

# Acclimatization Encyclopedia Article

## Acclimatization

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# Acclimatization

Acclimatization is a process whereby the human body becomes adapted to the challenges brought about by a change in altitude.

The decreasing amount of oxygen available as altitude—the vertical distance above the level of the sea--increases can make the body's ability to function more difficult. If the body is not given time to get used to changes in altitude, a syndrome called altitude sickness may arise. Altitude sickness is characterized by a severe **headache**, **nausea**, physical weakness, and increased respiration rate (as the body attempts to take in enough oxygen to maintain proper oxygenation). With sustained exposure, high altitude and lower air pressure can cause fluid build-up in the **lungs** and the **brain**. These conditions, called high altitude pulmonary **edema** and cerebral edema, can be life-threatening.

All these symptoms can most often be avoided with acclimatization. Given time--typically one to three days at the particular altitude--the body can adapt to the decrease in oxygen concentration at various altitudes. The "staging" of mountain climbers at various altitudes on their way up Mount Everest is an example of acclimatization in action.

A number of changes take place in acclimatization, in order to allow a body to operate with decreased oxygen. The depth of respiration increases. Put another way, the volume of air breathed in to the lungs in a breath is greater. Technically, this adaptation is known as the hypoxic ventilatory response. Second, the pressure in the **arteries** of the lung increases, powering **blood** into regions of the lung that otherwise would not be reached when **breathing** at sea level. Also, more oxygen-carrying red blood cells are made, in order to more efficiently distribute the available oxygen throughout the body. The rate at which the **heart** beats increases initially but then, as acclimatization progresses, decreases, so as to limit the consumption of oxygen. Finally, there is an increase in the amount of an enzyme that functions to promote the release of oxygen from **hemoglobin** (the protein that transports it throughout the body) to body tissues.

Athletes have exploited high altitude acclimatization. Training at high altitude prior to a competition at lower altitudes may imbue the athlete with an increased capacity to carry oxygen.