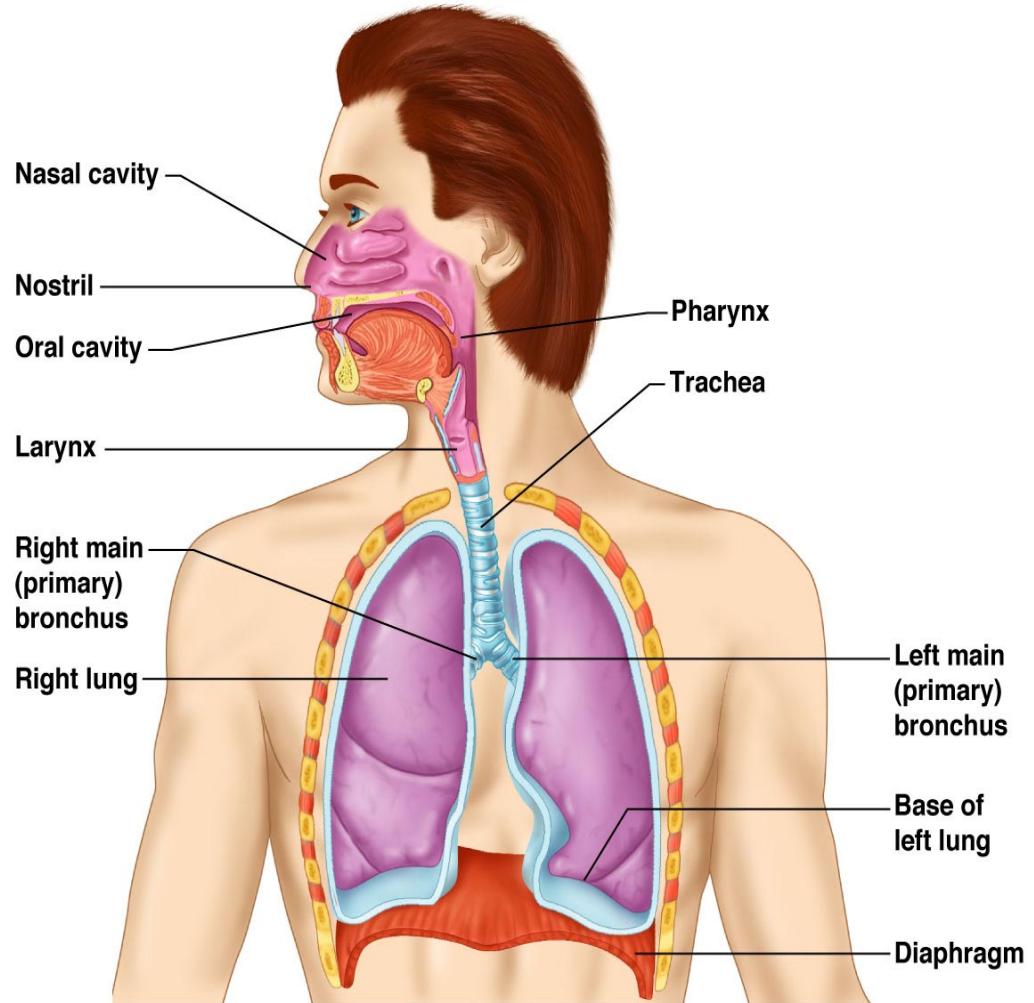


Respiratory System

- All about how we get oxygen and get rid of carbon dioxide in order to satisfy energy requirements.
- A normal respiratory rate for adults is between 12 to 18 breaths per minute.
- The respiratory system consists of organs and structures that allow us to breathe by taking in oxygen and expelling carbon dioxide.
- The main parts include the lungs, nasal cavity, sinuses, blood vessels, and various air passageways.



