

The Respiratory system

DR VISHAL BANNE

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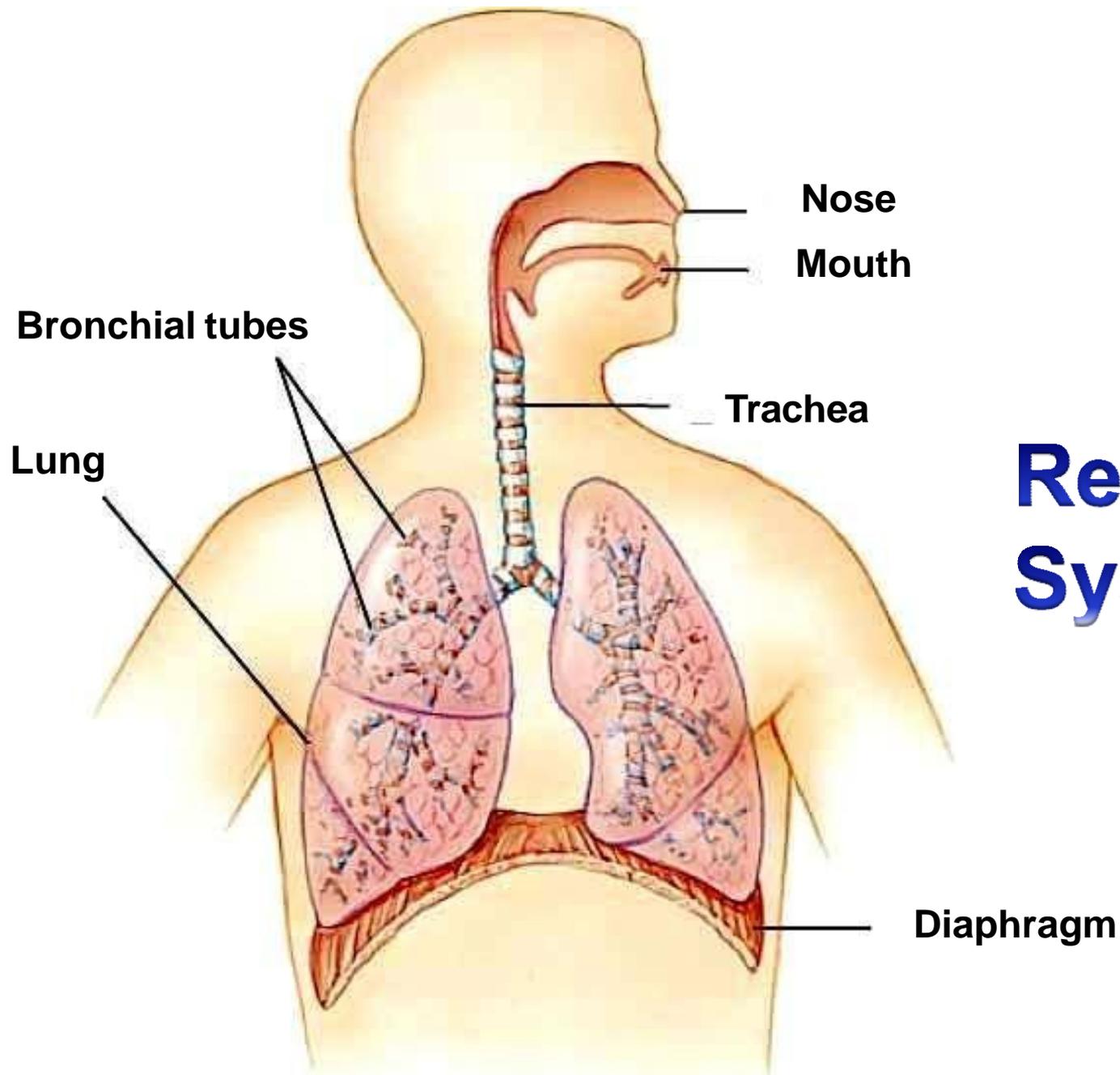
Respiratory System: Oxygen Delivery System

- *The respiratory system is the set of organs that allows a person to breathe and exchange oxygen and carbon dioxide throughout the body.*
- *The integrated system of organs involved in the intake and exchange of oxygen and carbon dioxide between the body and the environment and including the nasal passages, larynx, trachea, bronchial tubes, and lungs.*

The respiratory system performs two major tasks:

- Exchanging air between the body and the outside environment known as *external respiration*.
- Bringing oxygen to the cells and removing carbon dioxide from them referred to as *internal respiration*.





