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Anatomy of respiratory System

Learning objectives

After this lecture, the student should be able to:

-Know the parts of the respiratory system.

- Know the functions of the. respiratory system.

- Describe the anatomical features of the different parts of the respiratory system.

The respiratory system consists of all the organs involved in breathing.

These include the Nose, pharynx, larynx, trachea, bronchi and lungs.

►Function:

1-The respiratory system brings oxygen which we need for our cells to live and function properly.

2- It helps to get rid of carbon dioxide, which is a waste product of cellular function.

►Structural classification

1-Upper respiratory tract

2-Lower respiratory tract

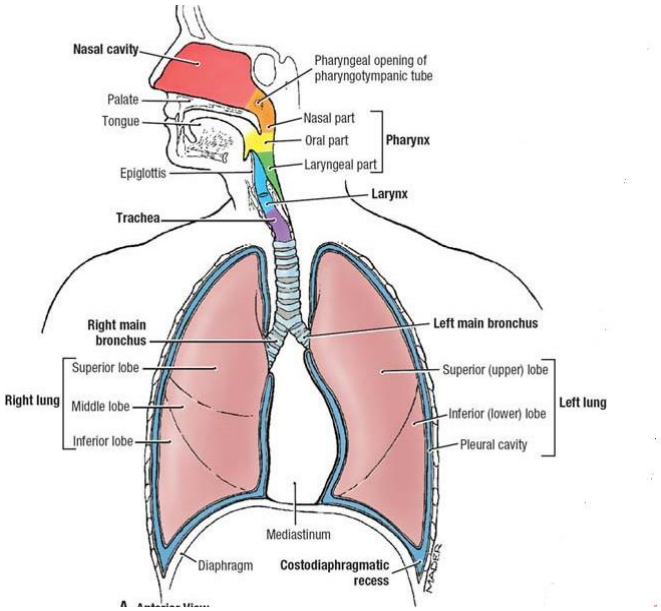
►Functional classification:

1- Conducting portion: (has no role in gas exchange):

The nose, pharynx, larynx, trachea and bronchi and terminal bronchiols, all work like a system of pipes through which the air is funneled down into lungs.

2-Respiratory portion: Through which gas exchange can occur.

It includes respiratory bronchiols ,alveolar ducts & alveoli.



The nose

The cavity of the nose is subdivided into right and left halves by a thin medium partition, called the nasal septum

The entrance to each cavity, called the nostril or naris. It opens into the vestibule which is lined with hairy skin to filter the air. Air enters the nose through (nostrils)

From the side wall of each cavity three downward curved shelves, the conchae, overhang three antero-posteriorly running passage, the meatuses. Opening into the inferior meatus is the tear duct (nasolacrimal duct), opening into the other meatuses are the orifices of large air sinuses.

Mucosa of the nasal cavities

The olfactory mucous membrane:

It lines the upper surface of superior concha and the sphenoethmoidal recess.

It also lines the corresponding area of the nasal septum and lines the roof.

Its function is the reception of olfactory stimuli.

It possesses specialized olfactory nerve cell.

***The respiratory mucous membrane:**

It lines the lower part of the nasal cavities.

It is formed of columnar ciliated epithelium with goblet calls.

Its function is to warm, moisten and clean the inspired air.

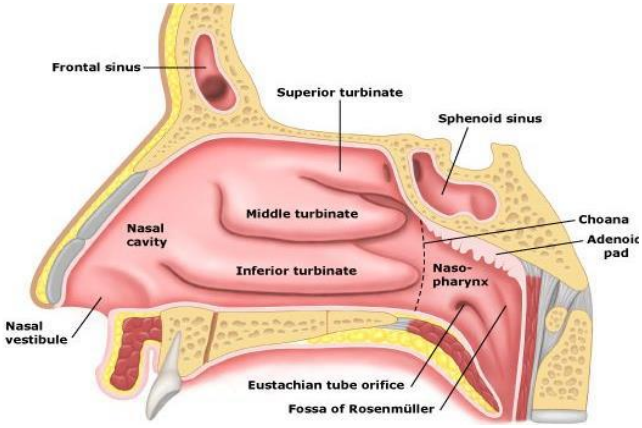
***Vestibular mucosa:**

The vestibule is lined by skin that bears short thick hairs (vibrissae) .