- The respiratory system, also called the pulmonary system, consists of several organs that function as a whole to oxygenate the body through the process of respiration (breathing).
- This process involves inhaling air and conducting it to the lungs where gas exchange occurs, in which oxygen is extracted from the air, and carbon dioxide expelled from the body.
- The respiratory tract is divided into two sections at the level of the vocal cords; the upper and lower respiratory tract.
- The upper respiratory tract includes the nasal cavity, paranasal sinuses, pharynx and the portion of the larynx above the vocal cords.
- The lower respiratory tract includes the larynx below the vocal cords, the trachea, bronchi, bronchioles and the lungs.

Design:

- The human gas-exchanging organ, the lung, is located in the thorax, where its delicate tissues are protected by the bony and muscular thoracic cage.
- The lung provides the tissues of the human body with a continuous flow of oxygen and clears the blood of the gaseous waste product, carbon dioxide.
- Atmospheric air is pumped in and out regularly through a system of pipes, called conducting airways, which join the gas-exchange region with the outside of the body.
- The airways can be divided into upper and lower airway systems.

THE HUMAN RESPIRATORY SYSTEM

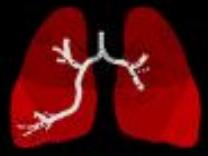
- * It is the system, consisting of tubes and is responsible for the exchange of gases in

- Humans by filtering incoming air and transporting it into the microscopic

- alveoli where gases are exchanged

- * Your respiratory system provides the energy

- needed by cells of the body to function according to their designated tasks.



The organs of the
“Respiratory Tract”
can be divided into two groups
“STRUCTURALLY”

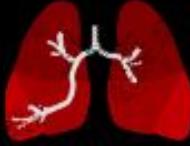


**** The Upper Respiratory Tract**

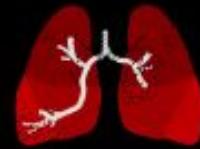
- * Nose
- * Nasal cavity
- * Sinuses
- * Pharynx

**** The Lower Respiratory Tract**

- * Larynx
- * Trachea
- * Bronchial Tree
- * Lungs



The organs of the
“Respiratory Tract”
can be divided into two groups
“FUNCTIONALLY”



**** The Conducting Portion**

- system of interconnecting cavities and tubes that conduct air into the lungs
- * Nose
- * Pharynx
- * Larynx
- * Trachea
- * Bronchi

**** The Respiratory Portion**

- system where the exchange of respiratory gases occurs
- * Respiratory bronchioles
- * Alveolar Ducts
- * Alveoli

- For respiration, the collaboration of other organ systems is clearly essential.
- The diaphragm, as the main respiratory muscle, and the intercostal muscles of the chest wall play an essential role by generating, under the control of the central nervous system, the pumping action on the lung.
- The muscles expand and contract the internal space of the thorax, the bony framework of which is formed by the ribs and the thoracic vertebrae.
- The blood, as a carrier for the gases, and the circulatory system (i.e., the heart and the blood vessels) are mandatory elements of a working respiratory system (see blood; cardiovascular system).

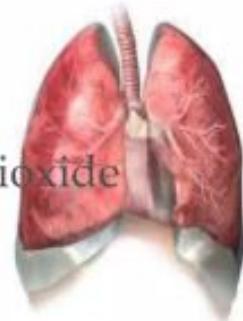
The Respiratory System

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***.



