SNS COLLEGE OF ALLIED HEALTH SCIENCES

SNS Kalvi Nagar, Coimbatore - 35

Affiliated to Dr MGR Medical University, Chennai

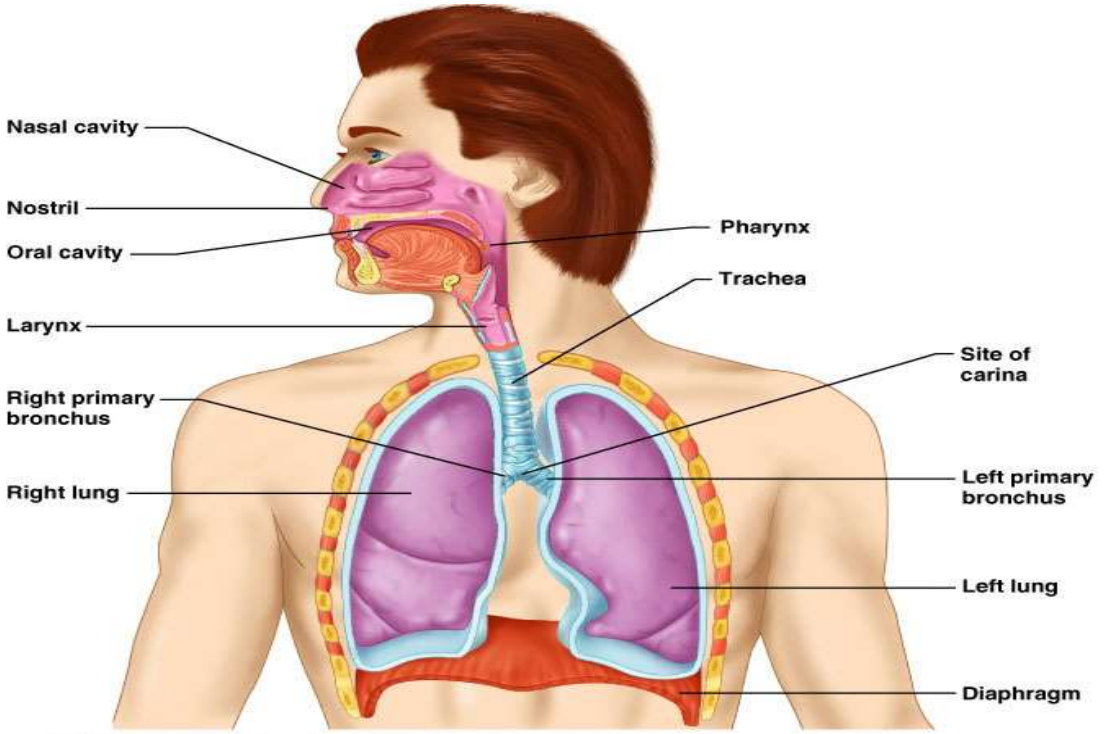
DEPARTMENT : CARDIAC TECHNOLOGY

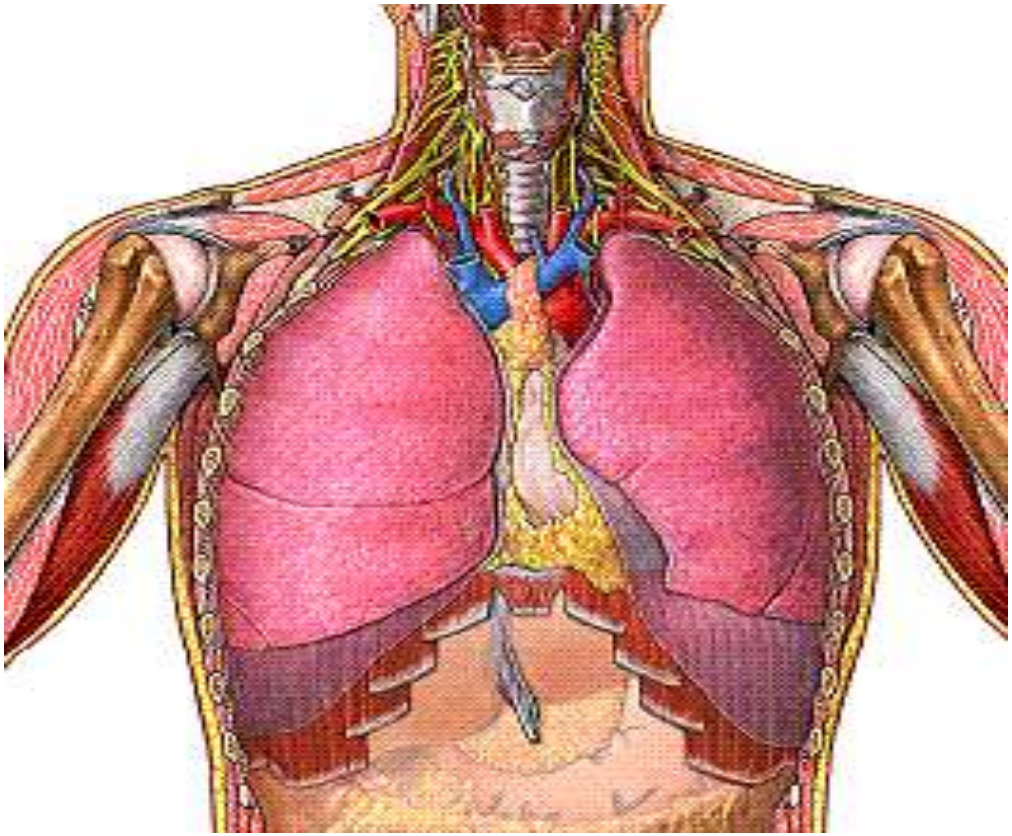
COURSE NAME : ANATOMY

UNIT : LUNGS

TOPICS : TRACHEA, BRONCHIAL TREE

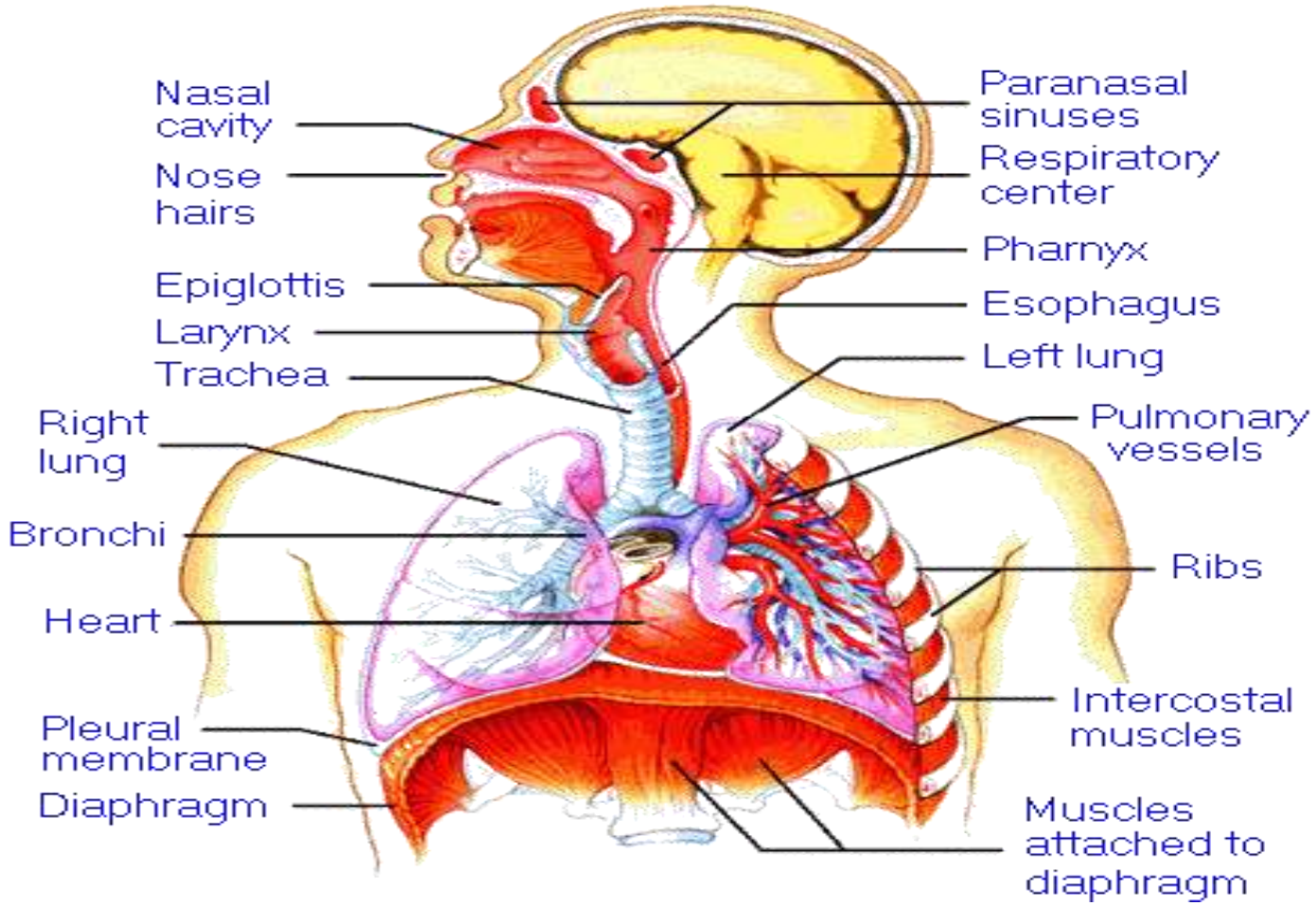
RESPIRATORY SYSTEM





- 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 funtion accroding to their designated tasks.


