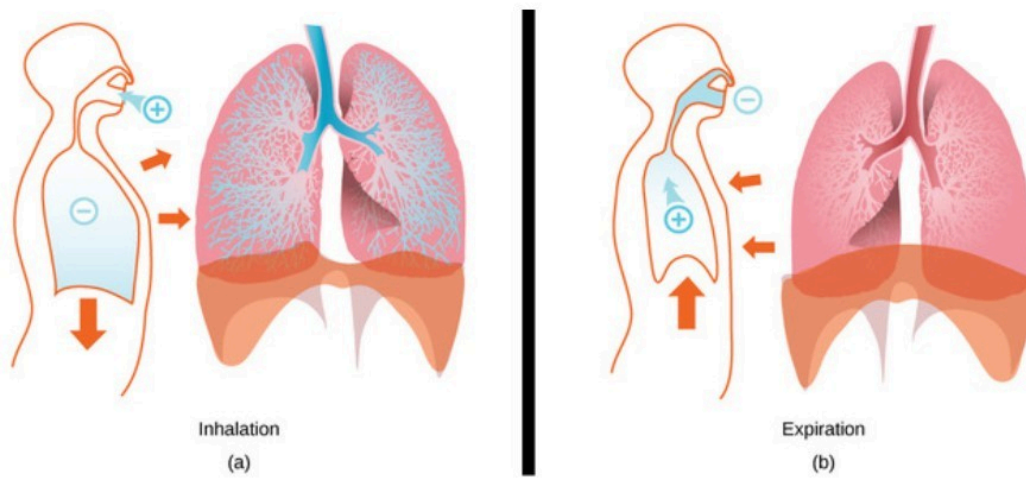


## Inhalation and Exhalation

The thoracic cavity, or chest cavity, always has a slight, negative pressure which aids in keeping the airways of the lungs open. During the process of inhalation, the lung volume expands as a result of the contraction of the diaphragm and intercostal muscles (the muscles that are connected to the rib cage), thus expanding the thoracic cavity. Due to this increase in volume, the pressure is decreased, based on the principles of Boyle's Law. This decrease of pressure in the thoracic cavity relative to the environment makes the cavity pressure less than the atmospheric pressure. This pressure gradient between the atmosphere and the thoracic cavity allows air to rush into the lungs; inhalation occurs. The resulting increase in volume is largely attributed to an increase in alveolar space because the bronchioles and bronchi are stiff structures that do not change in size.



**Inhalation and exhalation:** The lungs, chest wall, and diaphragm are all involved in respiration, both (a) inhalation and (b) exhalation.

During this process, the chest wall expands out and away from the lungs. The lungs are elastic; therefore, when air fills the lungs, the elastic recoil within the tissues of the lung exerts pressure back toward the interior of the lungs. These outward and inward forces compete to inflate and deflate the lung with every breath. Upon exhalation, the lungs recoil to force the air out of the lungs. The intercostal muscles relax, returning the chest wall to its original position. During exhalation, the diaphragm also relaxes, moving higher into the thoracic cavity. This increases the pressure within the thoracic cavity relative to the environment. Air rushes out of the lungs due to the pressure gradient between the thoracic cavity and the atmosphere. This movement of air out of the lungs is classified as a passive event since there are no muscles contracting to expel the air.