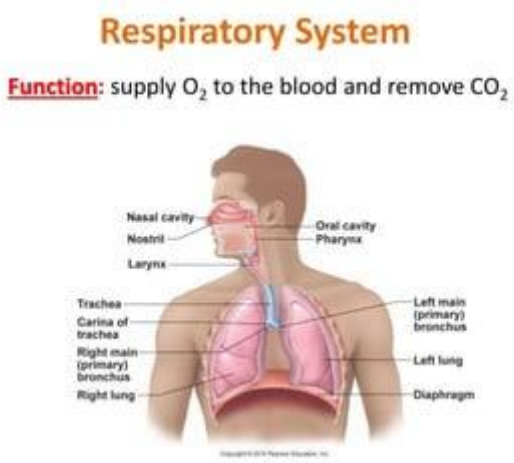
HUMAN ANATOMY & PHYSIOLOGY-II- BP201T

UNIT: 3
CLASS: 1
TOPIC: Anatomy of Respiratory System



Respiratory system forms the path through which the air passes from the nose to the lungs. Exchange of gases during internal and external respiration is the major function of respiratory system. The system also filters, warms and humidifies the inhaled air. The system includes vocal cord – produces sound. Lungs controls body PH level. Olfactory bulb helps in smelling

THE HUMAN RESPIRATORY SYSTEM

The human cells need continuous supply of oxygen for its proper functioning. Also it eliminates CO2 (carbon dioxide) as metabolic waste product. The exchange of gas between the atmosphere and human body takes place during the respiration.

ANATOMY

"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: Bronchioles, Alveolar Ducts, Alveoli

Anatomy

Nose/mouth: filtered, warmed, humidified. Mucus Traps bacteria & foreign debris. Cilia sweep mucus toward throat → digested by stomach

Pharynx: throat (passage for food/air). Tonsils: clusters of lymphatic tissue

Larynx: contains vocal cords

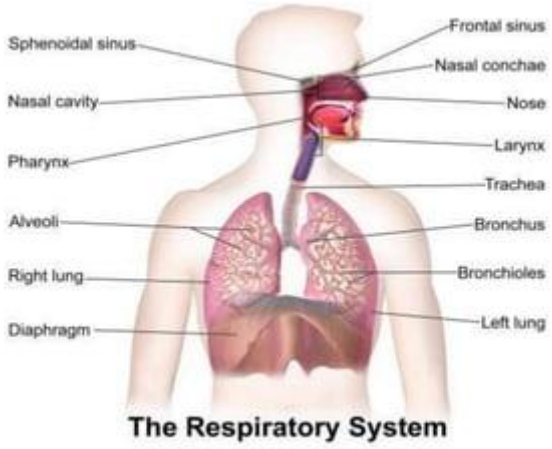
Epiglottis: covers larynx when liquids/food swallowed

Trachea: windpipe; lined with cartilage (C-shaped)

Bronchi: branches to lungs

Bronchioles: smaller branches

Lungs → Alveoli: air sacs for gas exchange



The Respiratory System

NOSE

The nose is positioned between forehead and upper lip. It is the first organ of respiratory tract. It provides an entrance for inhaled air. The nose performs the process of warming, moistening and filtering of inhaled air. It has 2 portions: The external nose (The nose). The internal nose (nasal cavities)

Nose is a bony and cartilaginous structure

Bony part: It is made up of the frontal, nasal & Maxillae bones. The cartilage part is made up of septal cartilage, lateral cartilages & alar cartilages. The internal portion is a large cavity in the skull, merging with the external nose anteriorly and communicating with the throat posteriorly.

LINING OF THE NOSE: The nose is lined with highly vascular ciliated columnar epithelium. Contains mucus secreting goblet cells

At the base of the nose two openings separated by nasal septum – septum cartilage is present. The openings are called as nostrils (anterior nares) through which the air enters to reach the

nasal cavity. The anterior nares are the openings of the nasal cavity – contains small hairs in it. The posterior nares are the nasal cavity openings in to the pharynx.