Nasal cavity
Nose hairs
Epiglottis
Larynx
Trachea
Right lung
Bronchi
Heart
Pleural membrane
Diaphragm
Paranasal sinuses
Respiratory center
Pharnyx
Esophagus
Left lung
Pulmonary vessels
Ribs
Intercostal muscles
Muscles attached to diaphragm

The organs of the

“Respiratory Tract”

can be divided into two groups

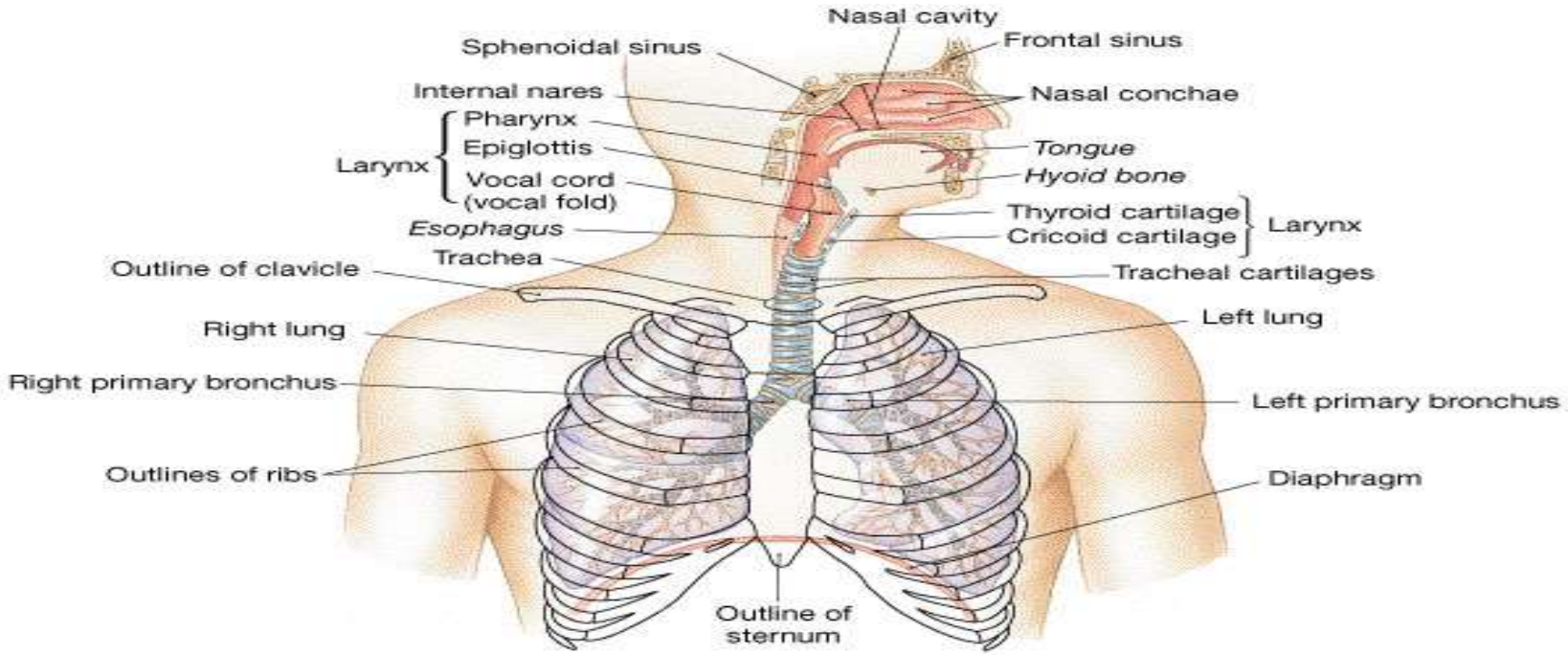
“STRUCTURALLY”

The Upper Respiratory Tract

* Nose
* Nasal cavity
* Sinuses
* Pharynx

The Lower Respiratory Tract

* Larynx
* Trachea
* Bronchial Tree
* Lungs


Nasal cavity
Sphenoidal sinus
Frontal sinus
Internal nares
Nasal conchae
Larynx
Pharynx
Epiglottis
Vocal cord (vocal fold)
Tongue
Hyoid bone
Esophagus
Thyroid cartilage
Cricoid cartilage
Larynx
Trachea
Outline of clavicle
Tracheal cartilages
Right lung
Left lung
Right primary bronchus
Left primary bronchus
Outlines of ribs
Diaphragm
Outline of sternum

The organs of the *"Respiratory Tract"* can be divided into two groups **"FUNCTIONALLY"**

The Conducting Portion

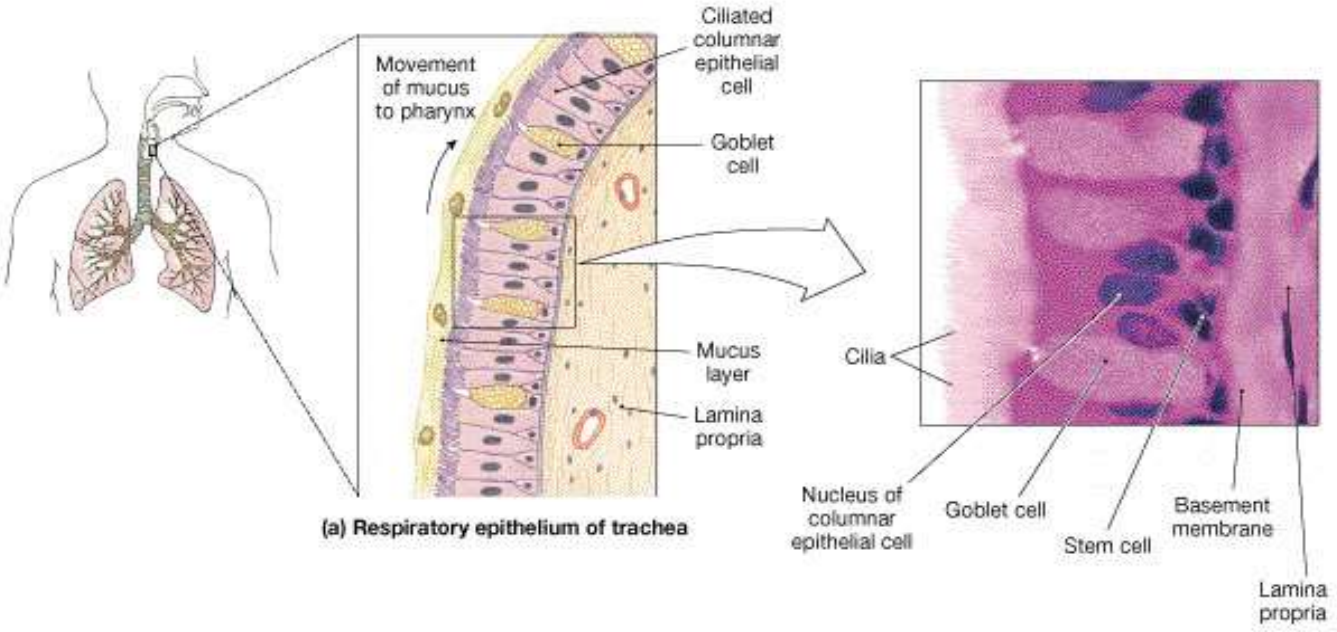
- **system of interconnecting cavities and tubes that conduct air into the lungs**

