Below is a topic taken from UpToDate that I thought you might find interesting. Please share it with your group as an additional source of information on AMS.

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INTRODUCTION — Traveling to high altitudes can cause an altitude-related illness, such as acute mountain sickness (AMS), swelling of the brain (high altitude cerebral edema or HACE), or accumulation of fluid in the lungs (high altitude pulmonary edema or HAPE).

It is possible to prevent these conditions by ascending slowly and allowing your body to adjust as you go. Serious complications of high altitude disease can usually be avoided by watching for early signs and symptoms of high altitude illness and responding quickly.

This article will review the prevention and treatment of high altitude illness. More detailed information is available by subscription. (See "Acute mountain sickness and high altitude cerebral edema".)

RISK FACTORS — It is not possible to know in advance if you will become ill when traveling to a high altitude. In addition, being physically fit does not decrease your chances of developing a high altitude illness. However, certain groups are at increased risk, including people who:

- Have a prior history of high altitude illness
- Exercise or drink alcohol before adjusting to the change in altitude
- Ascend rapidly
- Have a medical problem that affects breathing

PREPARING TO TRAVEL — If you will be traveling above 8,000 feet (2,400 meters), you should make an appointment with your healthcare provider before your trip. During this visit, you should discuss your travel plans, availability of medical care at your destination, and the potential need for medicines to prevent and/or treat high altitude illness. (See 'AMS treatment' below.)

Traveling with medical conditions — People with certain medical conditions need to take special precautions when traveling at high altitudes:

- If you have diabetes and you check your blood sugar, be aware that blood glucose meters can give inaccurate results at high altitudes. Consult the manufacturer of the meter for recommendations about high altitude readings.
- If you have angina or had a heart attack in the past, check with your doctor to be sure that it is safe to travel to high altitudes. If you develop chest pain, shortness of breath, or dizziness while traveling, seek medical help immediately.
- Asthma does not worsen at high altitudes.
- If you use oxygen because of lung disease, you will need a higher oxygen flow rate at high altitude. If you do not need oxygen for your lung disease at home, you might need oxygen at high altitude. Check with your doctor before you travel. (See "Patient information: Supplemental oxygen on commercial airlines".)
If you have sickle cell disease, you will probably need oxygen if you travel above 7,000 feet (2,100 meters). If you have sickle cell trait, altitude-related complications are rare, except at very high altitude (over 14,000 feet or 4,200 meters).

ACUTE MOUNTAIN SICKNESS — Acute mountain sickness (AMS) is the most common of the altitude diseases; it occurs in approximately 40 to 50 percent of people who live at a low altitude and sleep at an altitude above 10,000 feet (3,000 meters).

Symptoms usually occur within 6 to 12 hours of arrival at altitudes above 8,000 feet (2,400 m). Symptoms can begin as soon as one hour or as long as 24 hours after arriving.

AMS prevention

Ascend slowly — Ascending slowly is the best way to avoid AMS. Some experts recommend the following:

- If you live below 5,000 feet (1,500 m), avoid ascending rapidly. On the first night, avoid sleeping above 9,000 feet (2,800 m).
- If you plan to travel above 9,800 feet (3,000 meters), do not ascend more than 1,600 feet (500 meters) per day. Plan a day of rest for every 3,200 feet (1,000 meters) you ascend. On this rest day, do not ascend higher and do not over-exert yourself.
- Climb high and sleep low. Hike to a higher altitude during the day and return to a lower elevation to sleep at night. This will help you adjust to the altitude.
- If you plan to ski, hike, or climb, do not over-exert yourself during the first few days at altitude. Avoid alcohol and sleeping pills, especially as you are adjusting to the altitude in the first two days.
- Staying or hiking at elevations above 4,900 feet (1,500 meters) in the weeks before you ascend may allow you to ascend faster.
- If you drink caffeine (coffee, tea, soda) regularly, do not stop drinking it before or during your trip. Caffeine is safe at high altitudes, and stopping it suddenly can cause symptoms similar to AMS.

These suggestions are particularly important if you have had AMS or another high altitude illness previously. (See "High altitude illness: Physiology, risk factors, and general prevention".)

Consider taking a preventive medicine — Preventive treatment with a medicine may be recommended if you have had high altitude illness previously or if you must ascend quickly. (See 'AMS treatment' below.)

