

The Re The Respiratory System

Your respiratory system brings

Problems with your resp

The Parts of Lungs

The respiratory system is made up of

- Trachea
- Bronchi (Main)
- Bronchioles (Small)
- Alveoli (Tiny sacs where gas exchange happens)

Right and Left Lungs

Each lung has two lobes. The right lung is larger and has three lobes. The left lung is smaller and has two lobes.

The central cavity is made up of

- Heart and lungs
- Diaphragm
- Trachea
- Esophagus
- Stomach

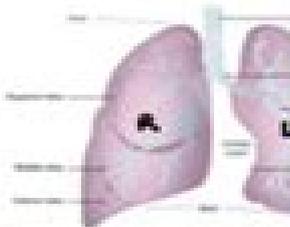
Air is inhaled or exhaled by moving the diaphragm up and down.



The Bronchial

Right and Left Bronchi

- Right is more than 10 times the diameter of the left bronchus.
- Left bronchus is shorter and narrower.
- It divides into:
 - Secondary Bronchi
 - Tertiary Bronchi
 - Bronchioles
 - Terminal Bronchioles
 - Alveoli (terminal respiratory units) at the end.

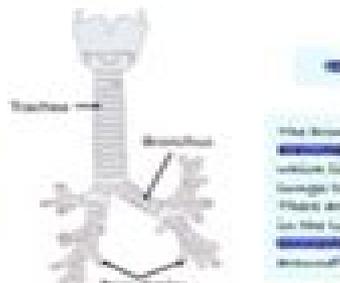


The Pleura

Two layers of pleura surround each lung. The inner layer is called the visceral pleura and the outer layer is called the parietal pleura.

The Diaphragm

It is a muscular partition between the chest and abdominal cavities. It contracts and relaxes to breathe.

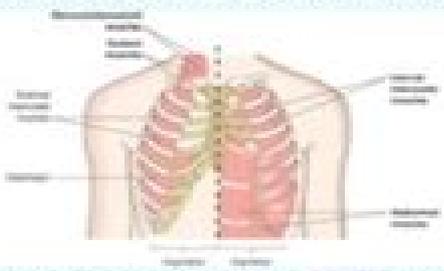


A diagram showing the trachea and bronchi.

Inflation and deflation of the lungs require changes in the volume of the thoracic cavity. This is dependent on the contraction and relaxation of the muscles of respiration and the elastic connective tissue.

Mechanics of Respiration

- Inhalation:
 - Diaphragm contracts and flattens, increasing the thoracic cavity.
 - As the cavity increases, the pressure inside decreases, resulting in negative pressure, and the negative pressure is below atmospheric pressure, air is drawn in.
- Exhalation:
 - Diaphragm relaxes and moves up, decreasing the thoracic cavity.
 - Relaxation of the intercostal muscles allows the rib cage to move down and in and the contraction of the diaphragm reduces the size of the thoracic cavity.
 - As the cavity decreases the pressure in the cavity increases, resulting in positive pressure, and if it becomes more than atmospheric pressure, air is forced out.



Inspiring muscles

- External Intercostals (30 pairs)
- Diaphragm
- Abdominal Oblique (inner lateral)
- Rectus Abdominus (6 pairs)

Expiring muscles

- Diaphragm (up)
- Internal Intercostals (10-15)
- Rectus Abdominus (6 pairs)

Inhalation: The muscles of respiration contract and utilize energy to do so, this is an **active** process as it uses energy. Inspiration last approximately **2 seconds**.

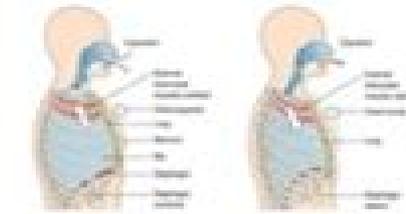
Exhalation: Contraction of the intercostal muscles pull the rib cage upwards and outwards.

The diaphragm contracts when contracted, increasing the thoracic cavity.

As the cavity increases, the pressure inside decreases, resulting in **negative pressure**, and the negative pressure is below atmospheric pressure, air is drawn in.

Exhalation: **relaxation** of the intercostal muscles allows the rib cage to move down and in and the **contraction of the diaphragm** reduces the size of the thoracic cavity.

As the cavity decreases the pressure in the cavity increases, resulting in **positive pressure**, and if it becomes more than atmospheric pressure, air is forced out.



Volume and Pressure

- Inhalation:** Volume of thoracic cavity of the connective tissues in the lungs will increase resulting in air.
- Exhalation:** Volume of the thoracic cavity will decrease, lung will expand and air will be forced out.
- Pressure:** As the volume of the thoracic cavity increases, the pressure inside decreases, resulting in negative pressure, and the negative pressure is below atmospheric pressure, air is drawn in.
- Exhalation:** As the volume of the thoracic cavity decreases, the pressure inside increases, resulting in positive pressure, and if it becomes more than atmospheric pressure, air is forced out.

Residual Volume (RV): The volume of air remaining in the lungs after a normal expiration.

Tidal Volume (TV): The amount of air which passes in and out of the lungs during normal breathing.

Inspiratory Capacity (IC): The amount of air that can be inhaled into the lungs during maximal inspiration.

Functional Residual Capacity (FRC): The maximum amount of air that can be inhaled, tidal volume + inspiratory reserve volume.

Residual Volume (RV): The amount of air remaining in the air passages and alveoli at the end of normal expiration.

Inspiratory Reserve Volume (IRV): The amount of air that can be inhaled during maximal inspiration.

Expiratory Reserve Volume (ERV): The amount of air that can be expired during maximal expiration.

Total Lung Capacity (TLC): The maximum amount of air which can be held in and out of the lungs.

Respiratory Volume

- Inhalation:** Normal, unforced breathing.
- Exhalation:** Normal, unforced breathing.
- Hyperinflation:** An abnormally rapid breathing rate of more than 20 breaths per minute.
- Hypoinflation:** An abnormally slow rate of breathing.

Composition of Inspired and Expired Air

Gas	Inspired Air	Expired Air
Oxygen	21%	16%
Carbon Dioxide	0.04%	4%
Nitrogen	78%	78%
Water	Variable	Saturated

BREATHE IN... BREATHE OUT

BREATHE IN... BREATHE OUT

BREATHE IN... BREATHE OUT... BREATHE IN... BREATHE OUT...

Chapter 22 Respiratory System Study Guide

B Lingard



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