-The nasal cavity is separated from the oral cavity by the palate

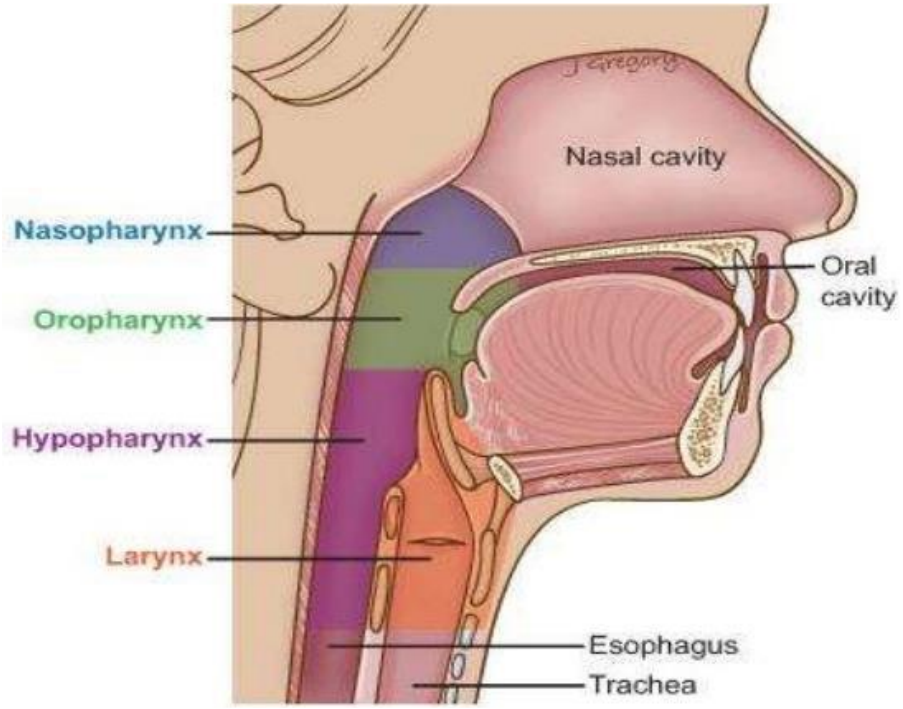
a-Anterior hard palate (bone)

b-Posterior soft palate (muscle)



Pharynx (Throat)

-It is a muscular passage from nasal cavity to larynx
Regions: It has three regions
Nasopharynx – superior region behind nasal cavity
Oropharynx – middle region behind mouth
Laryngopharynx – inferior region attached to larynx
N.B:The oropharynx and laryngopharynx are common passage ways for air and food



The larynx

▪The larynx or voice box extends from the 4th to 6th cervical vertebra . It is formed of a cartilagnous frame work formed of 9 cartilages.