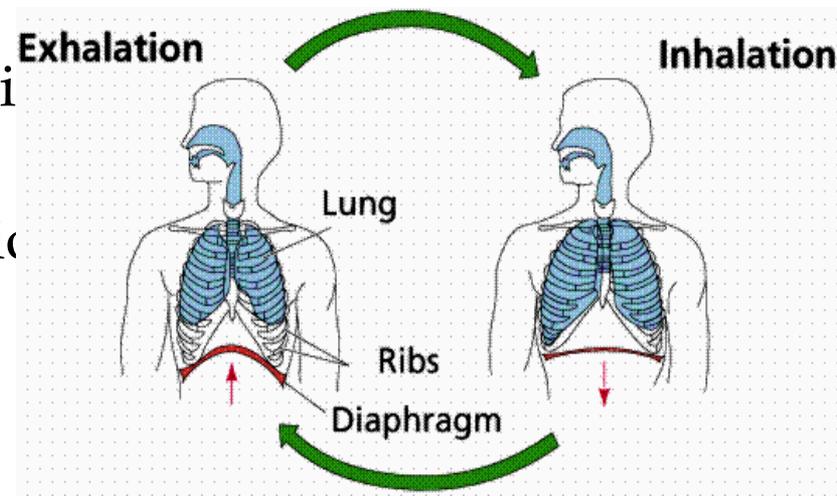
Respiratory System

Functions Of Respiratory System

1. Supplies the body with oxygen and disposes of carbon dioxide
2. Filters inspired air
3. Produces sound
4. Contains receptors for smell
5. Rids the body of some excess water and heat
6. Helps regulate blood pH

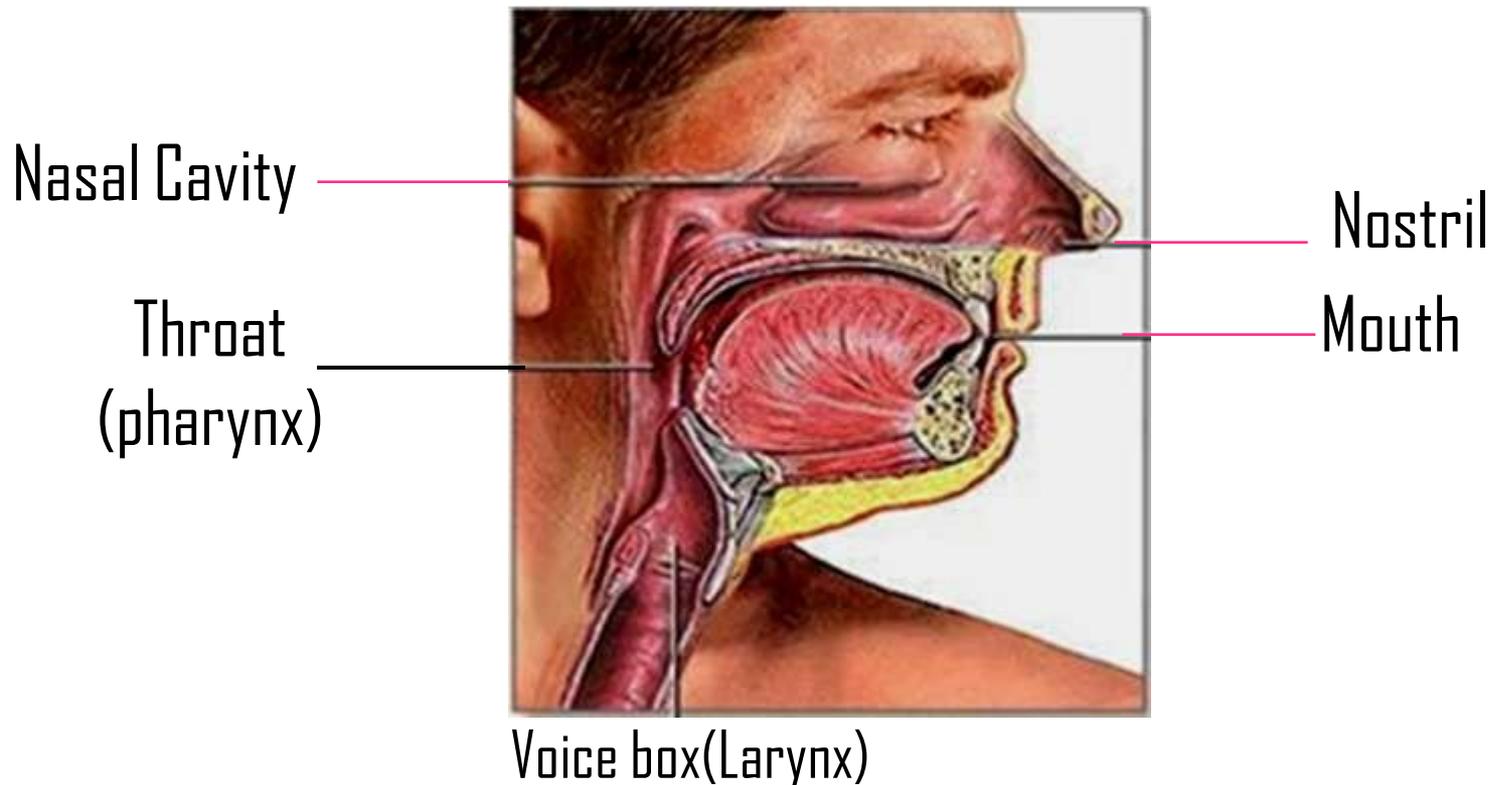
Breathing

- Breathing (pulmonary ventilation). consists of two cyclic phases:
 - **Inhalation**, also called inspirati gases into the lungs.
 - **Exhalation**, also called expiratio gases out of the lungs.



