Respiratory System

The respiratory system is a biological system consisting of specific organs structures used for the process of respiration in an organism. The respiratory system involved in the intake and exchange of oxygen and carbon dioxide between an organism and environment. Breathing is a vital function of the human body that takes place in the lungs, the passage of air into the lung to supply the body with oxygen(O_2 brought from the external environment and transported to the cells) is known as inhalation and the passage of air out the lung to expel carbon dioxide (CO_2 which results from cellular metabolism is eliminated into the atmosphere) is known as exhalation.

Respiratory System: Consists of **Conducting portion** transports air - respiratory passages that carry air to the site of gas exchange, Filters, humidifies and warms air, includes the nose, nasal cavity, pharynx, larynx, trachea and progressively smaller airways, from the primary bronchi to the terminal bronchioles. The conducting zone which doesn't participate in gas exchange.

Respiratory portion: Site of gas exchange - composed of small airways called respiratory bronchioles and alveolar ducts as well as air sacs called alveoli.

Major Functions of the Respiratory System

To supply the body with oxygen and dispose of carbon dioxide, filters inspired air, produces sound, contains receptors for smell, helps regulate blood pH, protection from inhaled pathogens and irritating substances, loss of water and loss of heat.

Functional structures

Nose

The only externally visible part of the respiratory system that functions by providing an airway for respiration moistening (humidifying) and warming the entering air, filtering inspired air and cleaning it of foreign matter, serving as a resonating chamber for speech, housing the olfactory receptor

Pharynx-Funnel-shaped tube of skeletal muscle that connects to the nasal cavity and mouth superiorly, It is divided into three regions

Nasopharynx , oropharynx and laryngopharynx serves as a common passage way for food and air

Larynx (Voice Box) Attaches to the hyoid bone and opens into the laryngopharynx superiorly**.** The three functions of the larynx are: to provide a patent airway, to act as a switching mechanism to route air and food into the proper channels and to function in voice production

Trachea-Flexible and mobile tube extending from the larynx into the mediastinum, composed of three layers**,** mucosa – made up of goblet cells and ciliated epithelium, submucosa – connective tissue deep to the mucosa**,** a dventitia – outermost layer made of(C-shaped) incomplete rings of hyaline cartilage

Bronchial Tree

Bronchea into the bronchi which are two tubes that carry air into each lung

Bronchi-The carina of the last tracheal cartilage marks the end of the trachea and the beginning of the right and left bronchi, air reaching the bronchi is warm and cleaned of impurities, saturated with water vapor. Tissue walls of bronchi mimic that of the trachea as conducting tubes become smaller, a highly branched system of air conducting passages that originate from the left and right primary bronchi. Incomplete rings of hyaline cartilage support the walls of the primary bronchi to ensure that they remain open. Right primary bronchus is shorter and wider than the left primary bronchus. The primary bronchi enter the hilus of each lung together with the pulmonary vessels, lymphatic vessels, and nerves. bronchi subdivide into secondary bronchi, each supplying a lobe of the lungs, air passages undergo 23 orders of branching in the lungs. Each primary bronchus branches into several secondary bronchi (or lobar bronchi).

The left lung has two secondary bronchi, the right lung has three secondary bronchi, they further divide into tertiary bronchi each tertiary bronchus is called a segmental bronchus because it supplies a part of the lung called a bronchopulmonary segment, bronchioles and terminal bronchioles with successive branching, the amount of cartilage decreases and amount of smooth muscle increases in this allows for variation in airway diameter during exertion and when sympathetic division active bronchodilation mediators of allergic reaction like

histamine bronchoconstriction, epithelium gradually changes from ciliated pseudostratified columnar epithelium to simple cubodial epithelium in terminal bronchioles.

Bronchioles

Consist of cuboidal epithelium have a complete layer of circular smooth muscle, lack cartilage support and mucus-producing cells. Respiratory bronchioles lead to alveolar ducts, then to terminal clusters of alveolar sacs composed of alveoli which are small spongy sacs, this is where the exchange of oxygen and carbon dioxide occurs, approximately 300 million alveoli.

Lung

Paired lungs occupy all thoracic cavity lateral to the mediastinum, each is cone-shaped with anterior, lateral and posterior surfaces contacting ribs. Superior tip is apex, just deep to clavicle, concave inferior surface hilus or (hilum**)** indentation that contains pulmonary and systemic blood vessels and nerves enter and exit the lung of the lung root. Root – site of vascular and bronchial attachments, above structures attaching lung to mediastinum pulmonary artery and veins and main bronchus resting on diaphragm is the base, right lung: 3 lobes upper lobe, middle lobe, lower lobe, left lung: 2 lobes upper lobe, lower lobe. Each lobe is made up of bronchopulmonary segments separated by dense connective tissue, each segment receives air from an individual segmental (tertiary) bronchus, approximately 10 bronchopulmonary segments in each lung, limit spread of infection can be removed more easily because only small vessels span segments. The smallest feed into the pulmonary capillary network around the alveoli, many elastic fibers, lungs light spongy and elastic, lasticity reduces the effort of breathing, blood supply lungs get their own blood supply from bronchial arteries and veins innervation pulmonary plexus on lung root contains sympathetic, parasympathetic and visceral sensory fibers to each lung .Divides the thoracic cavity into three chambers ,the central mediastinum, two lateral compartments ,each containing a lung. Mediastinum contains (mainly) heart, great blood vessels, trachea, main bronchi and esophagus.