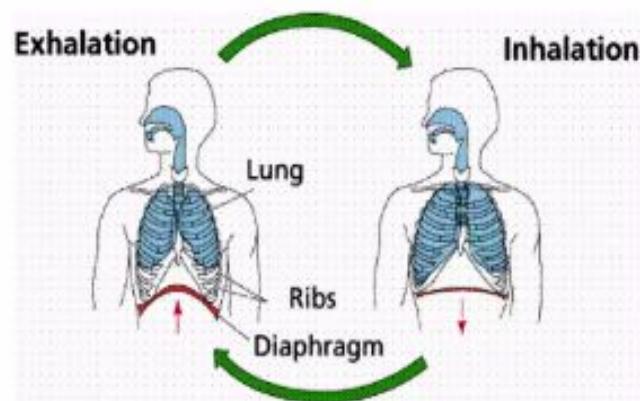
Functions Of Respiratory System

TUTOR

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

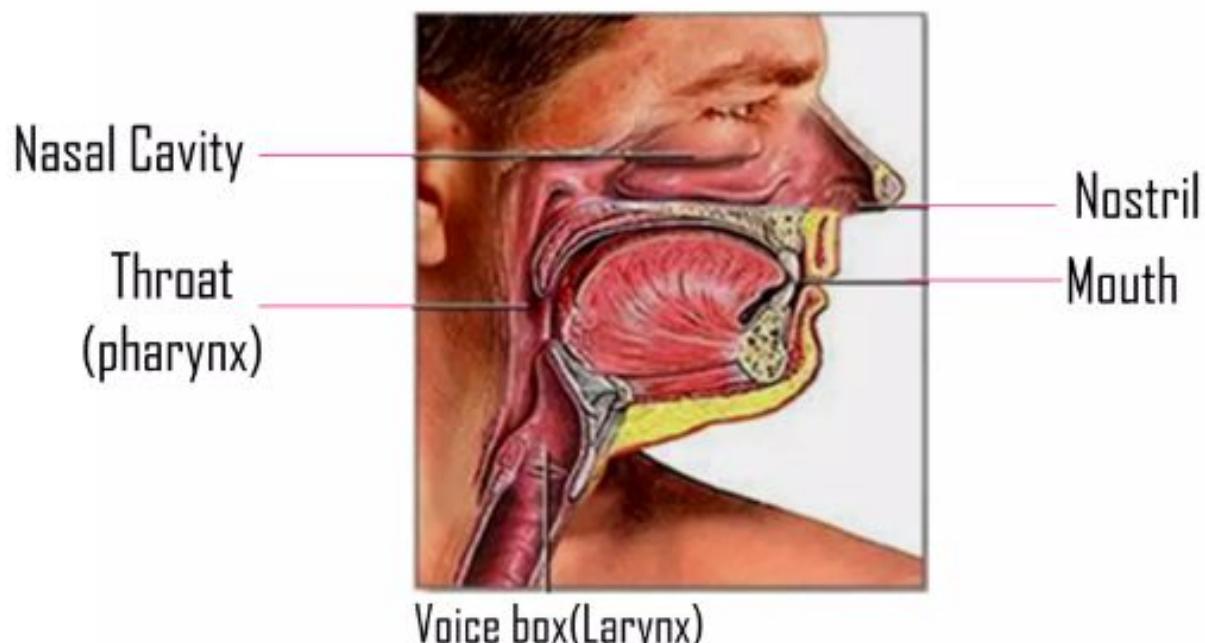
Breathing

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



External Respiration

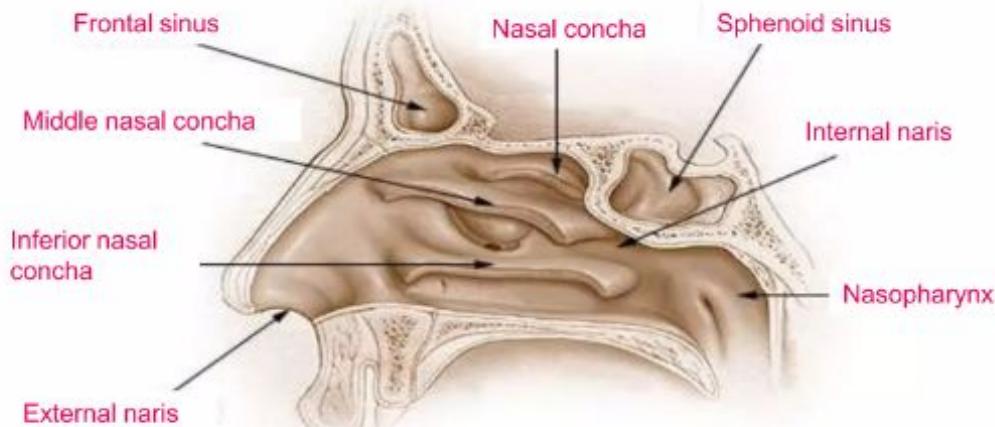
- Air from the outside environment enters the nose or mouth during **inspiration** (*inhala^{tion}*).
- Composed of the **nose** and nasal cavity, paranasal sinuses, pharynx (throat), larynx.
- All part of the conducting portion of the respiratory system.