* Nose
* Pharynx
* Larynx
* Trachea
* Bronchi

The Respiratory Portion

- **system where the exchange of respiratory gases occurs**

* Respiratory bronchioles
* Alveolar Ducts
* Alveoli



(a) Respiratory epithelium of trachea

I. **NOSE**
   A. Nasal Cavity
   B. Paranasal Sinuses

II. **PHARYNX**

III. **LARYNX**
   A. Eplgiottis
   B. Vocal Cords

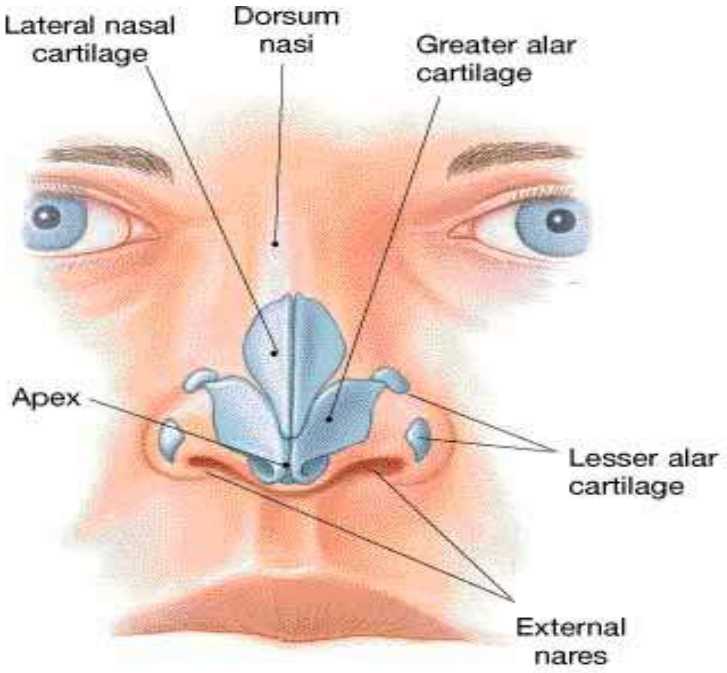
IV. TRACHEA

v. BRONCHI

A. Bronchial Tree

VI. LUNGS

A. Lobes of the Lungs
B. Pleural Cavities
C. Alveoli



(a) Anterior view

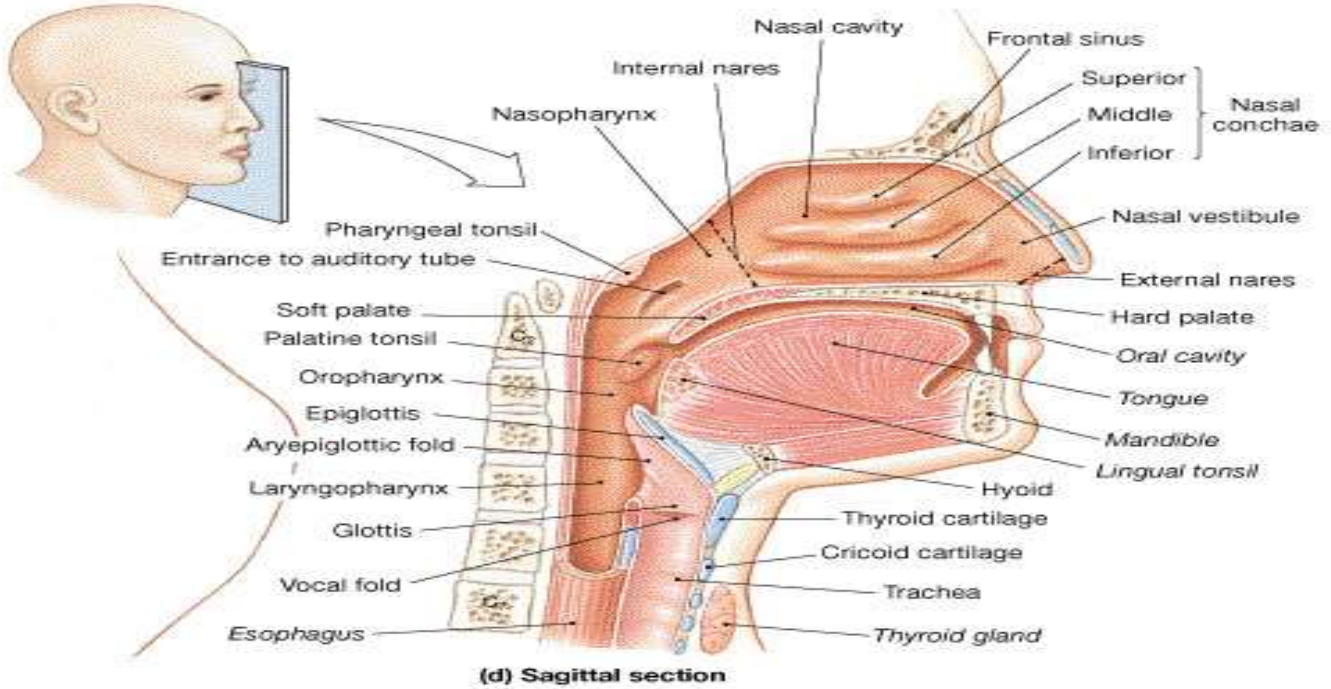
THE NOSE

* It provides an entrance for air in which air is filtered by coarse hairs inside the nostrils.

* It has 2 portions : the external and internal

* The external portion is supported by a framework of bone and cartilage covered with skin and lined with mucous membrane.

* The internal portion is a large cavity in the skull, merging with the extrenal nose anteriorly and communicating with the throat posteriorly.



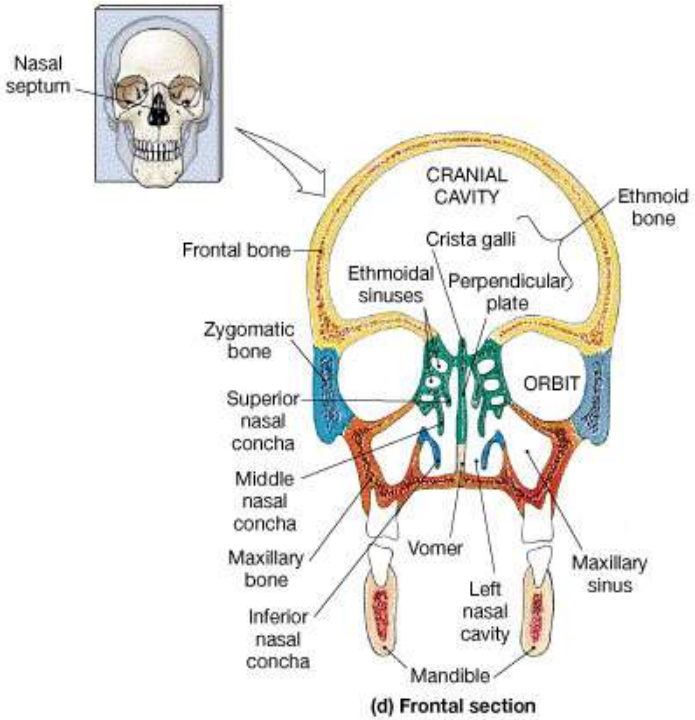
(d) Sagittal section

The Nasal Cavity

* Interior area of the nose; lined with a sticky mucous membrane and contains tiny, surface hairs, cilia. divided medially by the nasal septum.

* Nasal conchae divide the cavity into passageways that are lined with mucous membrane, and help increase the surface area available to warm and filter incoming air.

•Particles trapped in the mucus are carried to the pharynx by ciliary action, swallowed, and carried to the stomach where gastric juice destroys any microorganisms in the mucus.



