild AMS
- 6 or more = severe AMS

My Lake Louise score - name: _____

| | Notes | Score |
|----|-------|-------|
| 1 | | |
| 2 | | |
| 3 | | |
| 4 | | |
| 5 | | |
| 6 | | |
| 7 | | |
| 8 | | |
| 9 | | |
| 10 | | |
| 11 | | |
| 12 | | |
| 13 | | |
| 14 | | |