If you have had high altitude illness before, you may be able to avoid taking preventive medicines by ascending slowly. You will need a prescription for these treatments.

- Treatment usually includes a medicine called acetazolamide, which you start taking the day before you ascend and continue for 48 hours or until you reach the highest point of your trip. (See "Acute mountain sickness and high altitude cerebral edema".)

Acetazolamide can temporarily cause carbonated drinks to taste unpleasant. Other side effects can include the need to urinate more frequently, numbness or tingling in the hands or feet, nausea, drowsiness, or blurry vision. Acetazolamide is not recommended for pregnant women.

Acetazolamide is a sulfa medicine, but many people with a sulfa allergy can take acetazolamide without a problem. If you are allergic to sulfa, talk to your doctor or nurse to determine if you should take a test dose before traveling [1]. (See "Sulfonamide allergy in non HIV-infected patients", section on 'Cross-reactivity'.)

- Dexamethasone is a steroid that may be recommended as a preventive treatment if you are allergic to acetazolamide.
- Taking aspirin or ibuprofen can help to prevent the headache that often occurs with AMS. If you will be ascending quickly, you can start taking aspirin or ibuprofen before you ascend. Otherwise, take it only if you develop a headache.

AMS symptoms — The symptoms of AMS are similar to a hangover, and include:

- Headache
- Feeling tired
- Lightheadedness
- Lack of appetite
- Difficulty staying asleep (waking frequently)
- Nausea, sometimes with vomiting

These symptoms may be mild or severe. AMS symptoms are often the worst after the first night and improve within one day if you do not ascend to a higher altitude. Symptoms may return as you travel higher. However, symptoms
can sometimes persist for weeks, even if you do not climb higher.

If you develop signs of acute mountain sickness, you should NOT climb higher until your symptoms have resolved (usually within 24 hours). You should rest and avoid drinking alcohol and taking sedatives or sleeping pills as you recover.

This may mean that you, as well as your fellow climbers, will be delayed or unable to climb as high or as far as you had hoped. However, climbing higher while you have symptoms of AMS can lead to serious complications.

AMS treatment — AMS treatment includes rest, descent, and may also include medicines to relieve symptoms. You should not exercise or climb higher until your symptoms have resolved. You should also know when and if you need to seek help. (See 'When to seek help' below.)

- Headache — You can take non-prescription medicines for headache, such as aspirin, acetaminophen (Tylenol®), or ibuprofen (Advil®, Motrin®).
- Nausea or vomiting — If you have nausea or vomiting, a prescription medicine such as promethazine (Phenergan®) or ondansetron (Zofran®) may be helpful, if it is available.
- Descent — If your symptoms do not improve or worsen over 24 to 48 hours, descend to an altitude where you feel better. Most people feel better after descending 1,600 to 3,300 feet (500 to 1,000 meters).
- Oxygen — If needed, treatment with inhaled oxygen can reduce the symptoms of AMS. You can use oxygen for a period of time (eg, one hour), only when you have symptoms, or while sleeping.
- Acetazolamide — Acetazolamide is a prescription medicine that you can take to treat and prevent AMS.
- Dexamethasone — Dexamethasone is a steroid that can reduce symptoms of AMS. You can take dexamethasone with acetazolamide, if needed. Dexamethasone increases blood sugar levels in people with diabetes.

When to seek help — AMS symptoms should improve as you adjust to the altitude, usually within 24 to 48 hours. If your symptoms worsen at any point, you should descend and seek help.

HIGH ALTITUDE CEREBRAL EDEMA — High altitude cerebral edema (HACE) is a life-threatening altitude disease, and is a severe form of AMS. It is caused by leaky capillaries in the brain, which causes swelling.

HACE prevention — HACE can be prevented with the measures discussed above. (See 'AMS prevention' above.)

HACE symptoms — HACE usually occurs within 1 to 3 days after traveling above 9,800 to 11,500 feet (3,000 to 3,500 meters). Symptoms may include:

- Exhaustion, drowsiness, and severe weakness
- Difficulty walking straight
- Confusion and irritability
- Acting drunk

HACE treatment — HACE is a medical emergency and you should descend to a lower altitude as soon as possible. Waiting to descend can be disastrous; symptoms can worsen quickly and you may not be able to walk. Delaying descent increases the risk of life-threatening complications, or even death. (See "Acute mountain sickness and high altitude cerebral edema".)