External Respiration

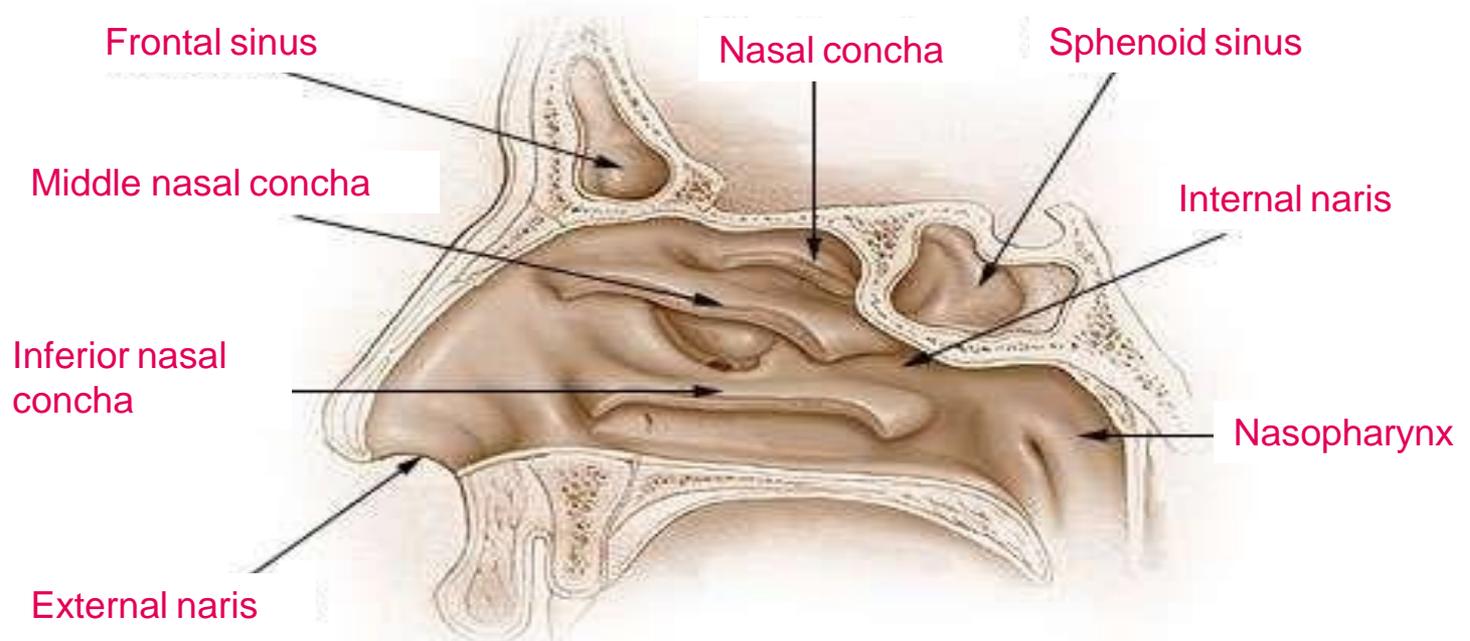
- Air from the outside environment enters the nose or mouth during **inspiration** (*inhalation*).
- Composed of the **nose** and nasal cavity, paranasal sinuses, pharynx (throat), larynx.
- All part of the conducting portion of the respiratory system.



Nose

- Also called external nares.
- Divided into two halves by the **nasal septum**.
- Contains the **paranasal sinuses** where air is warmed.
- Contains **cilia** which is responsible for filtering out foreign bodies.

Nose and Nasal Cavities



- **Internal nares** - opening to exterior
- **External nares** - opening to pharynx
- **Nasal conchae** - folds in the mucous membrane that increase air turbulence and ensures that most air contacts the mucous membranes

Provides and airway for respiration

- Moistens and warms entering air
 - Filters and cleans inspired air
 - Resonating chamber for speech
- detects odors in the air stream

Pharynx

- Common space used by both **the respiratory** and **digestive systems**.
- Commonly called **the throat**.
- Originates posterior to the nasal and oral cavities and extends inferiorly near the level of the bifurcation of the **larynx** and **esophagus**.
- Common **pathway** for both **air** and **food**.
- Walls are lined by a mucosa and contain skeletal muscles that are primarily used for swallowing.
- Flexible lateral walls are distensible in order to force swallowed food into the esophagus.

