



Now, what happens when things go from bad to worse. What can you do? What can others do for you? How do you know it has gotten to that point?

HAPE

High Altitude Pulmonary or HAPE for short, is a condition that occurs mainly in altitudes in excess of 2000 meters or 6560 feet. As I've mentioned before, HAPE can affect anyone, at any time and on any climb. There are, however, contributing factors which increase the incidence and severity of the illness, these include:

- Rate of ascent,
- The altitude attained,
- The amount of physical activity at high altitudes, and
- An individual's susceptibility.

Pathophysiology

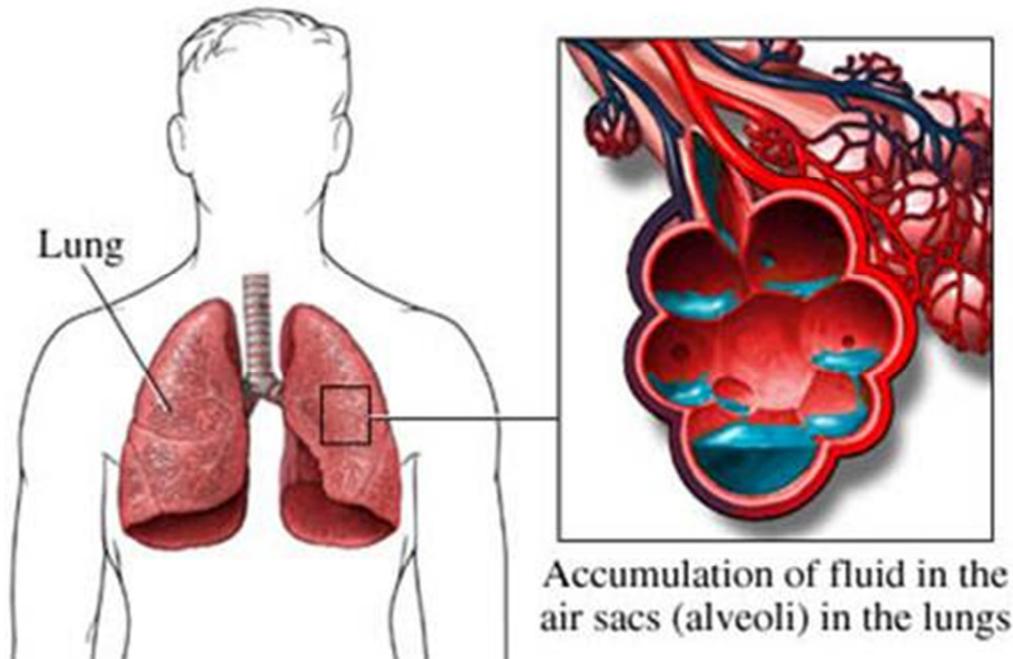
If you remember back to high school biology, which can be quite some time for most of us, we learnt that we have pair of lungs, each composed of lobes. While the right lung has 3 lobes, the left only 2 to make space for the heart. Now each lung is comprised of bronchioles (passages) and alveoli (rooms), when we breath in, air travels down our trachea aka wind-pipe and then branches to each lung via the bronchi. Now once the air reaches the aveoli, a series of processes allow for a gaseous exchange of oxygen into a blood. Then the blood is pumped to various parts of our body, thanks to the pumping action of our heart.

Now there are to 2 forms of pulmonary that can occur:

- Cardiogenic pulmonary edema – this is pulmonary edema caused when there's an issue with the heart or an increase of pressure within the heart.
- Non-cardiogenic pulomary edema – this is pulmonary edema is not related to conditions of the heart or linked to an increase of pressure in the heart.

So, now, when someone is suffering HAPE, the fluid within our vessels and capillaries of our lungs air sacs may leak out, as they've become more permeable. This condition generally only occurs from 2500 meters and above. The reasons why this happen aren't completely understood in the medical community yet, but there seems to be a theory that it may be caused by an increase in pressure due to the constriction of the pulmonary capillaries.





Incidence Rate

In the United States of America there was a study done on Colorado skiers, looking into the frequency of reported cases of AMS and HAPE. The results found that AMS occurred in 15-40% of skiers, while HAPE was extremely low, occurring in only 0.1-1%.

A further International study was carried out on Mount Everest trekkers. The results showed that the incidence of HAPE reported by trekkers was 1.6%, while this percentage was unusually high among trekkers of Mount Rainier.

In numerous blogs, I've mentioned that incidence of AMS is equally seen in males and females, but with HAPE, women are less likely to develop it. Apart this, other factors increase vulnerability, these include:

- Alcohol,
- Respiratory depressants, and
- Respiratory infections.

Symptoms

Knowing the symptoms of HAPE is the best way to keep yourself safe while on your trip. It also allows you to catch it at the beginning stages before coming too serious and life-threatening. The symptoms do vary depending on the severity.



The symptoms you need to keep an eye out for include:

- Shortness of breath, the shortness will first begin during exertion then slowly progresses to during rest,
- You'll develop a cough not experienced before,
- The cough will produce a frothy sputum, which may be blood streaked,
- You'll start finding physical exertion, especially walking, more and more difficult,
- Chest discomfort,
- Fever,
- You will develop heart palpitations, meaning you'll feel your heart in chest as the beats will become irregular and rapid,
- A headache will develop as well.

Treatment

Since you're on a mountain, all the tools, equipment and medications you will find at your local hospital won't be available. Even though this may be the case, expedition doctors will have everything necessary to treat HAPE on the spot. The main treatment protocols will be as follows:

- Descending to 600-900 meters as quickly as possible,
- Reduce physical activity,
- Keep warm,
- Oxygen supplementation will alleviate symptoms,
- If available, portable hyperbaric chambers will be used to imitate a descent,
- Nifedipine medication such as Procardia will be administered to reduce pulmonary arterial pressure,
- Medications such Diamox are prescribed before leaving to prevent HAPE,
- If your condition is severe, a helicopter rescue may be necessary.

Lifestyle

There are multiple lifestyle changes you can implement that may help prevent developing HAPE while on your trip. Some of these changes might be recommended by your doctor after your physical exam but they are generally changes that lead to a healthier lifestyle.

- Controlling high blood pressure
- Control high blood glucose levels if you suffer from diabetes
- Quit smoking
- Maintain and eat a healthy diet, preferably a low-salt diet
- Maintain a healthy weight





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- Exercise regularly, this should both strength training and cardiovascular exercise. You should try training with all of your gear at least once a week.

Complications

If HAPE goes untreated, it will cause a rise in your pulmonary artery, leading to what's called pulmonary hypertension. This will eventually lead to the weakening of your hearts right ventricle and begins to fail. Under normal conditions, the right ventricle is under less pressure than the left ventricle because it only has to pump to the lungs, while the latter has to pump blood systemically. So when the pressure starts to rise in the right ventricle, this will lead to blood backing up into the right atrium and eventually in various parts of the body as well, where it will cause:

- Increased Jugular Venous Pressure (JVP),
- Lower limb edema,
- Abdominal swelling (ascites),
- Congestion and swelling of the liver, and
- If it still remains untreated, it may be fatal.

Prevention

There are a things you can do before leaving and while on your trip to prevent developing HAPE. I hope the following trips will keep you safe on your travels.

- Acclimatise yourself at your own pace
- Ascend to high altitudes slowly and steadily, no more than 305-366 meters per day once reaching 2500 meters
- Rest an extra day for every 183-366 meters when at high altitudes
- Medications such as Diamox and Procardia



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