(d) Frontal section

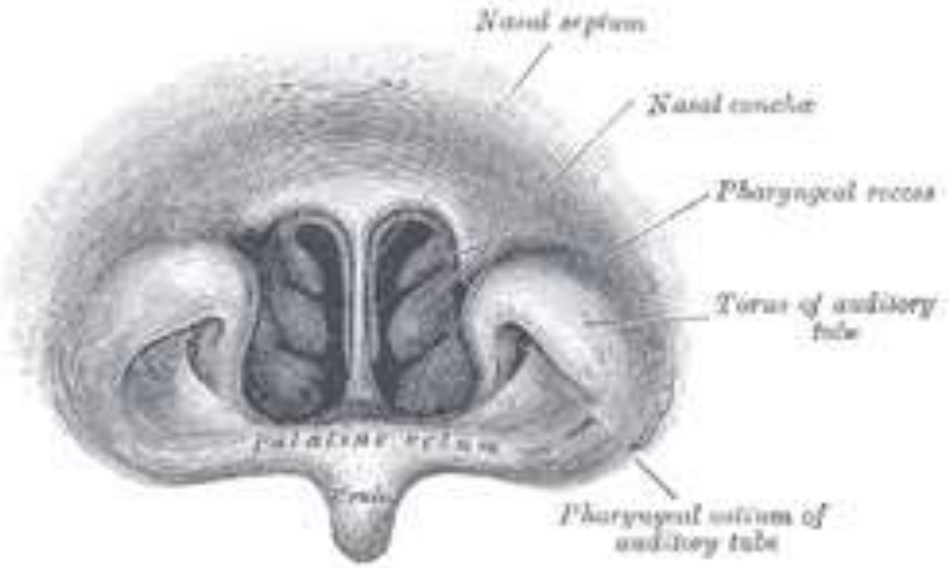
Paranasal Sinuses

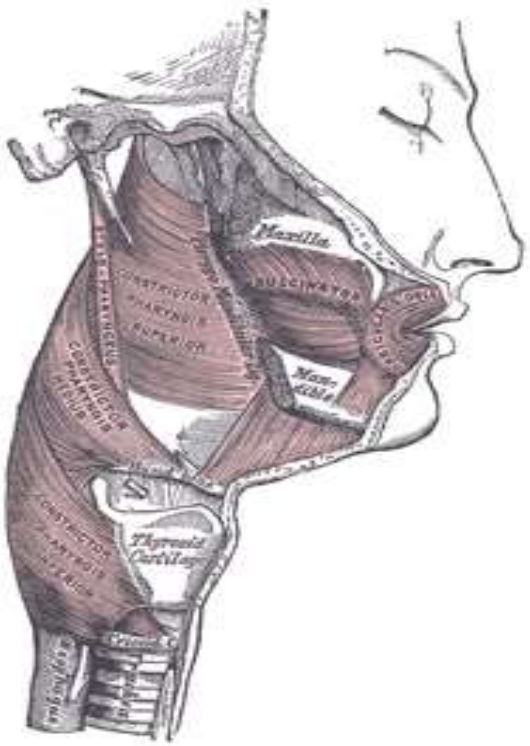
* Sinuses are air-filled spaces within the maxillary, frontal, ethmoid, and sphenoid bones of the skull.

* These spaces open to the nasal cavity and are lined with mucus membrane that is continuous with that lining the nasal cavity.

* The sinuses reduce the weight of the skull and serve as a resonant chamber to affect the quality of the voice.

THE PHARYNX


Nasal septum
Nasal concha
Pharyngeal recess
Torus of auditory tube
Pharyngeal ostium of auditory tube

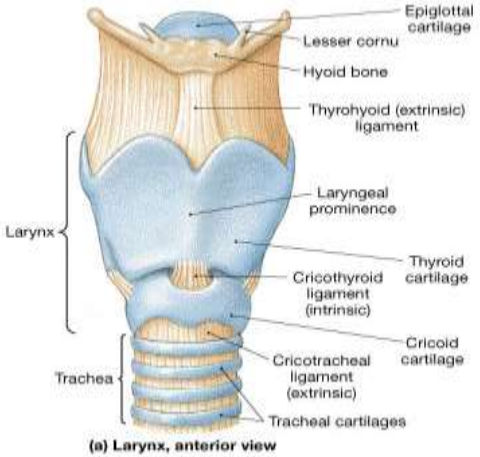

Maxilla
Thyroid Cartilage

THE PHARYNX

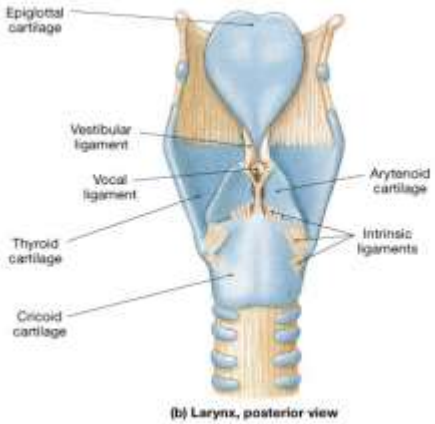
* The “throat” is a funnel shaped tube that lies posterior to the nasal cavity, oral cavity and larynx; and anteriorly to the cervical vertebra.

* It is composed of:
  - Nasopharynx – uppermost portion
  - Oropharynx – middle portion
  - Laryngopharynx – lowermost portion

* It is a common passageway for air and food and it provides a resonating chamber for speech sounds



(a) Larynx, anterior view



(b) Larynx, posterior view

(c) Larynx, sagittal section

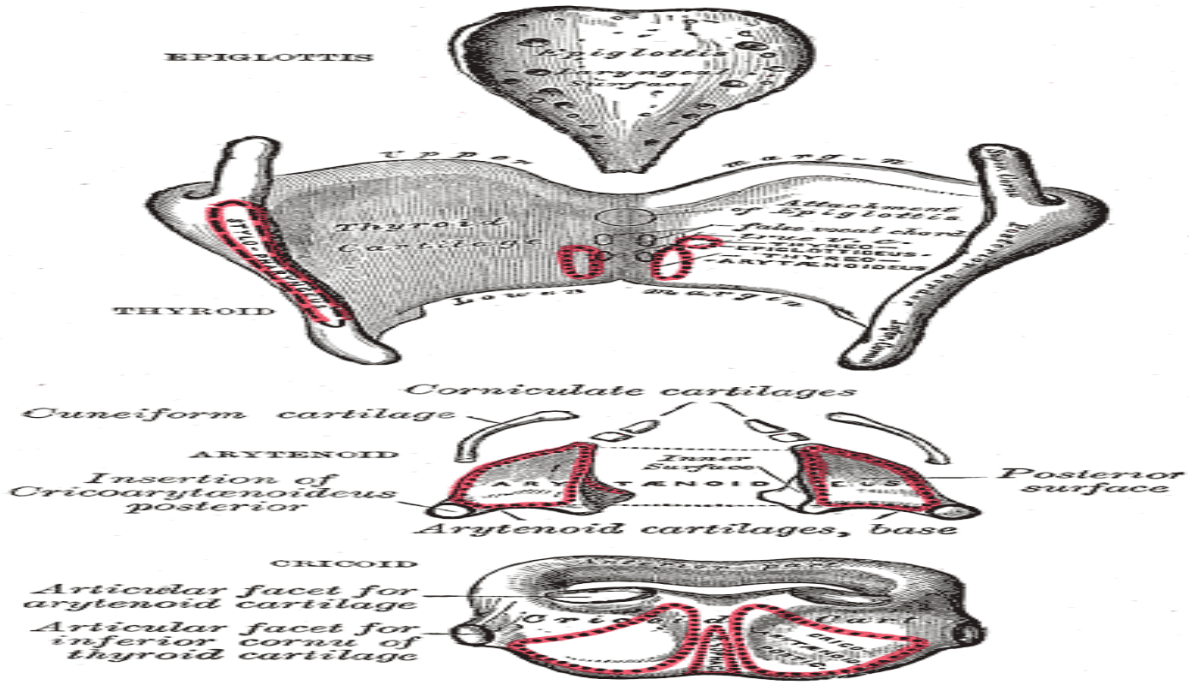
THE LARYNX

* It is an enlargement in the airway
  superior to the trachea and inferior to the pharynx.

* It helps keep particles from entering the trachea
  and also houses the vocal cords.

* It is composed of a framework of muscles
  and cartilage bound by elastic tissue

The Epiglottis

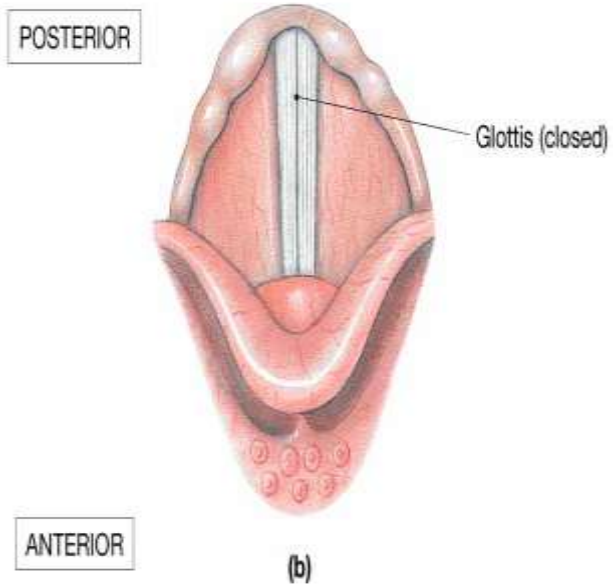


THE EPIGLOTTIS

* It is a large leaf-shaped piece of cartilage.

* A flap of cartilage that prevents food from entering the trachea (or windpipe).

* During swallowing, there is elevation of the larynx


POSTERIOR
Glottis (closed)
ANTERIOR
(b)

THE VOCAL CARDS

* Inside the larynx, 2 pairs of folds of muscle and connective tissues covered with mucous membrane make up the vocal cords.

a. The upper pair is the false vocal cords.