Besides descent, other HACE treatments include:

- Several hours in a portable hyperbaric chamber. This can be a useful and life-saving treatment until descent is possible. (See 'Portable hyperbaric chamber' below.)
- Dexamethasone. This is an important medicine to have on hand if you plan to travel above 9,800 to 13,000 feet (3,000 to 4,000 meters). You should take it immediately if you develop signs of HACE, with the recommended dose being 8 to 10 mg by mouth. You should take 4 mg every six hours thereafter until you have descended. You should take dexamethasone before entering a hyperbaric chamber.
- You should use oxygen if it is available. You can use oxygen inside a hyperbaric chamber.

Portable hyperbaric chamber — Portable hyperbaric chambers are inflatable pressure bags that can be used to treat people with acute mountain sickness, high altitude cerebral edema, or high altitude pulmonary edema. You are zipped into the chamber and the device is inflated with a foot pump (picture 1).

When inflated, the air inside the chamber is more like the air you breathe at lower altitudes. This increases the amount of oxygen in your blood, relieving symptoms of high altitude illness quickly. You can remain in the chamber for several hours.

HIGH ALTITUDE PULMONARY EDEMA — High altitude pulmonary edema (HAPE) is a potentially fatal condition in which lung capillaries leak and fluid accumulates in the lungs. HAPE is uncommon, but can occur in people who rapidly ascend to altitudes above 8,000 feet (2,500 m).
HAPE prevention — As with other high altitude illnesses, the best way to prevent high altitude pulmonary edema (HAPE) is to ascend slowly. This is especially true if you have a previous history of HAPE.

Preventive medicines are not usually recommended unless you have a history of HAPE and you must ascend quickly to altitudes above 8,200 feet (2,500 meters). Preventive medicines may include nifedipine (commonly used to treat high blood pressure), dexamethasone, or acetazolamide. (See "High altitude pulmonary edema".)

HAPE symptoms — Symptoms of HAPE include cough, breathlessness at rest or with activity, and difficulty walking uphill. These symptoms usually begin two to four days after arriving at altitude. You may or may not also have symptoms of acute mountain sickness. (See 'AMS symptoms' above.)

Symptoms can worsen, and you may feel more short of breath, even while resting. You may also begin to cough up pink, frothy sputum (spit).

HAPE treatment — HAPE is a medical emergency. You should seek medical care or descend as soon as possible if you develop symptoms. Waiting to descend can be disastrous; symptoms can worsen quickly and you may not be able to walk. Waiting also increases the risk of developing life-threatening complications, or even death. (See "High altitude pulmonary edema".)

Treatments for HAPE include:

- Descend or seek medical care at the first sign of HAPE.
- Supplemental oxygen; this is the most effective treatment and should be started as soon as possible. It should be continued until symptoms resolve. Oxygen may be life-saving if descent is not possible.
- Hyperbaric treatment may be used as an alternative to descent, if it is available. You can use oxygen inside a hyperbaric chamber. (See 'Portable hyperbaric chamber' above.)
- Nifedipine or other medicines may be helpful if oxygen is not available and descent is not possible.
- Stay warm and avoid cold temperatures
- Rest; this includes not carrying a pack while descending.

WHERE TO GET MORE INFORMATION — Your healthcare provider is the best source of information for questions and concerns related to your medical problem.

This article will be updated as needed every four months on our web site (www.uptodate.com/patients).

Related topics for patients, as well as selected articles written for healthcare professionals, are also available. Some of the most relevant are listed below.

Patient Level Information:

- Patient information: Supplemental oxygen on commercial airlines

Professional Level Information:

- Acute mountain sickness and high altitude cerebral edema
- High altitude and heart disease
- High altitude illness: Physiology, risk factors, and general prevention
- High altitude pulmonary edema
- Sulfonamide allergy in non HIV-infected patients

The following organizations also provide reliable health information.

- United States Center for Disease Control and Prevention (www.cdc.gov/travel/yellowBookCh6-AltitudeIllness.aspx)
- International Society for Mountain Medicine (www.ismmed.org)

[1-3]

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REFERENCES

1 Strom BL, Schinnar R, Apter AJ, et al. Absence of cross-reactivity between sulfonamide antibiotics and

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Thank you.