

# **HUMAN ANATOMY AND PHYSIOLOGY-II**

## **Respiratory System**

**Prepared by**

**Sucharita Babu**

**Assistant Professor**

**School of Pharmacy and Life Sciences**



**Centurion  
UNIVERSITY**

*Shaping Lives...  
Empowering Communities...*

# Lungs

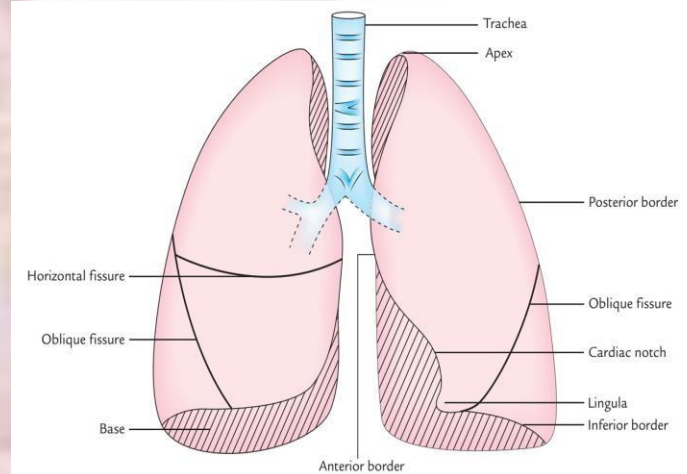
- Each lung has a conical shape. Its wide, concave base rests upon the muscular diaphragm.
- Both lungs are bordered by the thoracic wall anteriorly, laterally, and posteriorly, and supported by the rib cage.
- Toward the midline, the lungs are separated from each other by the **mediastinum**.