Three Sections of the Pharynx

- **Nasopharynx**

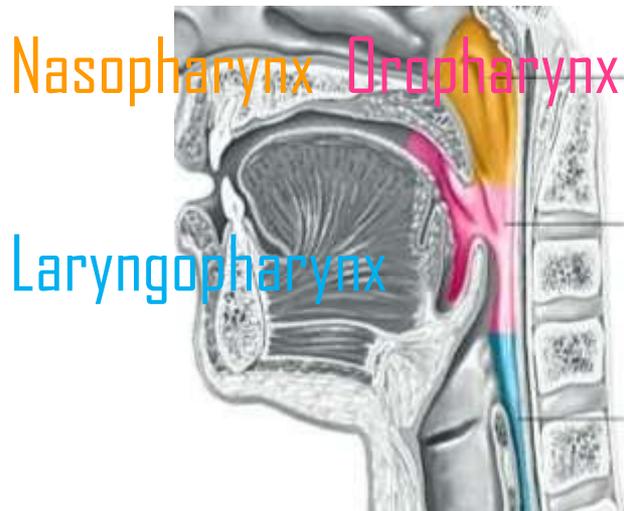
- contains the *pharyngeal tonsils* (adenoids) which aid in the body's immune defense.

- **Oropharynx**

- back portion of the mouth that contains the *palatine tonsils* which aid in the body's immune defense.

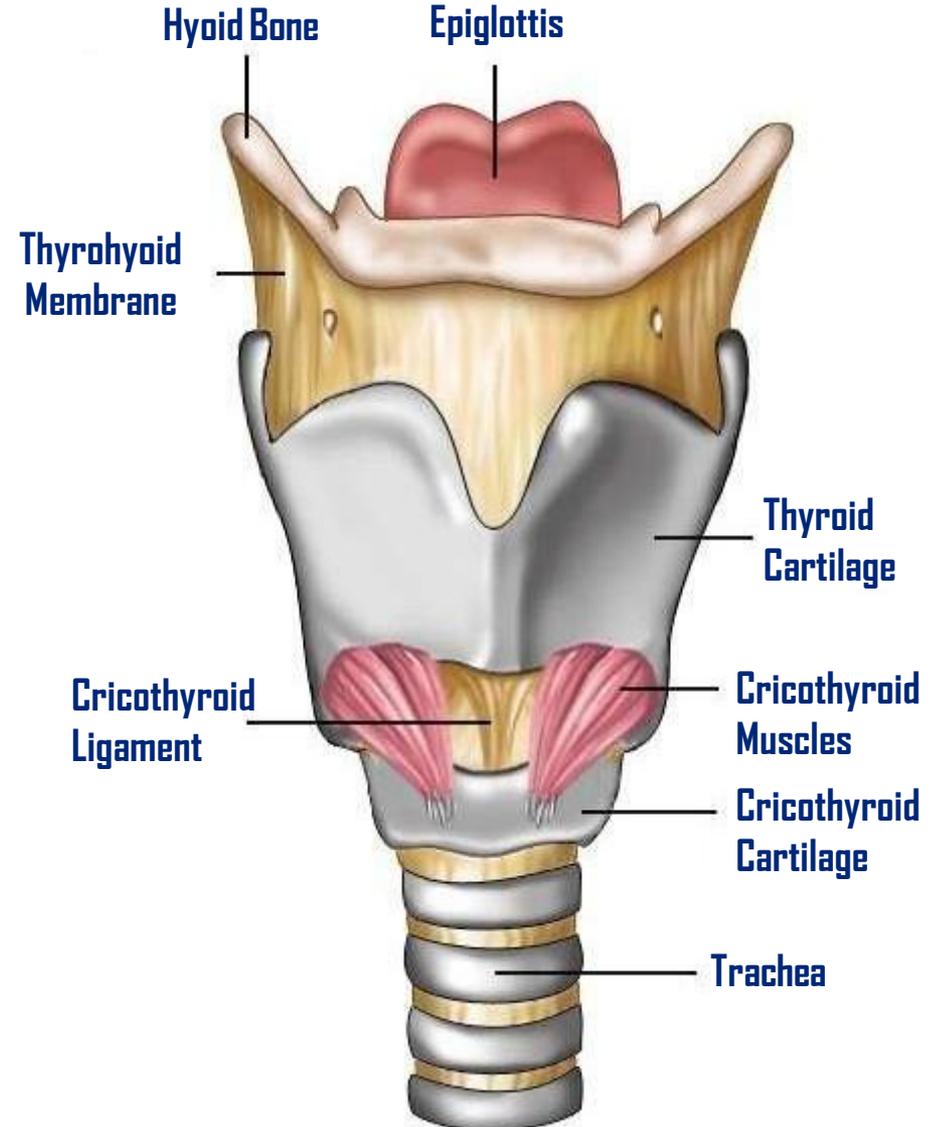
- **Laryngopharynx**

- bottom section of the pharynx where the respiratory tract divides into the *esophagus* and the *larynx*.