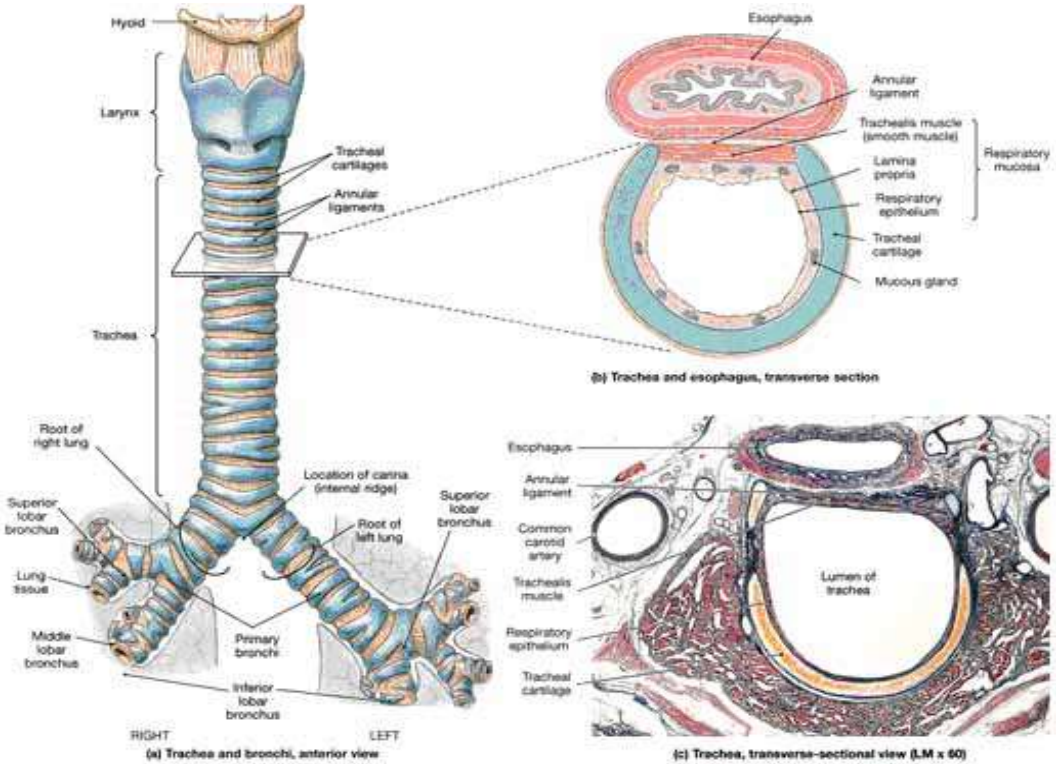
b. The lower pair is the true vocal cords.

c. Changing tension on the vocal cords controls pitch, while increasing the loudness depends upon increasing the force of air vibrating the vocal cords.

THE VOCAL CARDS

* During normal breathing, the vocal cords are relaxed and the glottis is a triangular slit.

* During swallowing, the false vocal cords and epiglottis close off the glottis.

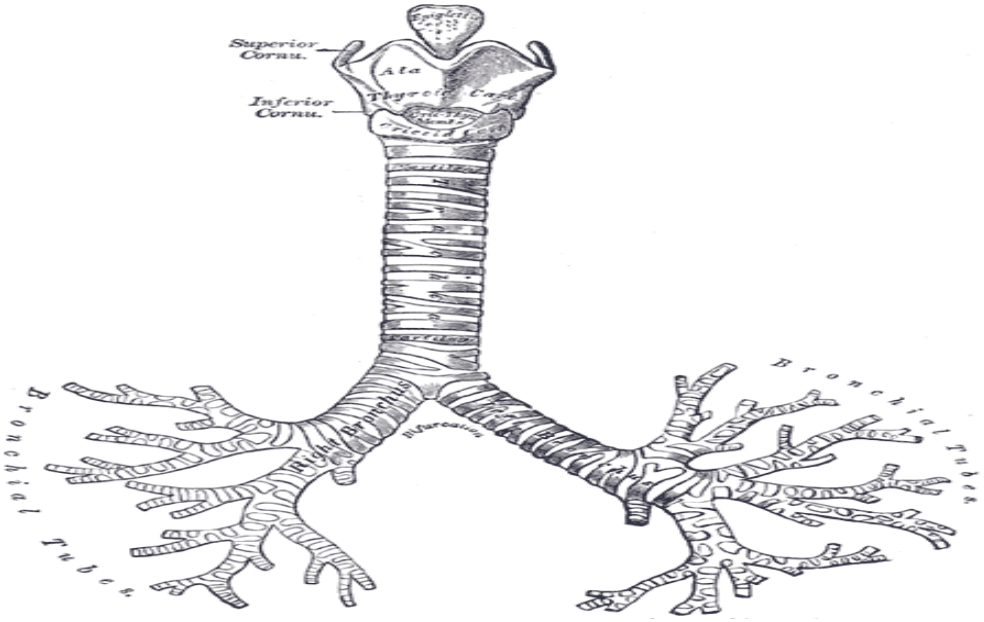

Hyoid
Larynx
Tracheal cartilages
Annular ligaments
Trachea
Root of right lung
Superior lobar bronchus
Lung tissue
Middle lobar bronchus
Location of carina (internal ridge)
Root of left lung
Superior lobar bronchus
Primary bronchi
Inferior lobar bronchus
RIGHT
LEFT
(a) Trachea and bronchi, anterior view
Esophagus
Annular ligament
Trachealis muscle (smooth muscle)
Lamina propria
Respiratory epithelium
Tracheal cartilage
Mucous gland
Respiratory mucosa
(b) Trachea and esophagus, transverse section
Esophagus
Annular ligament
Common carotid artery
Trachealis muscle
Respiratory epithelium
Tracheal cartilage
Lumen of trachea
(c) Trachea, transverse-sectional view (LM x 60)

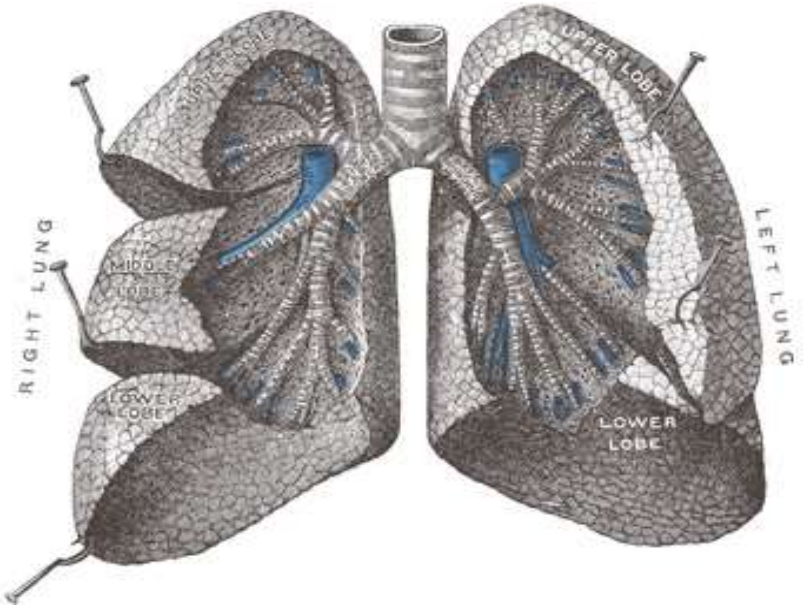
THE TRACHEA

* It is a tubular passageway for air, located anterior to the esophagus

* It extends from the larynx to the 5th thoracic vertebra where it divides into the right and left bronchi.

THE TRACHEA

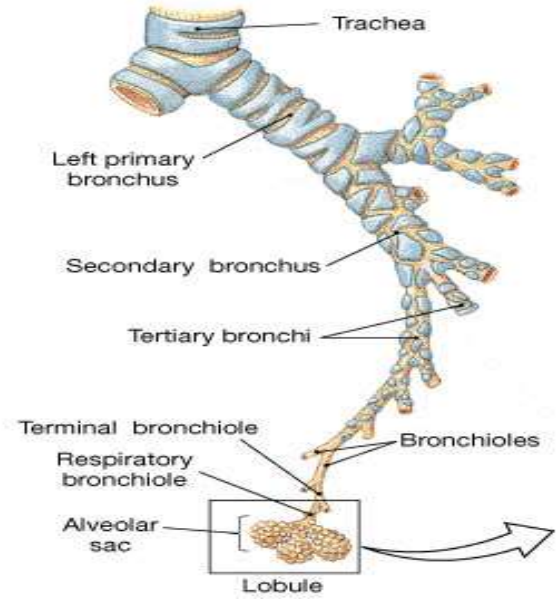

Superior Cornu.
Inferior Cornu.
Bronchial Tubes.
Bronchial Tubes.


UPPER LOBE
RIGHT LUNG
LEFT LUNG
LOWER LOBE
LOWER LOBE

THE TRACHEA

* The inner wall of the trachea is lined with ciliated mucous membrane with many goblet cells that serve to trap incoming particles.

* The tracheal wall is supported by 20 incomplete cartilaginous rings.