## 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

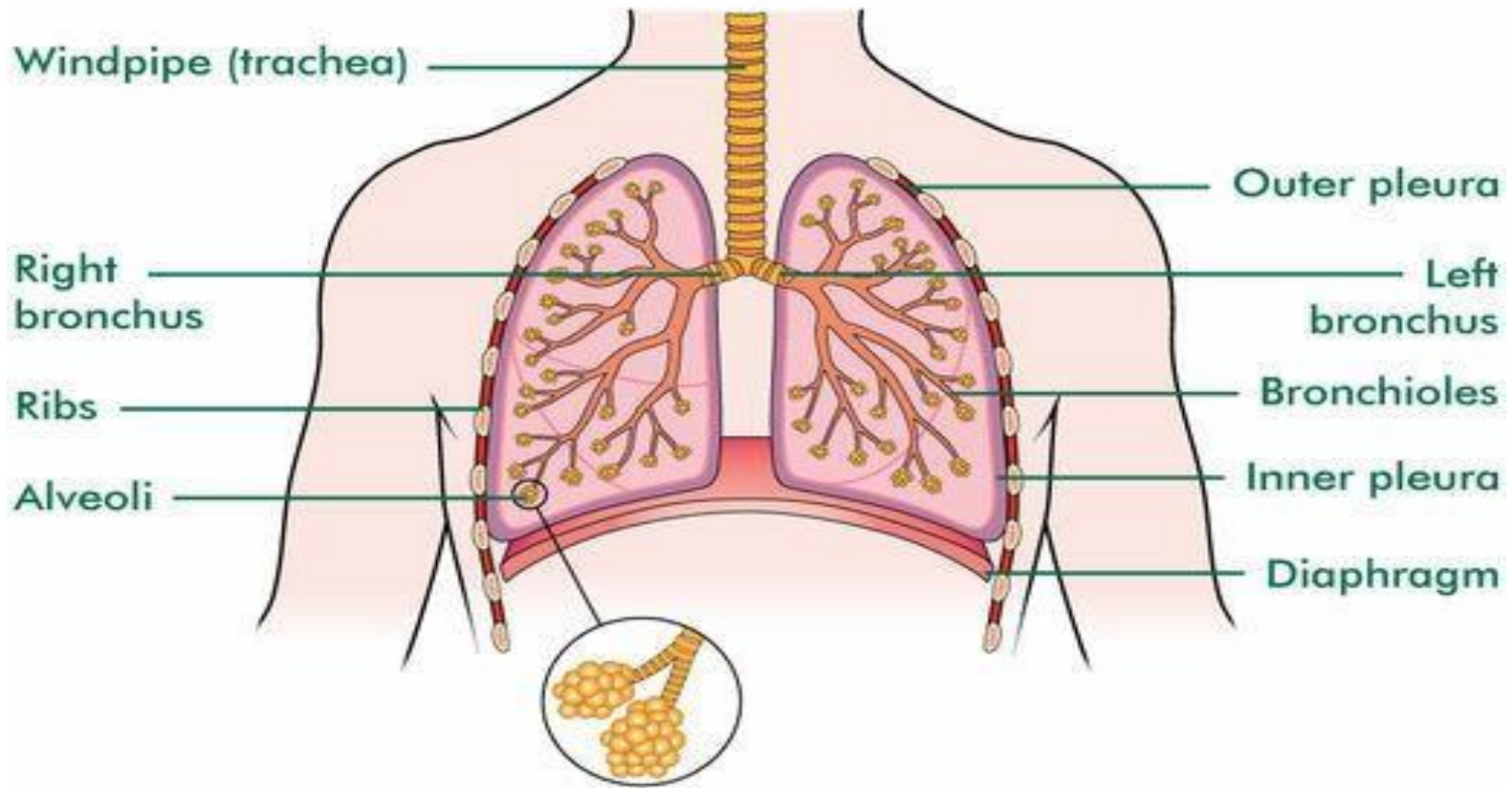


- The outer surface of each lung and the adjacent internal-thoracic wall are lined by a serous membrane called **pleura**.
- The outer surface of each lung is tightly covered by the **visceral pleura**.
- while the internal thoracic walls, the lateral surfaces of the mediastinum, and the superior surface of the diaphragm are lined by the **parietal pleura (covering the rib cage)**.

## Pleural Cavities

The potential space between the two pleura of the lungs 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