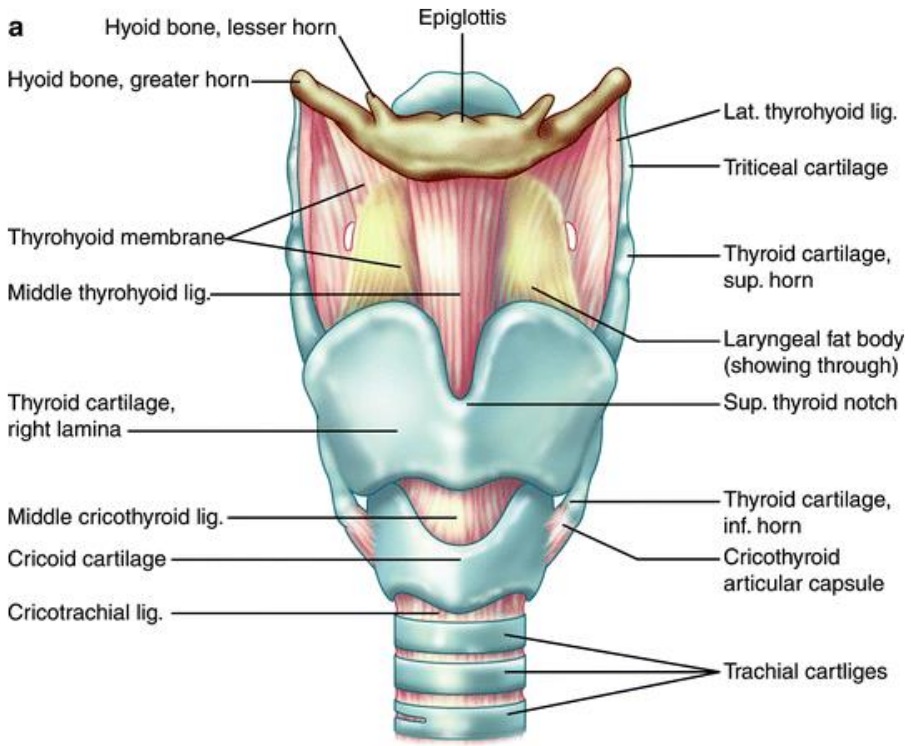
▪These cartilages are: epiglottis, thyroid cartilage, cricoid cartilage (single cartilages).

▪Behind the thyroid cartilage are three pairs of cartilages, they are:

1-arytenoids cartilages.

2-Cuniform cartilages.

3-corniculate cartilages..



▪Function:

1-Provide an open an open airway in respiration

2-phonation

Trachea (Windpipe)

The trachea or windpipe is a tube that conducts air from the larynx to the principal bronchi.

Length

In the adult, the trachea is about 12 cm long

Location

It is situated partly in the neck and partly in the thorax . The trachea lies in the midline in its cervical course but is deviated slightly to the right in its thoracic course.

Extent

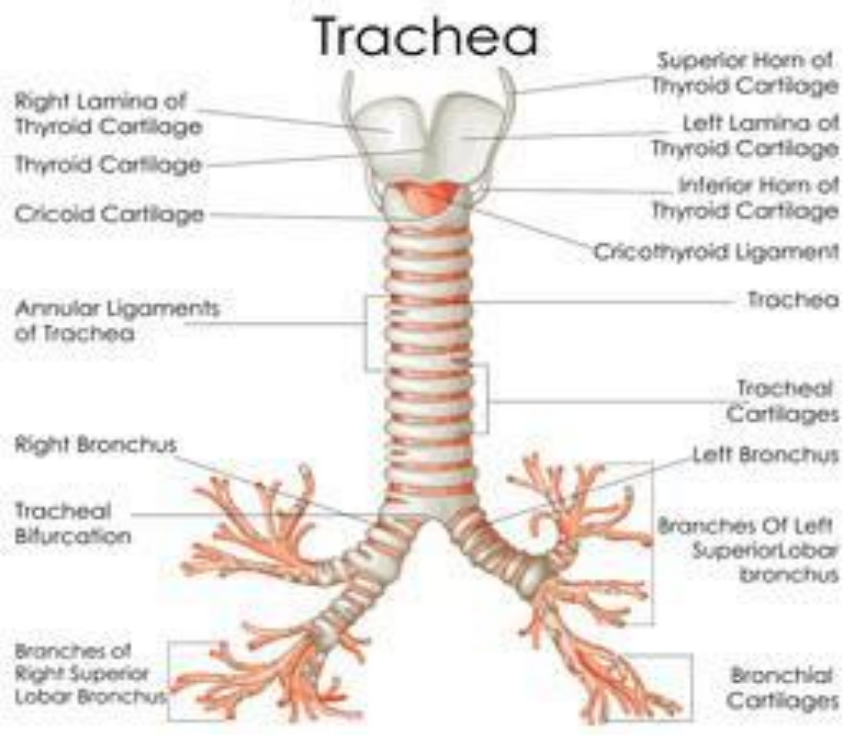
It extends from the lower border of the cricoid cartilage (level with C6) to the upper border of the fifth thoracic vertebra

It terminates by bifurcating at the level of the sternal angle of Louis (T4/5) to form the right and left main bronchi.