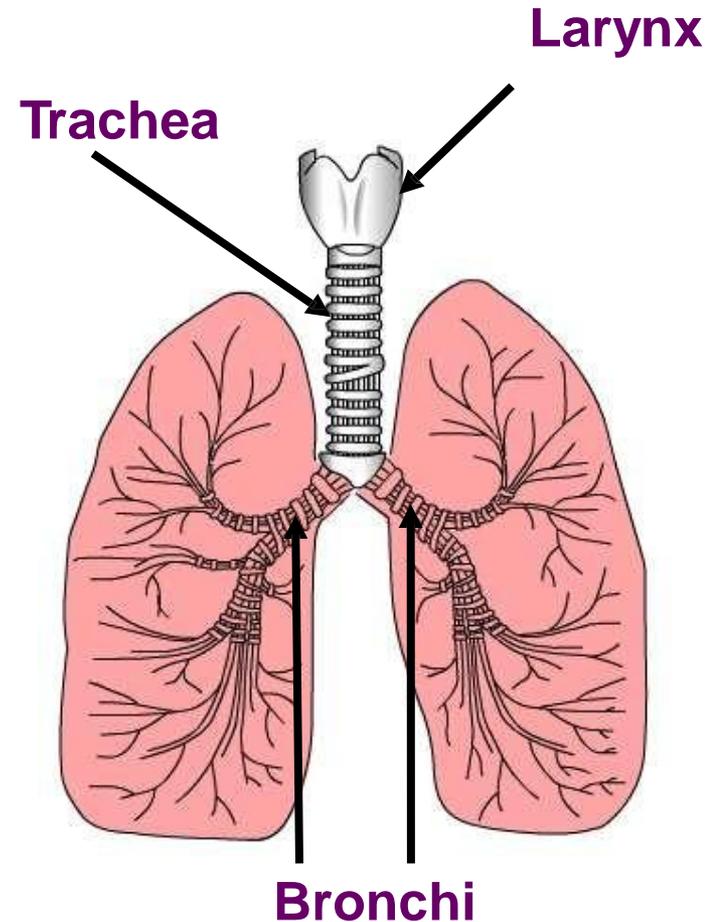
Larynx

- **Voice box** is a short, somewhat cylindrical airway ends in **the trachea**.
- Prevents swallowed materials from entering the lower respiratory tract.
- Conducts air into the lower respiratory tract.
- Produces sounds.
- Supported by a framework of nine pieces of cartilage (three individual pieces and three cartilage pairs) that are held in place by ligaments and muscles.



Trachea

- A flexible tube also called *windpipe*.
- Extends through the mediastinum and lies anterior to the esophagus and inferior to the larynx.
- Cartilage rings reinforce and provide rigidity to the tracheal wall to ensure that the trachea remains open at all times.
- At the level of the sternal angle, the trachea bifurcates into two smaller tubes, called the **right and left primary bronchi**.
- Each primary bronchus projects laterally toward each lung.



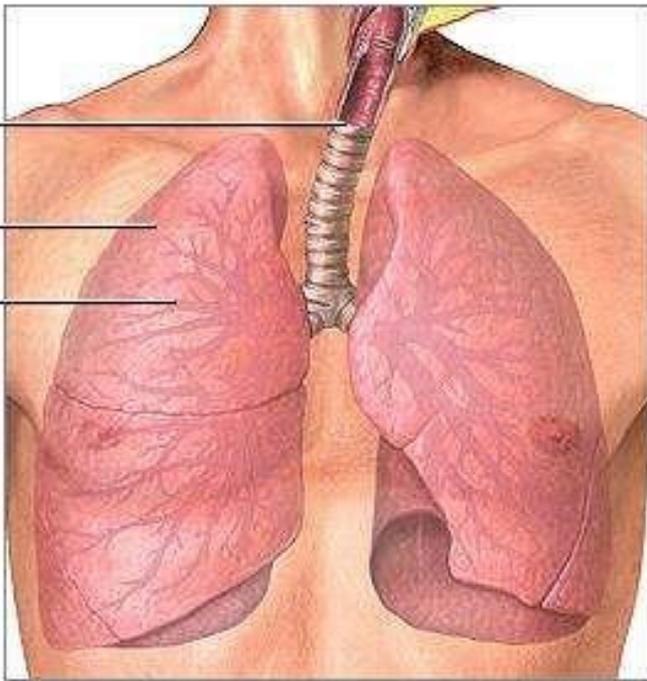
Lungs

- Each lung has a conical shape. Its wide, concave base rests upon the muscular diaphragm.
- Its superior region called the **apex** projects superiorly to a point that is slightly superior and posterior to the clavicle.
- Both lungs are bordered by the thoracic wall anteriorly, laterally, and posteriorly, and supported by the rib cage.
- Toward the midline, the lungs are separated from each other by the **mediastinum**.
- The relatively broad, rounded surface in contact with the thoracic wall is called the **costal surface** of the lung.

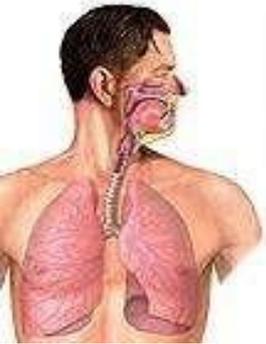
Windpipe
(trachea)

Lung

Bronchus



Lungs



Left lung

- divided into 2 lobes by **oblique fissure**
- smaller than the right lung
- **cardiac notch** accommodates the heart

Right lung

- divided into 3 lobes by **oblique and horizontal fissure**
- located more superiorly in the body due to liver on right side