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**

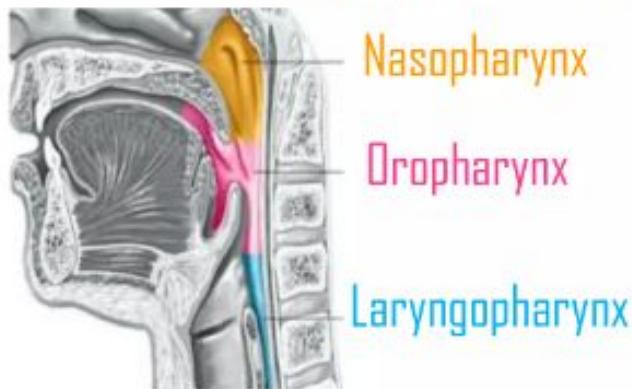
- contains the *pharyngeal tonsils* (adenoids) which aid in the body's immune defense.

- **Oropharynx**

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

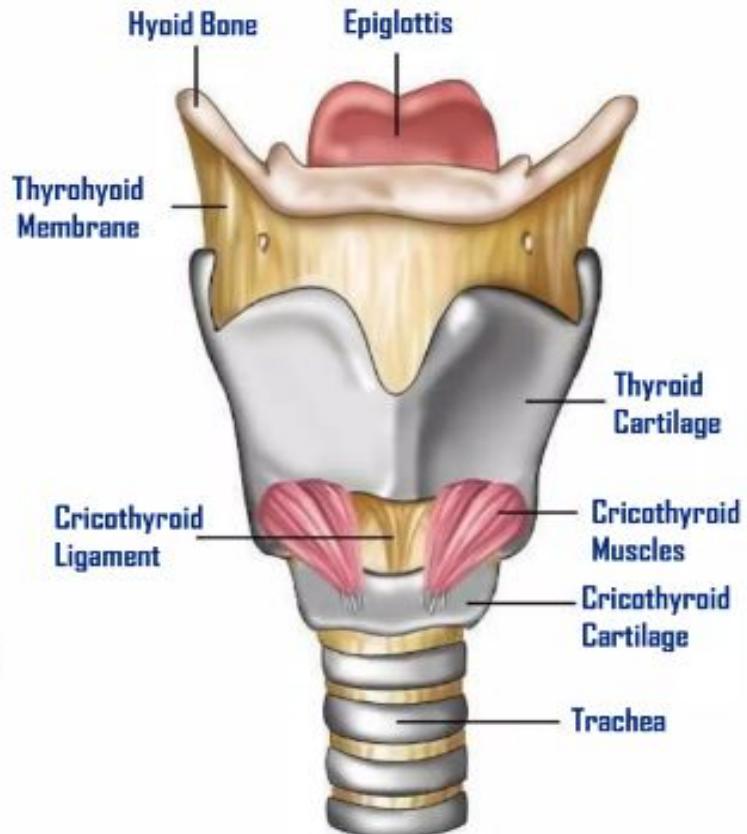
- **Laryngopharynx**

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



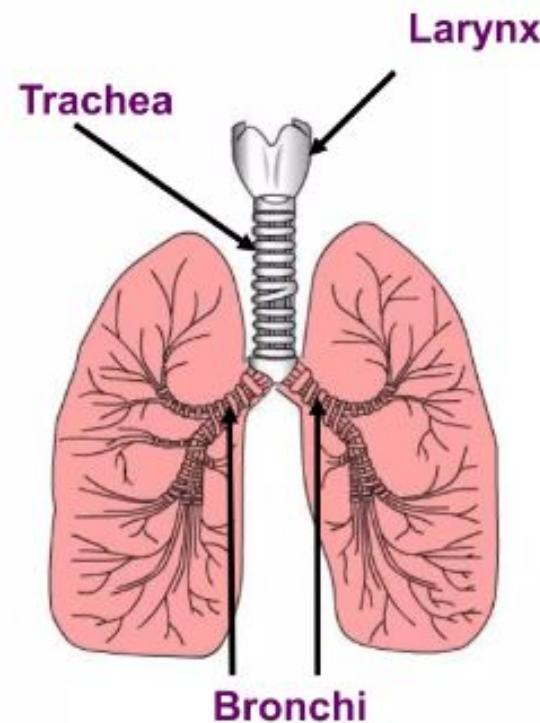
Larynx

- **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

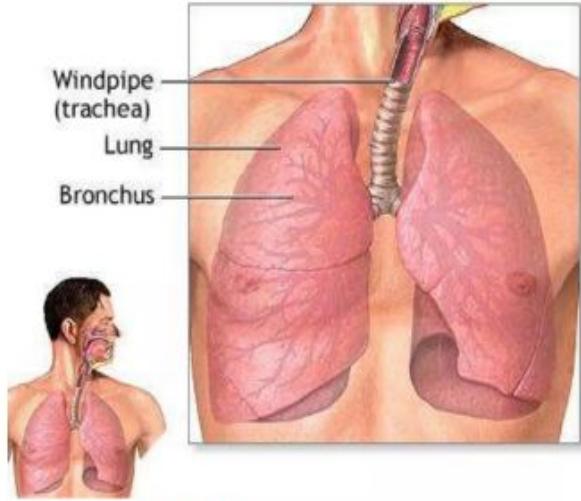
- A flexible tube also called *windpipe*.
- Extends through the mediastinum and lies anterior to the esophagus and inferior to the larynx.
- Cartilage rings reinforce and provide rigidity to the tracheal wall to ensure that the trachea remains open at all times.
- At the level of the sternal angle, the 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.