The bronchi

The right main bronchus is wider, shorter and more vertical than the left. It is about 1 in (2.5 cm) long and passes directly to the root of the lung at T5.

The left main bronchus is nearly 2 in (5 cm)



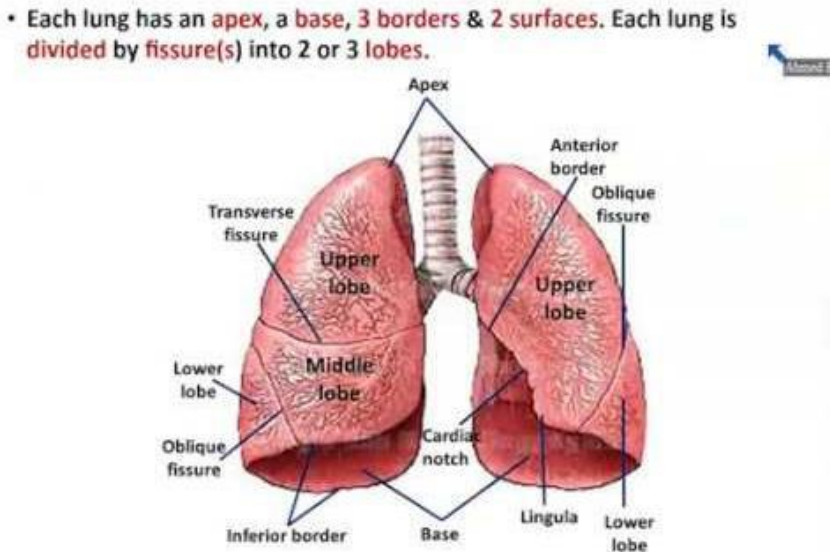
The lungs

The lungs are the organs of respiration. They are located in the thorax, either side of the mediastinum. The function of the lungs is to oxygenate blood. They achieve this by bringing inspired air into close contact with .oxygen-poor blood in the pulmonary capillaries

Each lung is conical in shape, It has an apex and base, costal and medial surfaces, anterior, posterior and inferior borders and a hilus. The apex rises to the neck which reaches above the sternal end of the 1st rib. The base is concave, and lies on the diaphragm. The medial surface faces the heart and pericardium. The hilus of the lung is on the medial surface, it transmits the main bronchus, one pulmonary artery and two pulmonary veins.

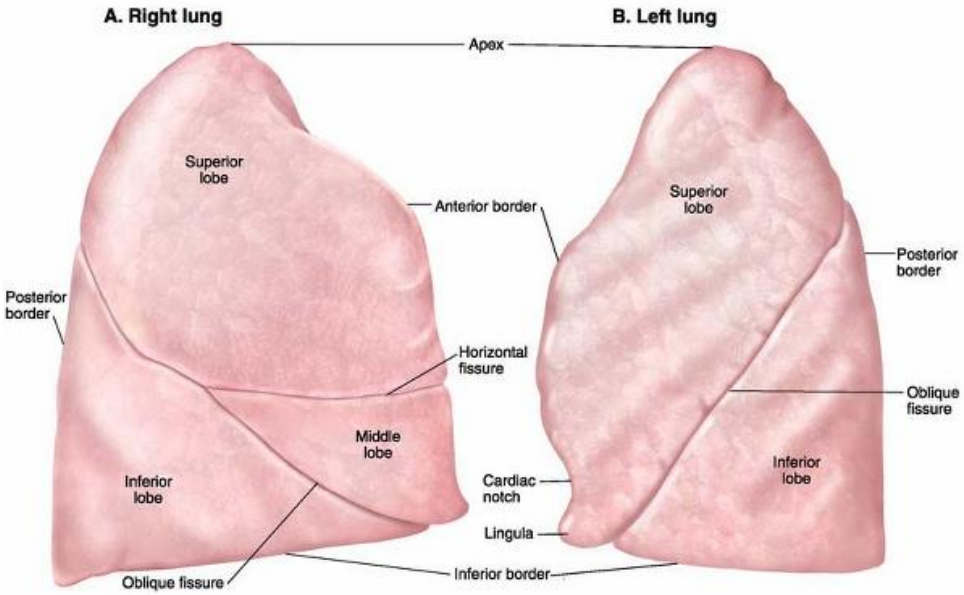
The right lung is divided by two complete fissures into three lobes while the left lung is divided by one fissure into two lobes. The right lung is shorter and heavier than the left lung. The left lung presents a cardiac notch for the heart.