Sinuses are air-filled spaces. They present within the maxillary, frontal, ethmoid and sphenoid bones of the skull. These spaces open to the nasal cavity. The space is lined with mucus membrane. The sinuses reduce the weight of the skull Paranasal Sinuses

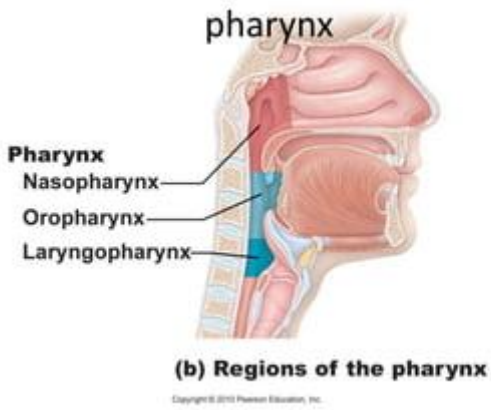
Functions of Nasal Cavity Respiration: Helps in the passage of air across the nasal cavity

Air conditioning: Air with -5^0 C – 55^0 C is converted in to31- 37^0 C at the nasopharynx Turbinate make the inhaled air water saturated so that the lungs receive 100% humid air. Inhaled air is filtered, warmed, humidified n the nasal cavity

Defense: Mucociliary system hold back all the microorganism and foreign particles. Antibodies and enzymes present in the mucus are active against bacteria. The irritants are expelled from nose forcefully while sneezing. Olfactory system recognizes environment and food Speech: Vocal card help in the generation of voice

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

THE PHARYNX



(b) Regions of the pharynx

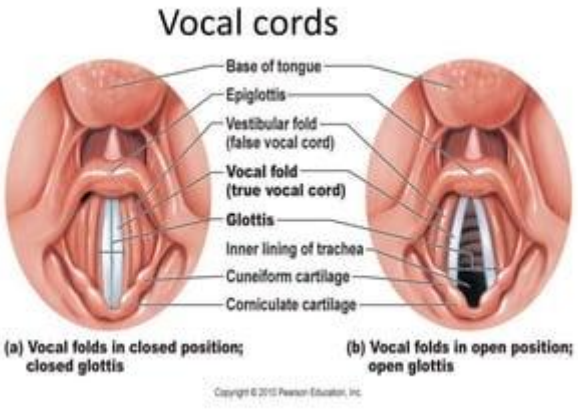
It is a large leaf-shaped piece of cartilage. Found in the entrance of larynx. Epiglottis close the tracheal opening during the swallowing of food –that prevents food from entering the trachea (or windpipe). During swallowing, there is elevation of the larynx The Epiglottis

Functions of Pharynx: Passage way for food & air, Taste, Warming and humidifying, Hearing, Protection, Speech.

It is the triangular chamber in the front upper part of the neck. A prominent elevation present just in front of the larynx – adam's apple. It joints pharynx with trachea. It is made up of cartilages – 3 single, 3 paired Single cartilages: Thyroid cartilage, cricoid cartilage, epiglottis Paired cartilages: Arytenoids, corniculates, cuneiforms

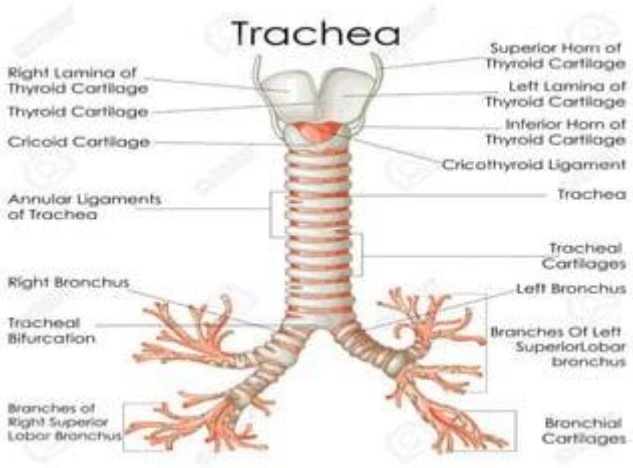
THE LARYNX

The Vocal Cords: Inside the larynx, 2 pairs of folds of muscle and connective tissues covered with mucous membrane make up the vocal cords. Changing tension on the vocal cords controls pitch, while increasing the loudness depends upon increasing the force of air vibrating the vocal cords. When vocal card is opened – abducted. When vocal card is closed – adducted.