Pleura

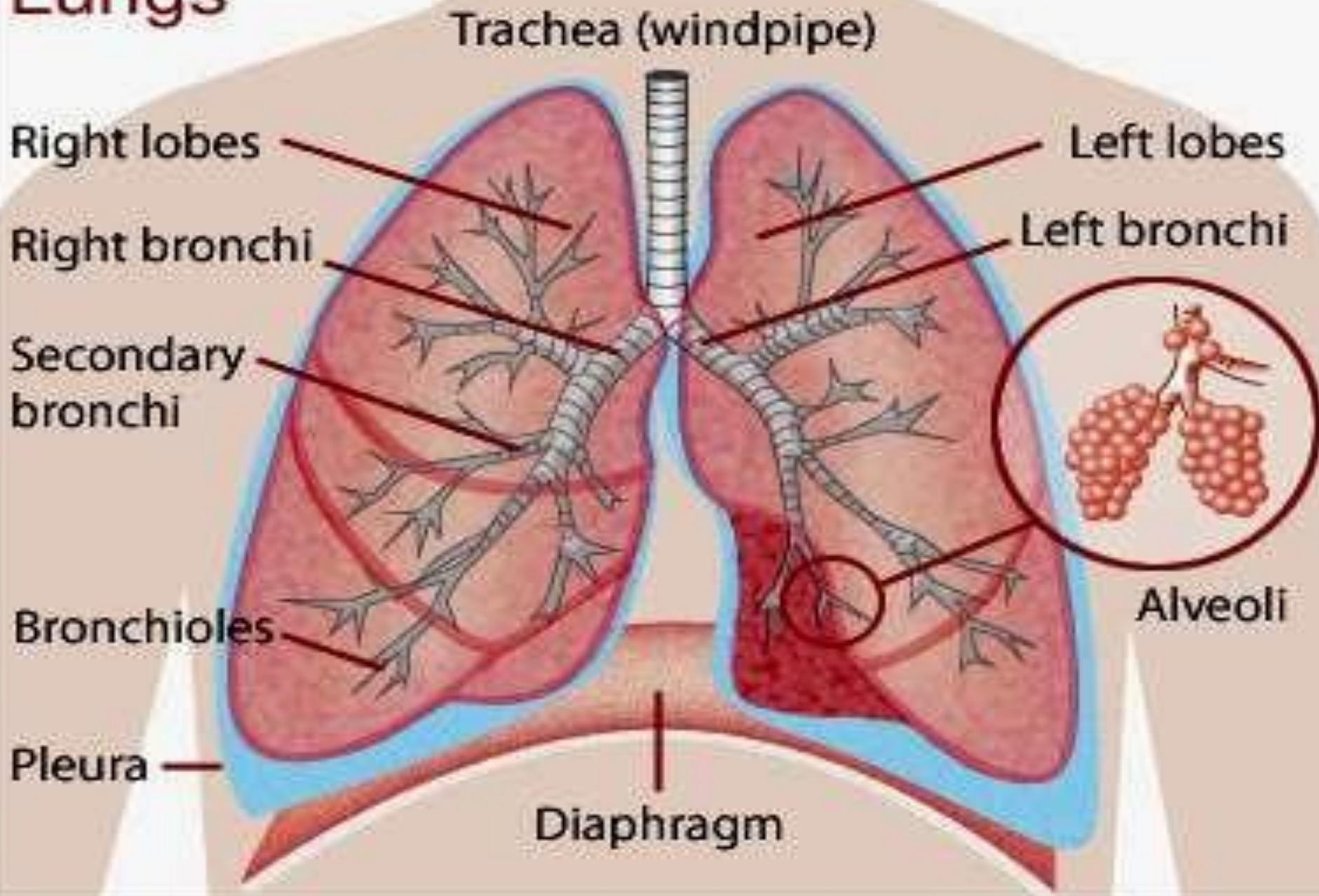
- The outer surface of each lung and the adjacent internal thoracic wall are lined by a serous membrane called **pleura**.
- The outer surface of each lung is tightly covered by the **visceral pleura**.
- while the internal thoracic walls, the lateral surfaces of the mediastinum, and the superior surface of the diaphragm are lined by the **parietal pleura**.
- The parietal and visceral pleural layers are continuous at the **hilus** of each lung

Pleural Cavities

The potential space between the serous membrane layers is a **pleural cavity**.

- The pleural membranes produce a thin, serous **pleural fluid** that circulates in the pleural cavity and acts as a lubricant, ensuring minimal friction during breathing.
- **Pleural effusion** – pleuritis with too much fluid