Trachea
Left primary bronchus
Secondary bronchus
Tertiary bronchi
Terminal bronchiole
Bronchioles
Respiratory bronchiole
Alveolar sac
Lobule

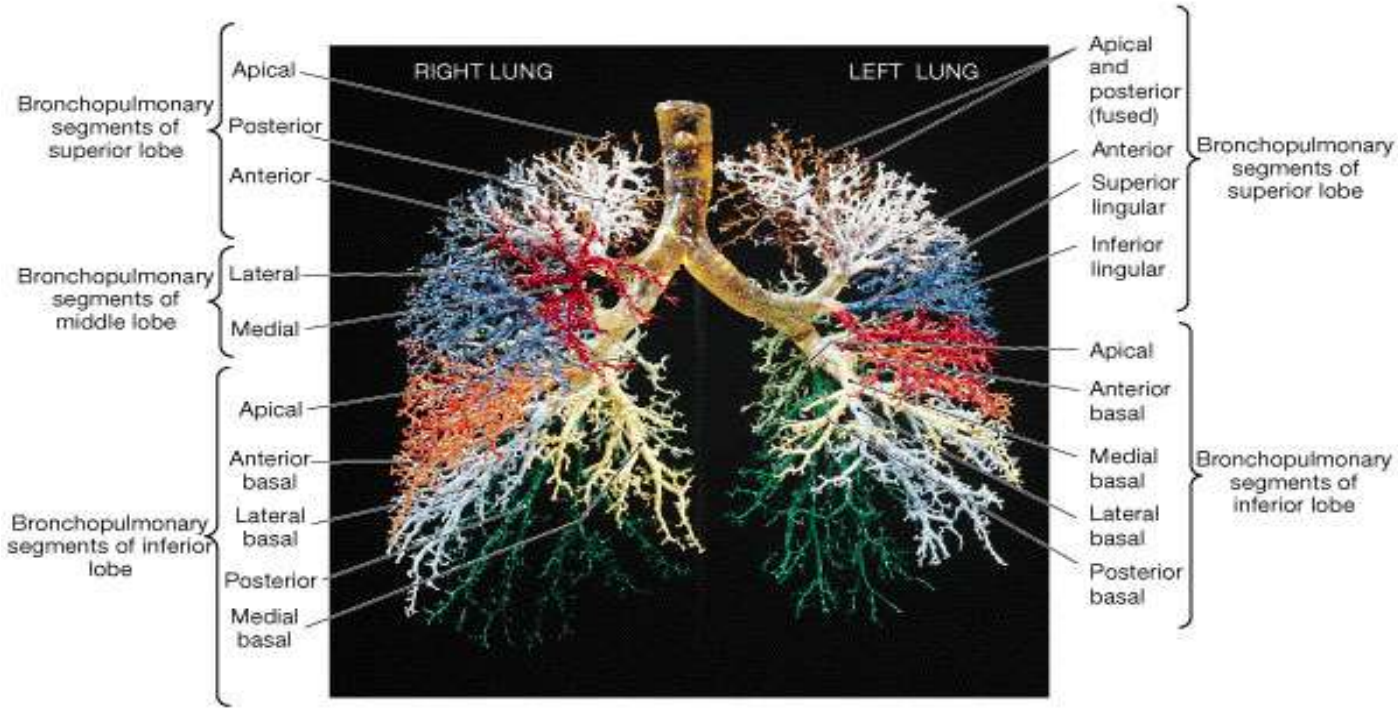
BRONCHI

* The Bronchi are the two main air passages into the lungs.

* They are composed of the:

** “Right Primary Bronchus”
- leading to the right lung.

** “Left Primary Bronchus”
- leading to the left lung.



(d) The bronchial tree

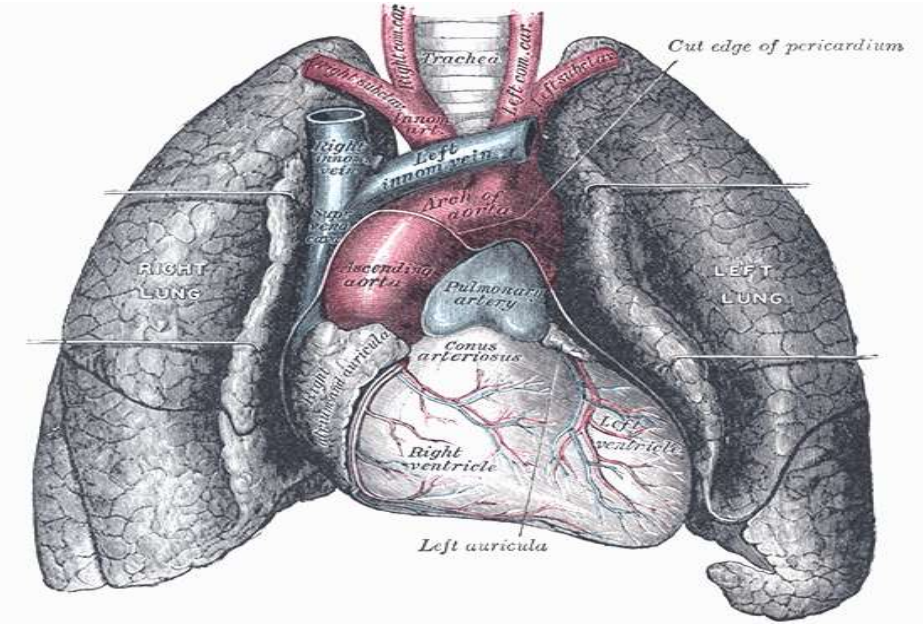
The Bronchial Tree

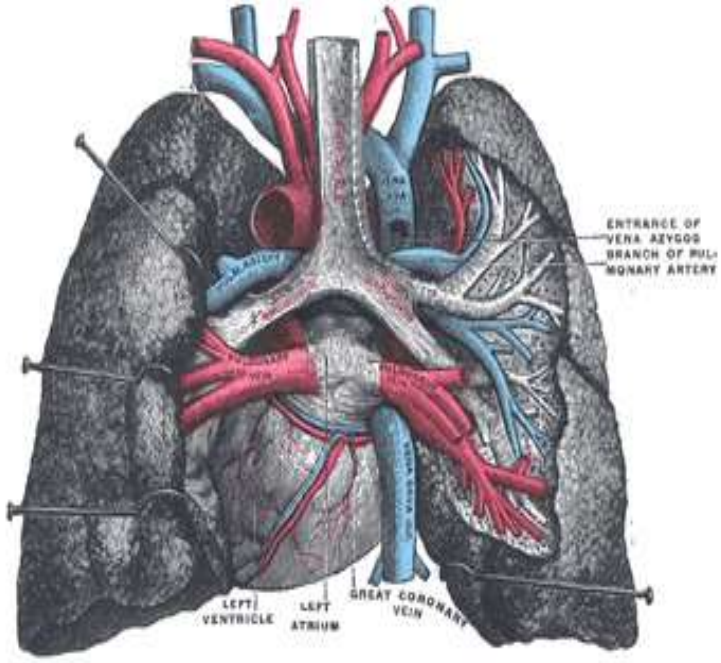
* The bronchial tree consists of branched tubes leading from the trachea to the alveoli.

* The bronchial tree begins with the two primary bronchi, each leading to a lung.

* The branches of the bronchial tree from the trachea are right and left primary bronchi; these further subdivide until bronchioles give rise to alveolar ducts which terminate in alveoli.

* It is through the thin epithelial cells of the alveoli that gas exchange between the blood and air occurs.


Cut edge of pericardium
Trachea
Right vagus nerve
Left vagus nerve
Left innominate vein
Arch of aorta
Ascending aorta
Pulmonary artery
Conus arteriosus
Right auricle
Right ventricle
Left ventricle
Left auricula
RIGHT LUNG
LEFT LUNG