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

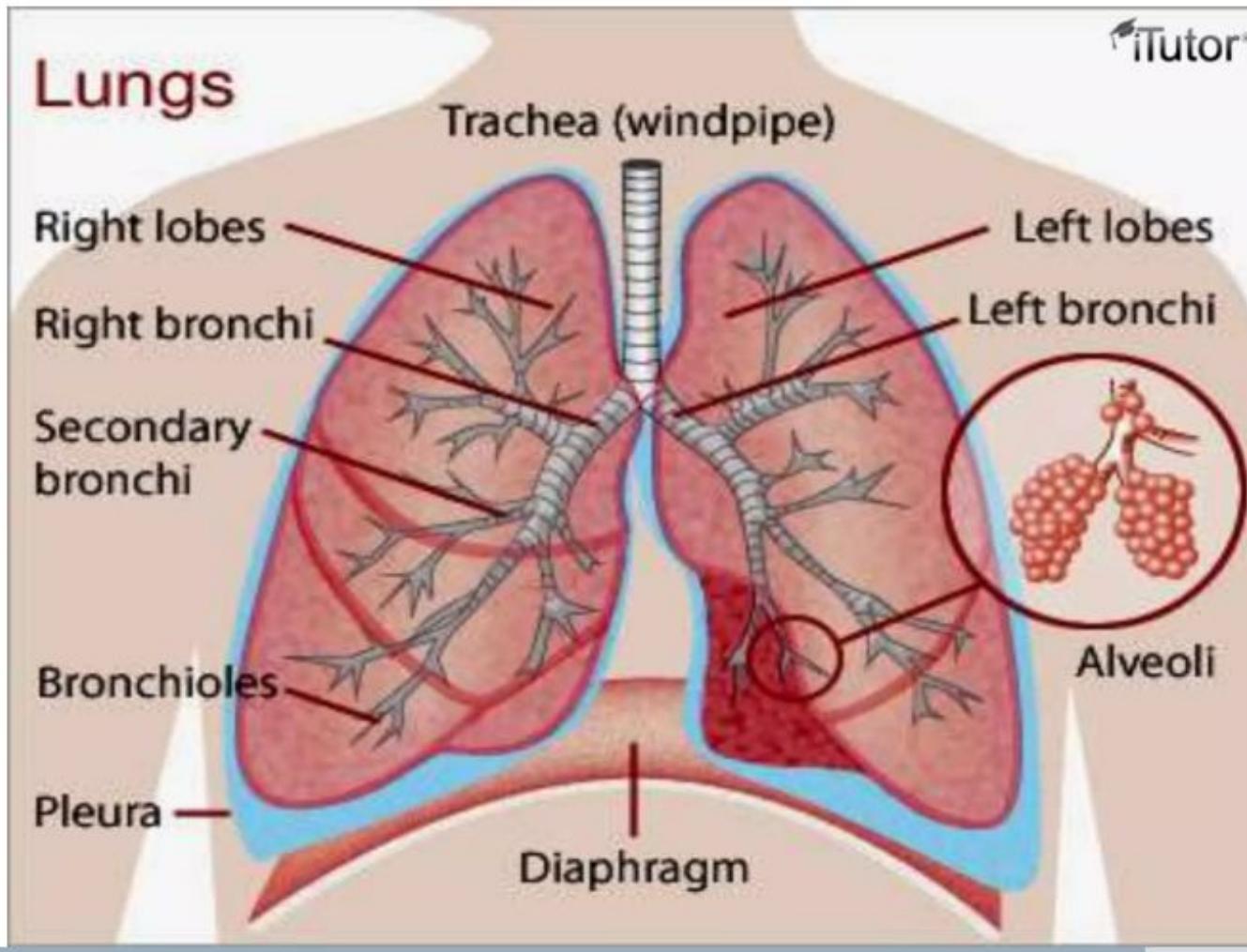
Pleura

- 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**.