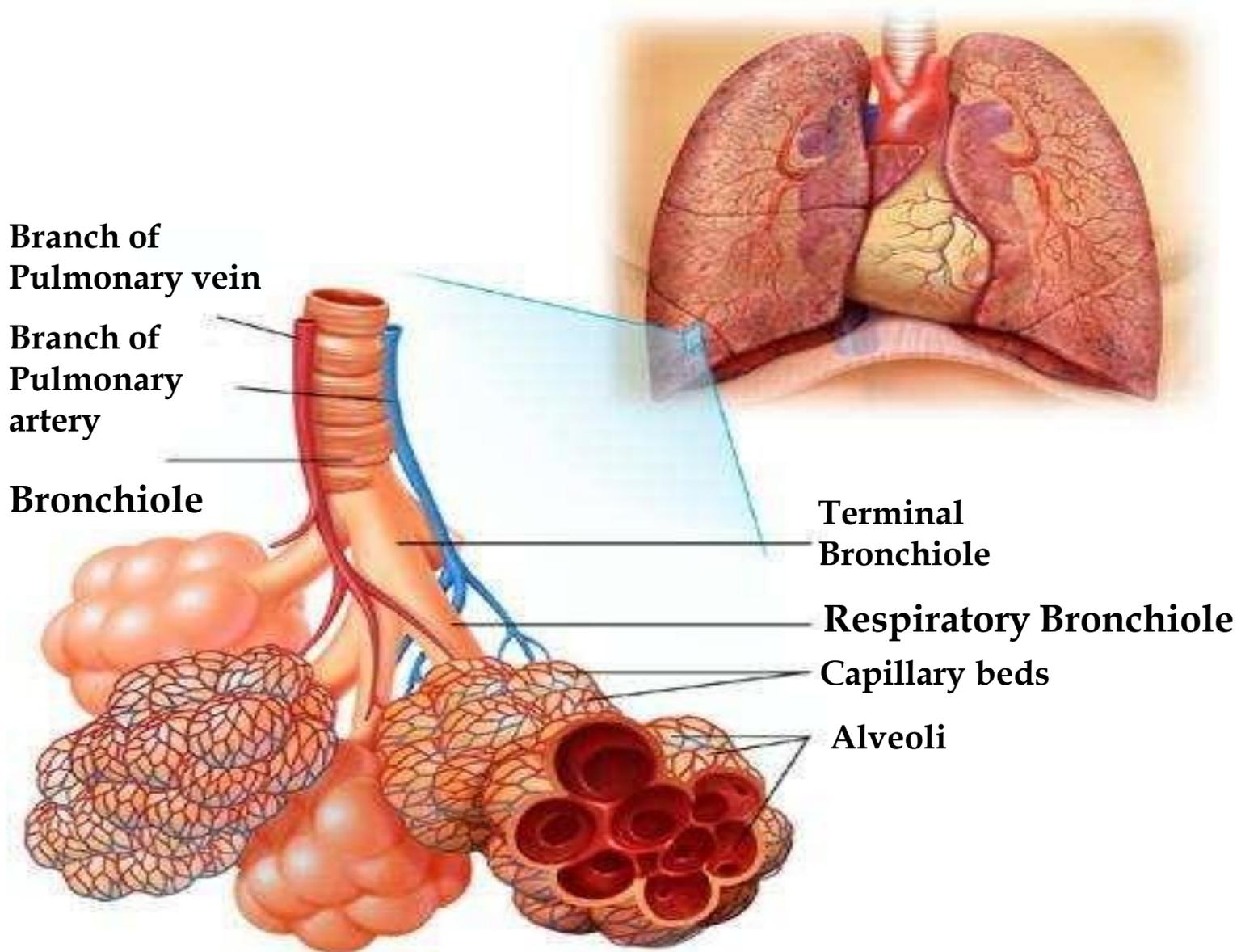
Lungs



How Lungs work?

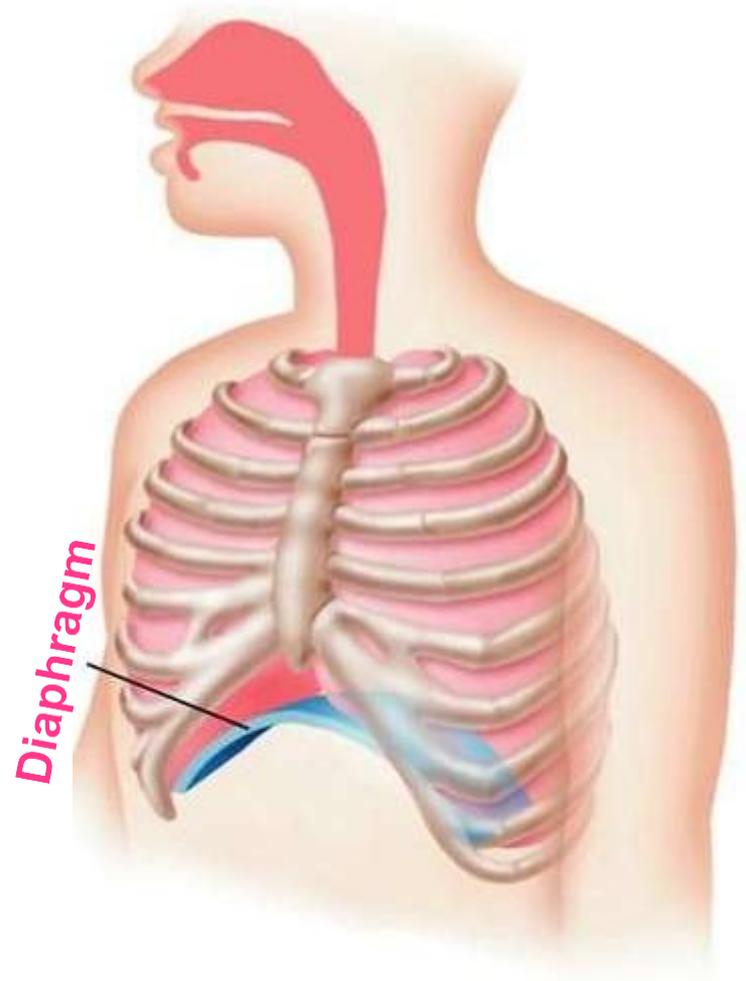
- Air enters your lungs through a system of pipes called the *bronchi*.
- The *alveoli* are where the important work of gas exchange takes place between the air and your blood. Covering each alveolus is a whole network of little blood vessel called *capillaries*,
- It is important that the air in the alveoli and the blood in the capillaries are very close together, so that oxygen and carbon dioxide can move (or diffuse) between them.
- When you breathe in, air comes down the trachea and through the bronchi into the alveoli.
- This fresh air has lots of oxygen in it, and some of this oxygen will travel across the walls of the alveoli into your blood stream.
- Travelling in the opposite direction is carbon dioxide, which crosses from the blood in the capillaries into the air in the alveoli and is then breathed out.
- In this way, you bring in to your body the oxygen that you need to live, and get rid of the waste product carbon dioxide.