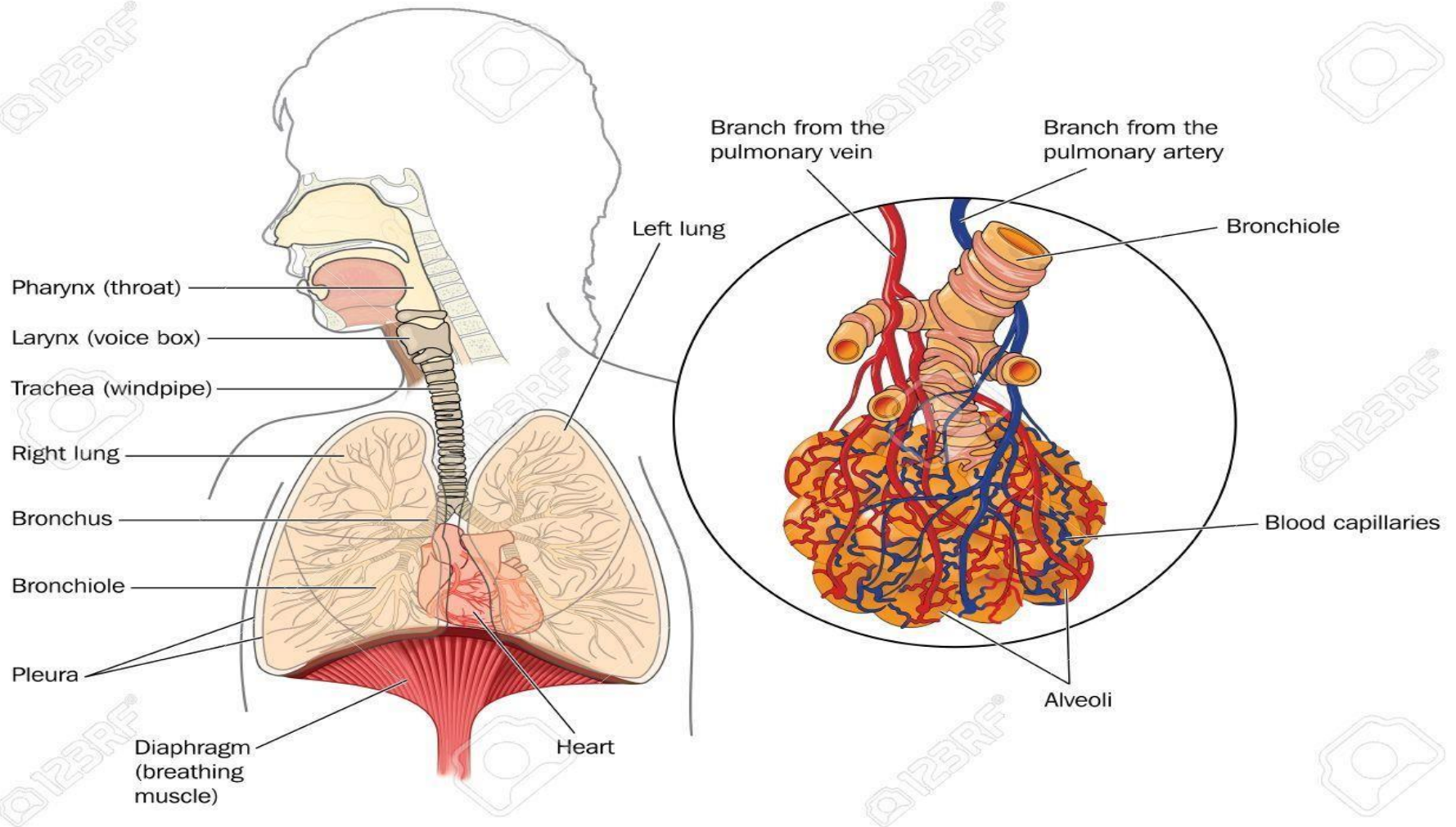


*Interior of the lungs The lungs are composed of the bronchi and smaller air passages, alveoli, connective tissue, blood vessels, lymph vessels and nerves, all embedded in an elastic connective tissue matrix. Each lobe is made up of a large number of lobules.*

## How lung work??

- Air enters our 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 our 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 we 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 our 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, we bring in to your body the oxygen that you need to live, and get rid of the waste product carbon dioxide.

# How lung work??



## Pulmonary blood supply

The pulmonary trunk divides into the **right and left pulmonary arteries**, which transport deoxygenated blood to each lung.

Within the lungs each pulmonary artery divides into many branches, which eventually end in a dense capillary network around the **walls of the alveoli**

The walls of the alveoli and the capillaries each consist of only one layer of **flattened epithelial cells**.

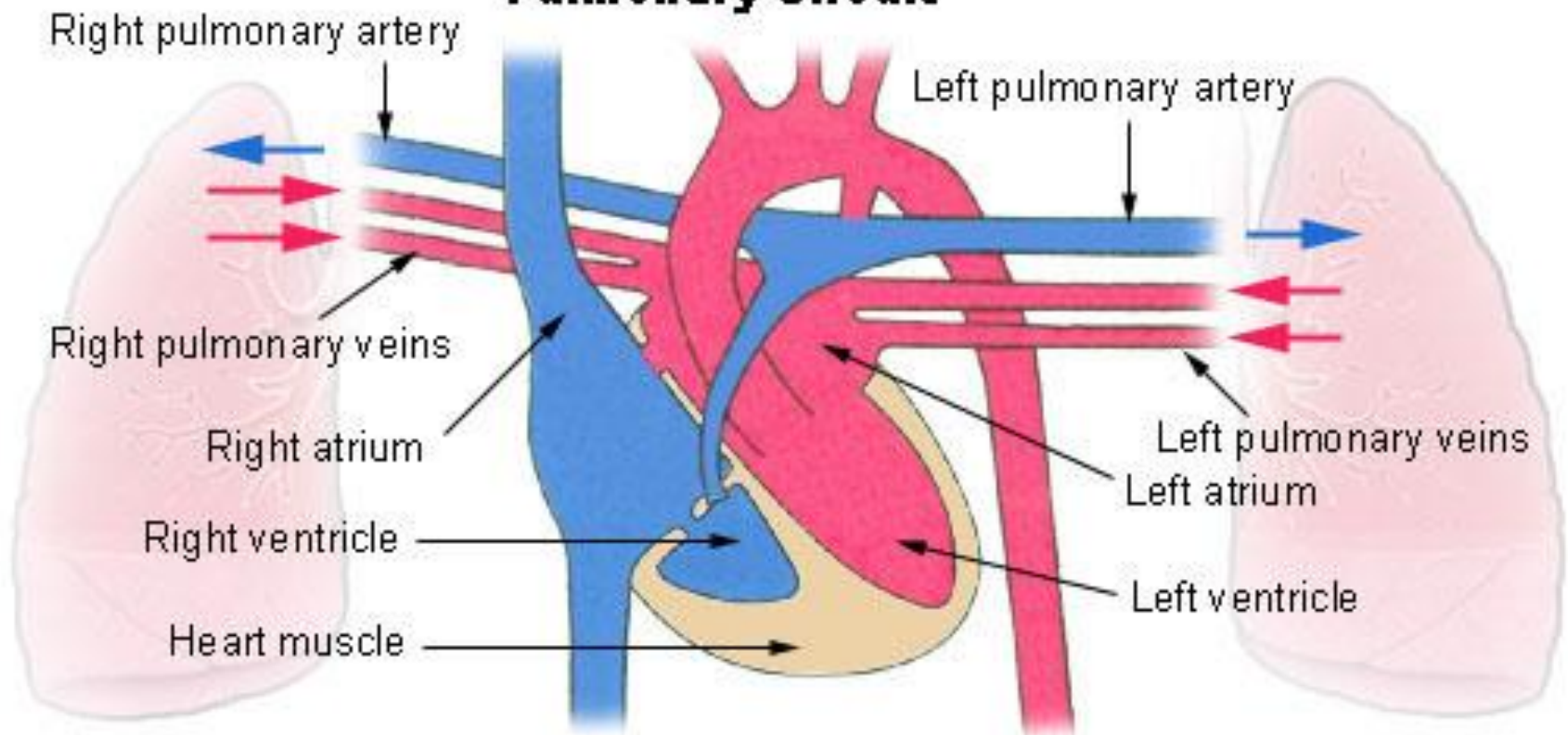
The exchange of gases between air in the alveoli and blood in the capillaries takes place across these two very fine membranes (*together called the respiratory membrane*).

