To maintain diffusion of gases across the alveolar epithelium, air is constantly moved in and out of the lungs through ventilation (breathing).

When the **air pressure of the atmosphere is greater than the air pressure inside the lungs**, air is forced into the lungs = **inspiration**.

When the **air pressure in the lungs is greater than that of the atmosphere**, air is forced out of the lungs = **expi**-

The pressure changes within the lungs are brought about by three sets of muscles: The Diaphragm: a phree of Muscle that separates the thorax from the abdomen

The Intercostal muscles: lie between the ribs=

- Internal intercostals: whose contraction leads to expiration
- External intercostals: whose contraction leads to inspiration



Inspiration:

Breathing is an active process (uses energy):

- 1. external intercostal muscles contract, while the internal intercostal muscles relax.
- 2. The ribs are pulled upwards and outwards, increasing the volume of the thorac.
- The diaphratic puscies contract, causing it to thorax.
 - The creased volume of the thorax results in reduction of pressure in the lungs.
 - 5. Atmospheric pressure is now greater than pulmonary pressure so air is forced into the lungs.

The mechanism of breathing

Expiration:

Breathing out is largely a passive process (doesn't require lots of energy:

- 1. internal intercostals contract, while the external intercostals relax.
- 2. The ribs move downwards and inwards, decreasing the volume of the thorax.
- 3. The diaphragm muscles relax and so it is pushed up again by the contents of the abdomen that were compressed during inspiration. Volume of thorax is therefore further decreased.
- 4. The decreased volume of the thorax increases the pressure in the lungs.
- 5. The pulmonary pressure is now greater than that of the atmosphere = air is forced out of the lungs.



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Pulmonary Ventilation Rate = Tidal volume x breathing rate

(dm3min-1)

(dm3) (m

Pulmonary Ventilation: how much air is taken in and out of the lungs in a given time. Pulmonary ventilation rate is the total volume of air that is moved into the lungs during 1 minute.