

High Altitude Acclimatization

- **Process of body adjusting to the decreased availability of oxygen at high altitude**
- **It's a slow process**
- **Takes place over a period of days to weeks**



Why low Oxygen at high altitude?



- Because air is compressible, the weight of all the air above us compresses the air around us, making it denser. As you go up a mountain, the air becomes less compressed and is therefore thinner. That is to say, air pressure drops as one goes up.
- At sea level, Oxygen % in the air is 21. The important thing is **even at the top of Mt. Everest, Oxygen % in the air is 21!!** so why is there so much of **fuzz about less Oxygen at altitude?**
- As one attains higher altitudes, air density reduces. That means, amount of available air in a given space decreases. **But when overall air density reduces, it naturally means the Oxygen content also reduces; even if it's % in the air remains same.**

Blood & Oxygen saturation



- At altitude roughly below 2500 m, there is no much physiological changes in human body.
- Altitude starts kicking in as one goes suddenly above 2500 m. or do not take proper care of one's health. This results in poor supply of Oxygen to the blood cells
- At high altitude, body has to deal with the reduced oxygen levels by breathing faster and deeper even when you are resting, so as to compensate the less Oxygen intake per breath.

High Altitude Challenges



- **AMS** : Stems from rising in altitude too fast where the levels of available oxygen are far lower
- **HAPE** : HAPE occurs when fluid leaks into your lungs through the capillary wall
- **HACE** : HACE occurs when there is dangerous swelling of the brain
- AMS, if not treated in time, can subsequently develop into either HAPE or HACE
- Both conditions are extremely dangerous and usually occur from ascending too quickly or spending too long at high altitude

The Process of Acclimatization



- **At high altitude, the blood oxygen level decreases** which forces lungs to breath faster so as to compensate the Oxygen supply. This is known as hyperventilation.
- **In Hyperventilation stage**, body looses Carbon Dioxide below the certain permissible limits. Carbon Dioxide being acidic in nature, it leads to the body's physiological imbalance by making the system more alkaline.
- In this case, to avoid the imbalance, first thing that body can do is to slow down the process of breathing. But that's not possible. The other way is to removal **of bicarbonates** through urine to restore the balance.
- Thus, body best acclimatizes when one consumes lots of fluids and urinates frequently. The process of urination is helpful in a way to maintaining the warmth inside the body. This is a **natural way of acclimatizing to higher altitude**.
- **Diamox just facilitates this exact process of acclimatization by stimulating the person to urinate frequently.** So, if you are planning to take Diamox (after medical consultation), one needs to be well prepared in terms of proper fluid intake or else, the drug may cause side effects such as dizziness due to dehydration, kidney stones, numbness in fingertips, changed taste.
- **We recommend though to follow the natural process of acclimation.**

Symptoms for AMS

Mild	Moderate	Severe
Headache	Vomiting	Severe Headache
Fatigue	Persisting Headache	Inability walk
Nausea	Decreased coordination	Fainting
Loss of Apatite	Weakness	Shortness of breath during rest periods
Loss of Sleep		

Golden Rule 1: If you feel unwell at altitude, it is altitude sickness unless proven otherwise

Golden Rule 2: Never Ascend with symptoms of altitude sickness

Golden Rule 3: If you are getting worse, get down at once

Can AMS be Fatal?

- AMS is not fatal
- But if it is not treated in time, it develops into either **HACE** or **HAPE**, which can surely become fatal!

So what to do to avoid this??

- Drink plenty of water (Keep hydrated)
- Walk slow at steady pace
- Climb high, sleep low



If the AMS doesn't recover, then **Descend** is the only option!

Misconceptions

- **Misconception 1 : Good fitness keeps AMS at bay.**
- **Truth: Good fitness can help acclimate easier but it cannot assure AMS free ride**
- **Misconception 2 : Diamox will prevent AMS from worsening during ascent**
- **Truth: It will only worsen the situation. Best option is to descend.**
- **Misconception 3 : Alcohol keeps you warm and help acclimate better**
- **Truth: Alcohol is a vasodilator. Consumption of alcohol causes peripheral veins to dilate and lets more blood to circulate in the peripheral body keeping the core body deprived of blood. This gives false sense of warm feeling, while the core muscles heart, lungs are left vulnerable to cold.**

Final thoughts

- Walk slow
- Keep hydrated
- Climb high, sleep low
- Get your Oxygen Saturation checked from experts, doctors etc.
- Take Diamox only in case if rapid ascend is unavoidable after consulting with experts!!
- In case the situation doesn't improve, DESCEND!! Mountain will still be there next time. You should turn around **ALIVE** to come back next time