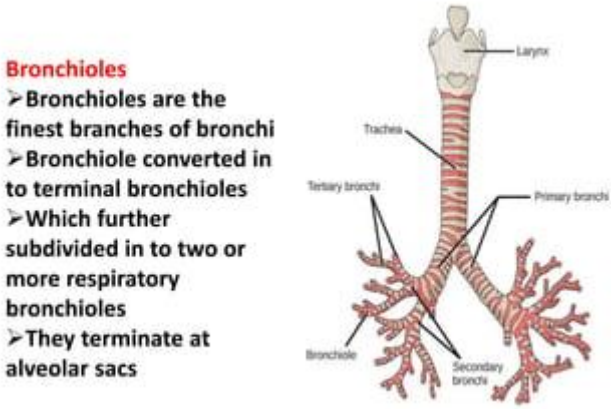
The larynx contains: Vestibule – false vocal cord, Ventricle, Infraglottic cavity – from the vocal cords to the tracheal cavity. During normal breathing, the vocal cords are relaxed and the glottis is a triangular slit. During swallowing, the False vocal cords and epiglottis close off the glottis.

Trachea is a wind pipe. It is measured around 10-11 cm. It extends downwards up to 5th thoracic vertebra. At the end its divide in to right and left bronchi. Which enters in to their respective lungs. It is composed of 16-20 c shaped rings of hyaline cartilage. Connective tissues and involuntary muscles joins the cartilage and forms the posterior wall. The trachea cartilages covered by 3 tissue layers. Outer layer, middle layer, inner layer. It helps in the cough reflex.



Bronchi: It is the air way passage in to the respiratory tract. They carry inhaled air in to lungs. They are two types right bronchi and left bronchi. The primary bronchi split in to three secondary bronchi. They enter in to superior, middle & inferior lobes of the right lung. Secondary bronchi further divide in to tertiary bronchi. The tertiary bronchi then divide in to smaller branches

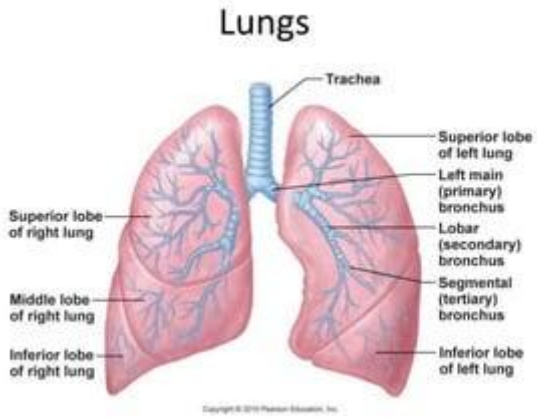
Bronchioles: Bronchioles are the finest branches of bronchi. Bronchiole converted in to terminal bronchioles. Which further subdivided in to two or more respiratory bronchioles. They terminate at alveolar sacs



LUNGS

Lungs present in the thoracic cavity as two cone shaped lobes separated by heart and other structures. Present from clavicle to diaphragm. 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. Left lung is smaller than the right lung due to the space occupied by the heart in the thoracic cavity



The various parts of lungs are: Apex, base, costal surface, medial surface

APEX: Lung has round apex. Which extends up to the root of the neck

BASE: It has concave and semilunar base. Which associated with the thoracic surface of diaphragm

COSTAL SURFACE: It has convex costal surface. Which is associated with the costal cartilages, ribs & intercostal muscles

MEDIAL SURFACE: It has concave medial surface. Triangular shaped hilum present 5-7th thoracic vertebra. All artery veins nerve supply pass through this surface

MEDIASTENUM:

• It is an area between the lungs and is occupied by the heart, great vessels, trachea, right and left bronchi, oesophagus, lymph nodes, lymph vessels and nerves.

PLEURA & PLEURAL CAVITY:

• Each lung is enclosed with in a pleural membrane – which is made up of double layered serous membrane

• Parietal pleura – outer layer lines thoracic cavity wall

• Visceral pluera – deep layer – lines the lungs

• Pleural cavity: it is the space between the two layers and contains pleural fluid

• pleural fluid lubricating fluid secreted by the membranes – prevents the friction between the layers during breathing

LOBES/FISSURES & LOBULES

• Each lung is separated in lobes • Left lung: divided in to two lobes • Right lung: divided in to three lobes • The lobes are further divided in to numerous lobules – contains alveoli. FUNCTIONS: • Respiration • Alter the blood pH filter out small blood clots formed in the vein • Alter the concentration of drugs • Convert angiotensin-I to angiotensin II • Provides protection by Ig-A

ALVEOLI: Hollow cavity found in the mammalian lungs. Pulmonary alveoli is a spherical projections of the respiratory bronchioles. The alveolar membranes are the major sites were exchange of gases occurs with the blood. A human lung has around 300 million alveoli ¬ The alveoli are made up of an epithelial layer. 70% of each alveoli is occupied with blood capillaries FUNCTIONS: External respiration – gas exchange occurs between alveoli & blood by diffusion. Protection against microbes