The pulmonary capillaries join up, forming two **pulmonary veins** in each lung.

They leave the lungs at the hilum and carry oxygenated blood to the **left atrium of the heart**.

The innumerable blood capillaries and blood vessels in the lungs are supported **by connective tissue**

## Pulmonary Circuit





## **Bronchi and bronchioles**

The two primary bronchi are formed when the trachea divides, at about the level of the 5th thoracic vertebra

### **The right bronchus**

- wider, shorter and more vertical than the left bronchus and is therefore more likely to become obstructed by an inhaled foreign body.
- approximately 2.5 cm long.
- After entering the right lung at the hilum it divides into three branches, one to each lobe.
- Each branch then subdivides into numerous smaller branches

### **The left bronchus**

- 5 cm long and is narrower than the right.
- After entering the lung at the hilum it divides into two branches, one to each lobe.
- Each branch then subdivides into progressively smaller airways within the lung substance.

## Functions

- Control of air entry
  - The diameter of the respiratory passages is altered by contraction or relaxation of the smooth muscle in their walls, thus regulating the speed and volume of airflow into and within the lungs.
  - These changes are controlled by the autonomic nerve supply: parasympathetic stimulation causes constriction and sympathetic stimulation causes dilation

The following functions continue as in the upper airways:

- warming and humidifying
- support and patency
- removal of particulate matter
- cough reflex
- Respiratory bronchioles and alveoli

- Within each lobe, the lung tissue is further divided by fine sheets of connective tissue into *lobules*.
- Each lobule is supplied with air by a terminal bronchiole, which further subdivides into respiratory bronchioles, alveolar ducts and large numbers of *alveoli (air sacs)*.
- There are about 150 million alveoli in the adult lung. It is in these structures that the process of gas exchange occurs.
- As airways progressively divide and become smaller and smaller, their walls gradually become thinner until muscle and connective tissue disappear, leaving a single layer of *simple squamous epithelial cells in the alveolar ducts and alveoli*.
- These distal respiratory passages are supported by a loose network of elastic connective tissue in which *macrophages, fibroblasts, nerves and blood and lymph vessels are embedded*.
- The alveoli are surrounded by a dense network of capillaries
- Exchange of gases in the lung (**external respiration**) takes place across a membrane made up of the alveolar wall and the capillary wall fused firmly together. *This is called the respiratory membrane*.

## Functions

- **External respiration**
- **Defence against infection**
  - At this level, ciliated epithelium, goblet cells and mucus are no longer present, because their presence would impede gas exchange and encourage infection.
  - By the time inspired air reaches the alveoli, it is usually clean.
  - Defence relies on protective cells present within the lung tissue.
  - These include lymphocytes and plasma cells, which produce antibodies and phagocytes, including alveolar macrophages.
  - These cells are most active in the distal air passages where ciliated epithelium has been replaced by flattened cells.
- **Warming and humidifying** These continue as in the upper airways. Inhalation of dry or inadequately humidified air over a period of time causes irritation of the mucosa and encourages infection

An anatomical illustration of the human respiratory system, showing the trachea, bronchi, and lungs. The illustration is rendered in a soft, painterly style with a muted color palette of pinks, purples, and yellows. The text "Thank you" is overlaid in a large, bold, black serif font, centered horizontally and vertically.

**Thank you**