ENTRANCE OF VENA AZYGOS
BRANCH OF PULMONARY ARTERY
LEFT VENTRICLE
LEFT ATRIUM
GREAT CORONARY VEIN

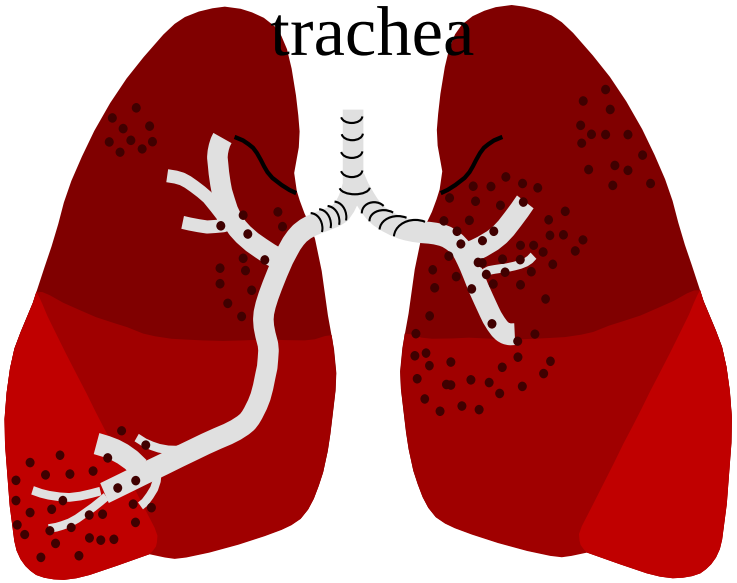
THE LUNGS

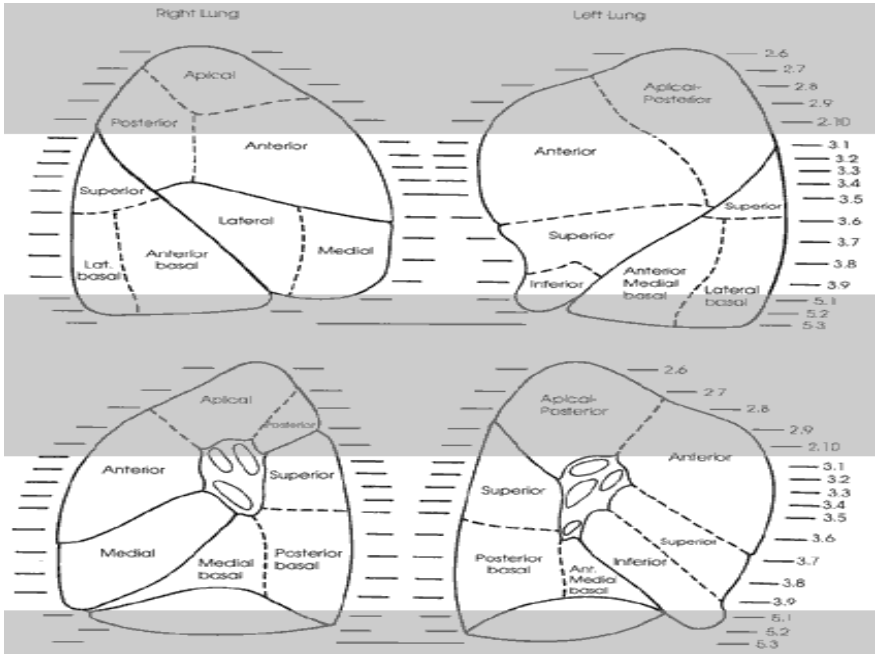
•The paired soft, spongy, cone-shaped lungs, separated medially by the mediastinum and are enclosed by the diaphragm and thoracic cage.

•2 layers of serous membrane, collectively known as pleural membrane, enclose and protect each lung.

** *Parietal Pleura*
- outer layer attached to the thoracic cavity

** *Visceral Pleura*
- inner layer covering the lung itself





Right-3 lobes

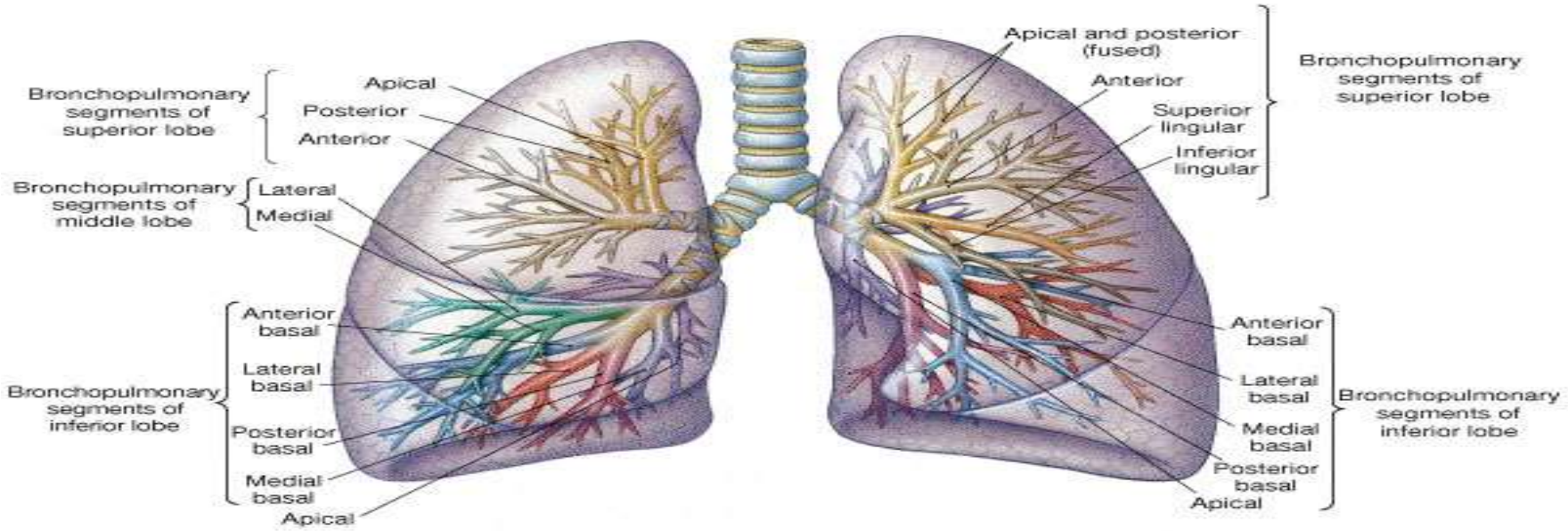
Left-2 lobes

THE LUNGS

* The two organs that extract oxygen from inhaled air and expel carbon dioxide in exhaled air.

* This is the main and primary organ of the Respiratory System.

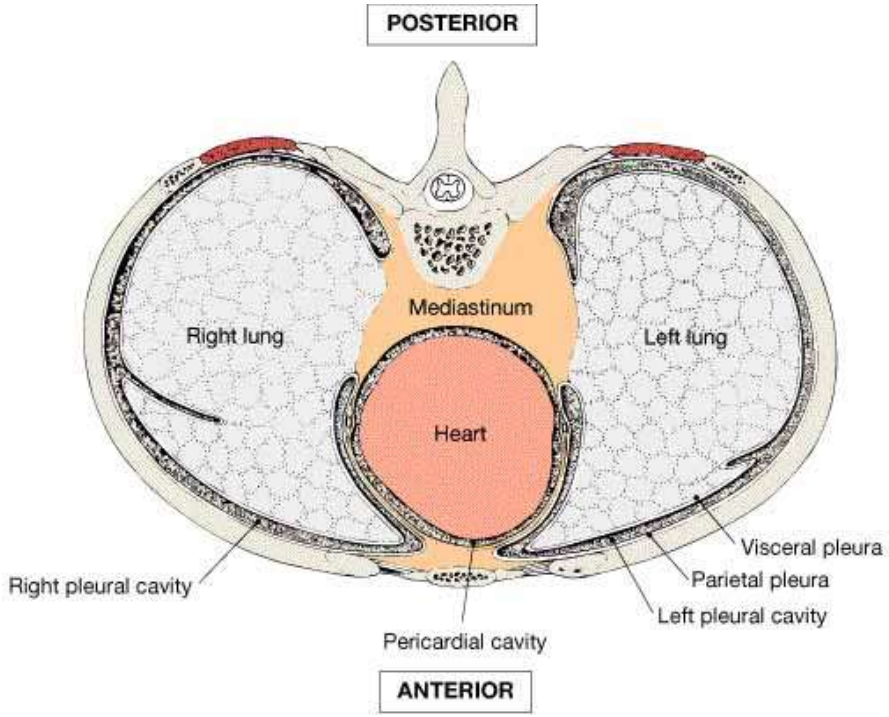
* The bronchus and large blood vessels enter each lung.

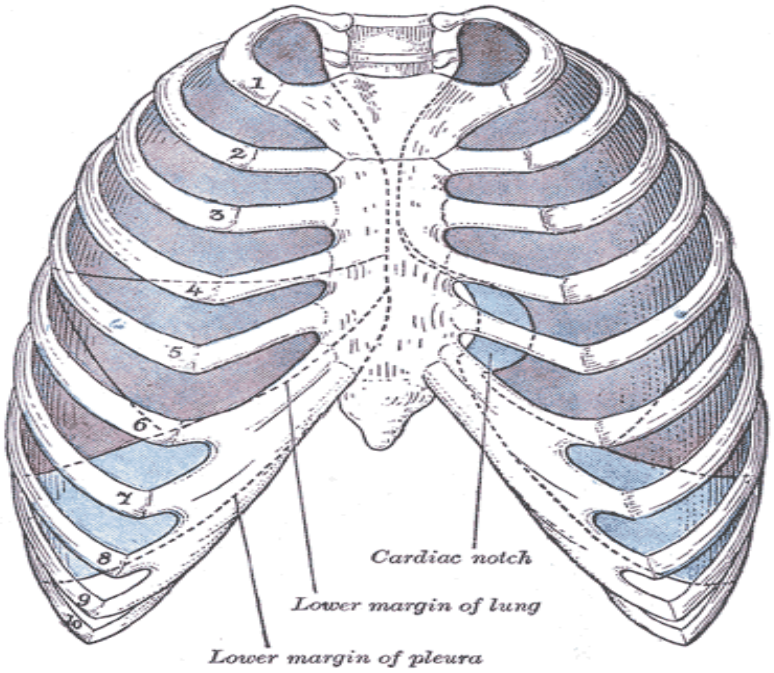


(a) Bronchial divisions and bronchopulmonary segments, anterior view

Lobes of the Lungs

* The right lung has three lobes.
* The left lung has two lobes.
* Each lobe is composed of lobules that contain air passages, alveoli, nerves, blood vessels, lymphatic vessels, and connective tissues.