How Lungs work?



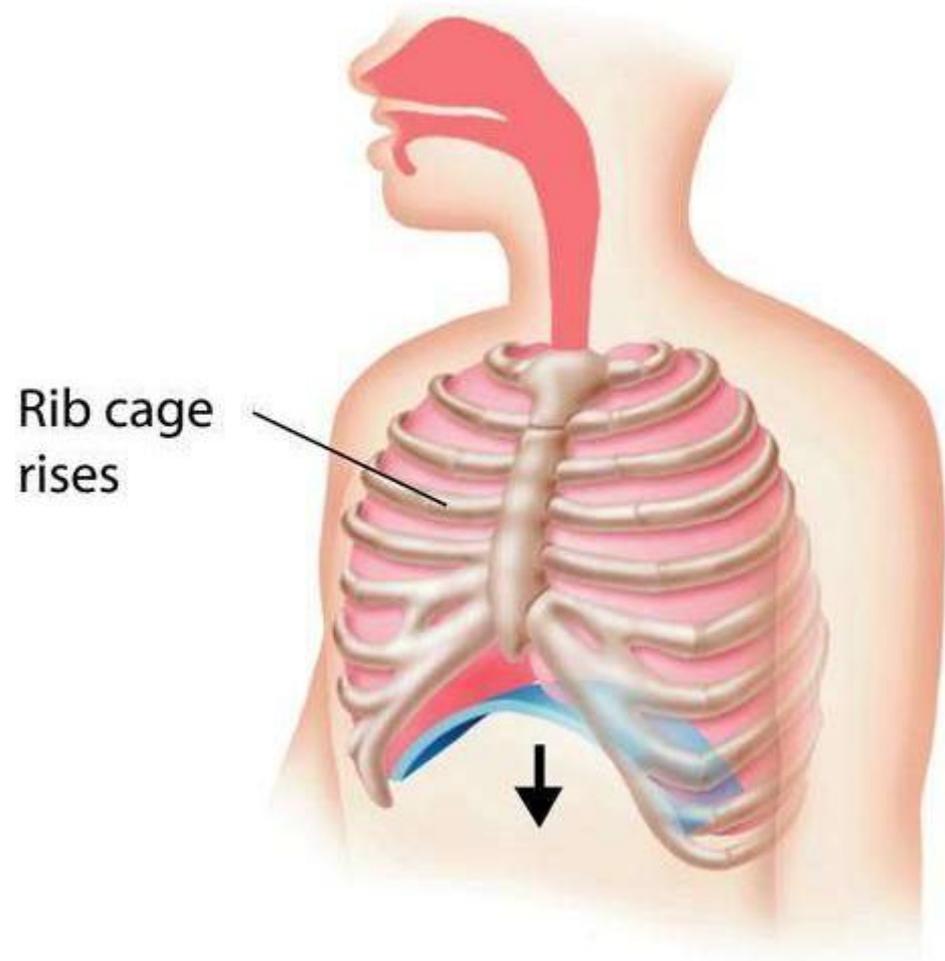
Breathing

- Lungs are sealed in pleural membranes inside the chest cavity.
- At the bottom of the cavity is a large, flat muscle known as the **diaphragm**.



Breathing

- During inhalation, the diaphragm contracts and the rib cage rises up.
- This expands the volume of the chest cavity.
- The chest cavity is sealed, so this creates a partial vacuum inside the cavity.
- Atmospheric pressure fills the lungs as air rushes into the breathing passages.



Breathing

- Often exhaling is a passive event.
- When the rib cage lowers and the diaphragm relaxes, pressure in the chest cavity is greater than atmospheric pressure.
- Air is pushed out of the lungs.

Air Exhaled

inhaled

Rib cage
lowers