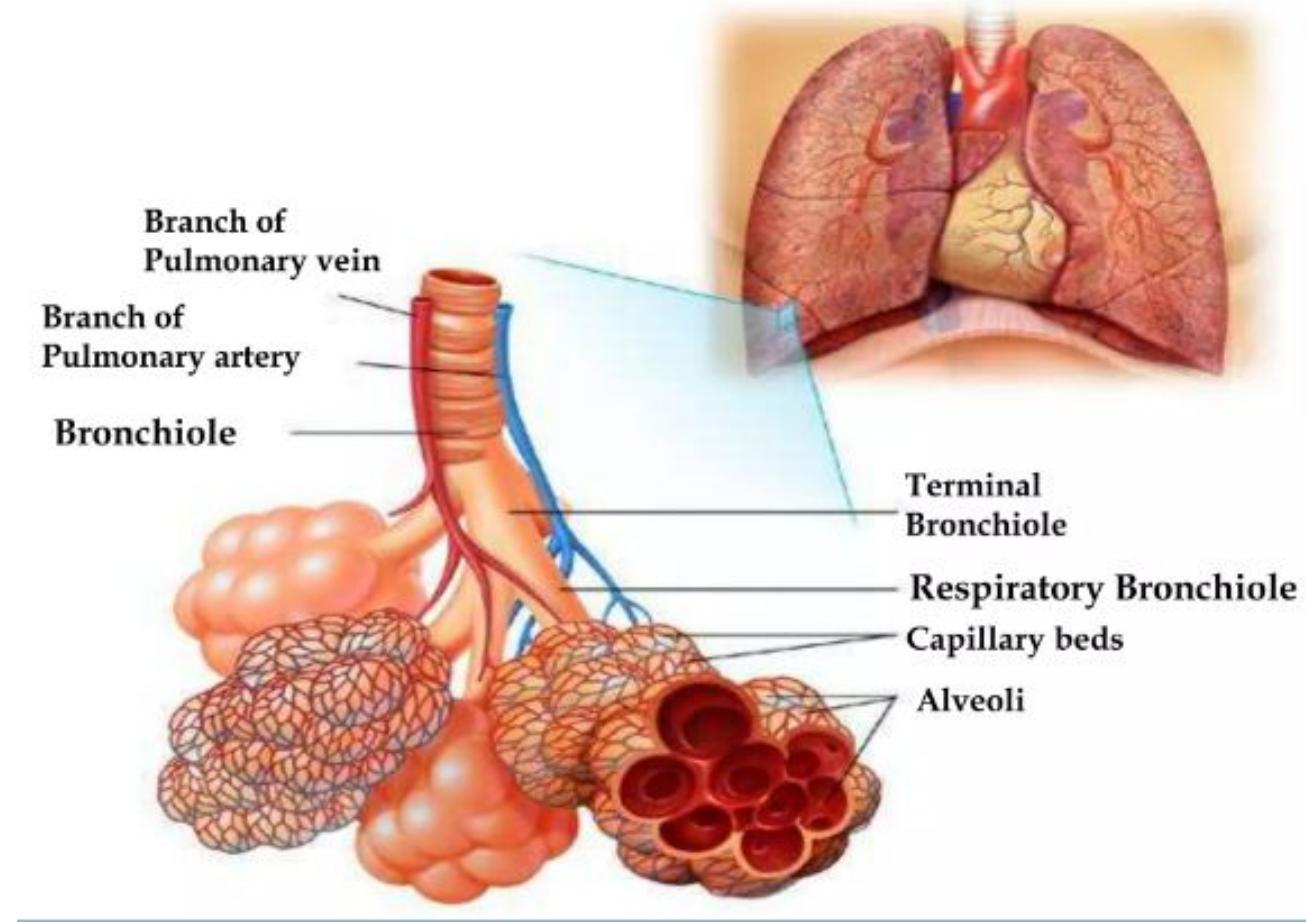
- The pleural membranes produce a thin, serous **pleural fluid** that circulates in the pleural cavity and acts as a lubricant, ensuring minimal friction during breathing.
- **Pleural effusion** - pleuritis with too much fluid



How Lungs work?

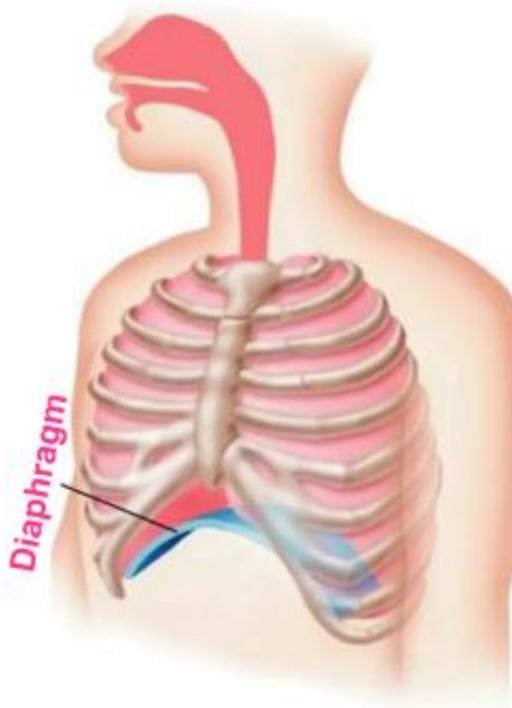
- Air enters your lungs through a system of pipes called the *bronchi*.
- The *alveoli* are where the important work of gas exchange takes place between the air and your blood. Covering each alveolus is a whole network of little blood vessel called *capillaries*,
- It is important that the air in the 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**.