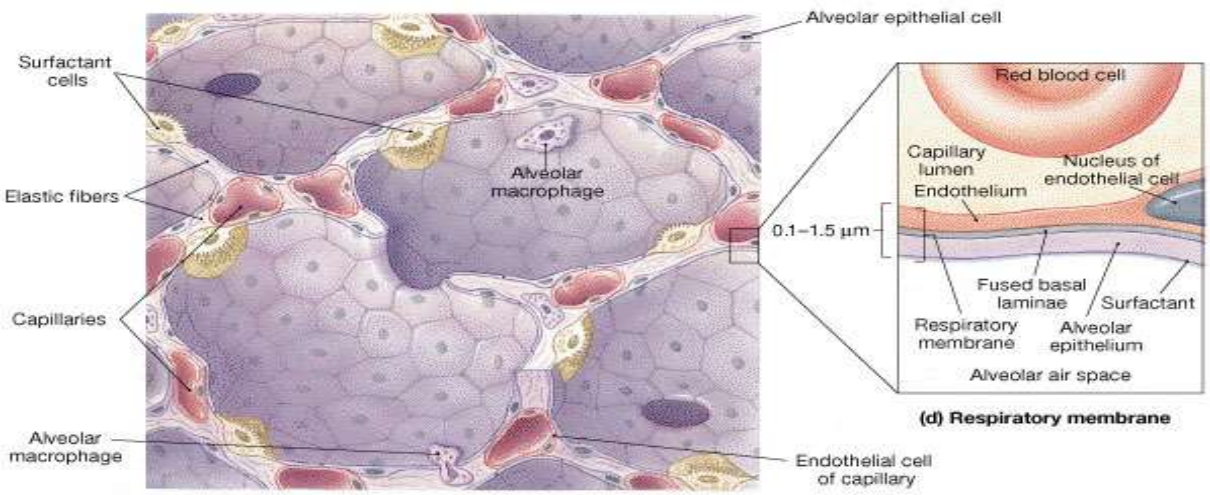

POSTERIOR
Mediastinum
Right lung
Left lung
Heart
Visceral pleura
Parietal pleura
Right pleural cavity
Left pleural cavity
Pericardial cavity
ANTERIOR


Cardiac notch
Lower margin of lung
Lower margin of pleura

The Pleural Cavities

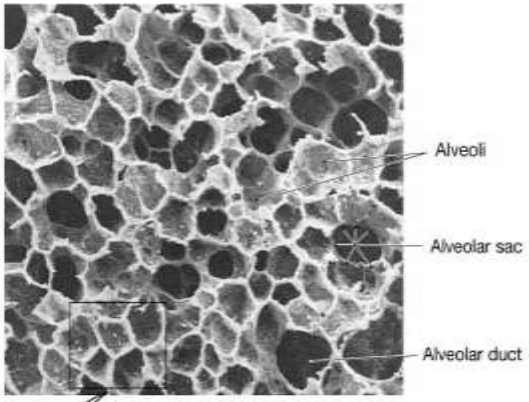
* A layer of serous membrane, between the visceral pleura and the parietal pleura.

* It contains a lubricating fluid secreted by the membranes that prevents friction between the membranes and allows their easy movement on one another during breathing.

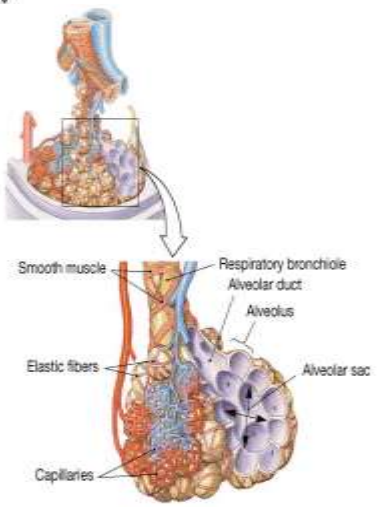


(c) Alveoli, sectional view

(d) Respiratory membrane



(b) SEM of lung alveoli



(a) Alveolar organization

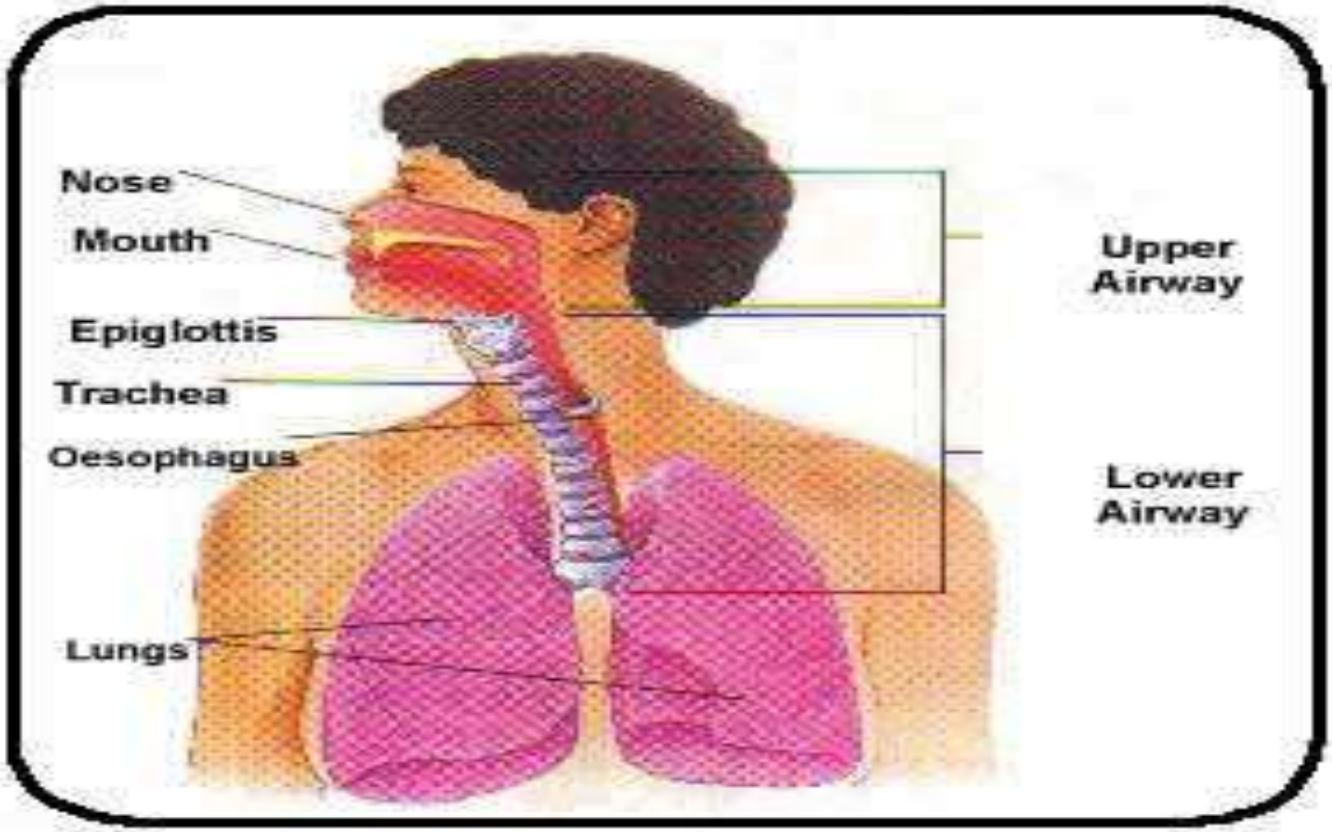
The Alveoli

* They are cup-shaped out pouching lined by epithelium and supported by a thin elastic basement membrane.

•With that you can imagine having bunch of grapes with each grape indicating and alveolus.

* Alveolar sacs are 2 or more alveoli that share a common opening.

* This is where the primary exchange of gases occur.


Nose
Mouth
Epiglottis
Trachea
Oesophagus
Lungs
Upper Airway
Lower Airway

ASSESSMENT

- What is the Structure of Trachea ?
- What is Bronchial tree ?