The lungs are covered by double layered membrane with thin layer of .fluid in between called pleural membrane
These layers are
Visceral pleura covers the lung surface
Parietal pleura lines the walls of the thoracic cavity
Pleural fluid fills the area between layers of pleura .It to allow gliding movement during respiration



Differences between right and left lungs

	Right lung	Left lung
Shape	Short and wide	Long and narrow
Fissures	2 fissures, oblique and transverse	One oblique fissure
Lobes	3 lobes	2 lobes



Bronchopulmonary segments

Each lobar bronchus, which passes to a lobe of the lung, gives off branches called segmental bronchi. Each segmental bronchus to a structurally and functionally independent unit of a lobe called a bronchopulmonary segment. A bronchopulmonary segment of lung tissue is pyramidal in shape, having its apex toward the root of the lung and its base toward the lung surface. Each bronchopulmonary segment is surrounded by connective tissue, and in addition to its own bronchus it receives an artery, a vein, lymph vessels and autonomic nerves.

DIAPHRAGM

- The diaphragm forms a musculofibrous partition between the thoracic and abdominal cavities. It has convex upper surface which forms the floor of the thoracic cavity. Its concave lower surface forms the roof of the abdominal cavity.
- The diaphragm takes origin from the circumference of the outlet of the thorax.
- The fibers converge from their origin to be inserted into the central tendon of the diaphragm. This is a thin, but strong, aponeurotic tendon formed of interlacing fibers which run in different directions.

Action:

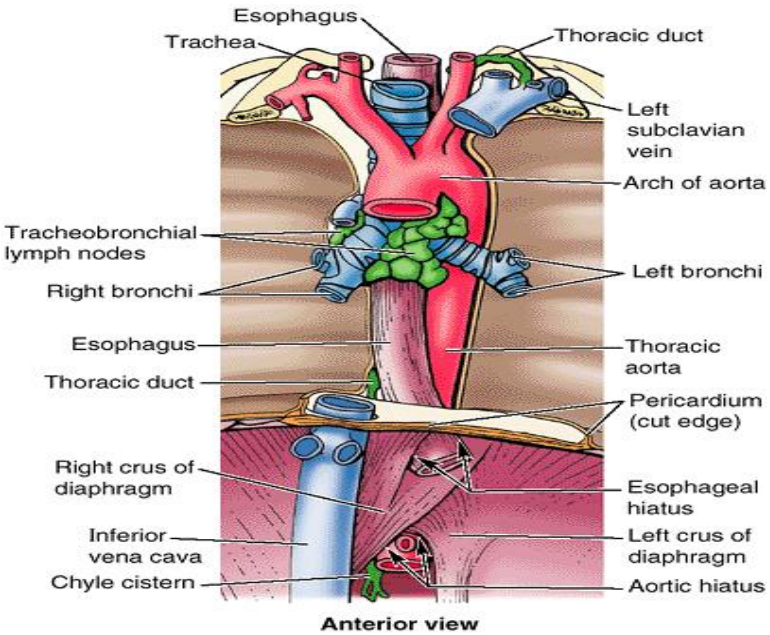
The diaphragm is the chief muscle of inspiration. It also has an important role in expulsive acts e.g. defecation, urination and parturition.

Major openings in the diaphragm

Aortic opening: At the level of lower border of the last thoracic vertebra.

Oesophageal openings: At the level of tenth thoracic vertebra.

Vena caval openings: At the level of eighth thoracic vertebra.



Anterior view