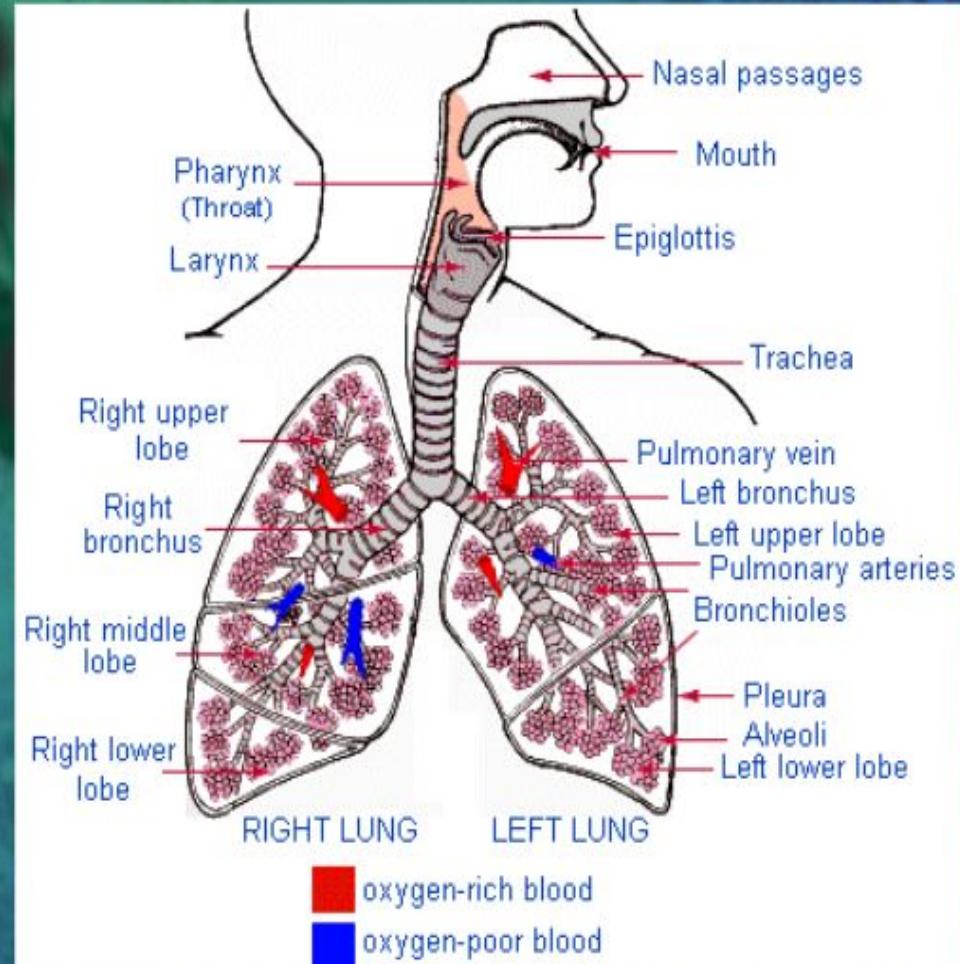
The Path of Air

1. Nose or Mouth – moistens and heats the air before going into the trachea. Cilia and mucus trap dirt in the air.
2. Larynx – part of the trachea where our vocal cords are located.
3. Trachea – the tube that leads from the nose and mouth to the lungs. The walls have rings of cartilage to protect the trachea and prevent it from collapsing.

The Path of Air (Cont.)

4. Bronchi – the trachea splits into right and left bronchi, each one leading into your right and left lung. Each bronchus (singular) leads air into the lungs and divides into smaller and smaller tubes, like a tree trunk divides into smaller and smaller branches.
5. Alveoli – grape-like structures at the end of the bronchi. This is where our blood picks up the oxygen we need.

The Path Air Takes In The Body



Diseases: Asthma, Chronic Obstructive Pulmonary Disease, Lung Cancer, Pneumonia, Influenza, also known as the flu

