Histology lab.:

Respiratory system :

Respiratory system: it consist of lungs ,and numerous air passages (tubes) of varies size that lead to and from each lung .

The main function of the respiratory portion is the exchange of oxygen and carbon dioxide between inspired air and blood.

RESPIRATORY EPITHELIUM

Pseudostratified columnar ciliated epith., with goblet cells. It lines most of the conducting part. It consists of five types of cells:

1- Ciliated columnar cells: represent the most common type. Each cell has about 300 cilia on the apical surface. Beneath these cilia, there is a basal body, and small mitochondria, to supply ATP for ciliary beating. Ciliary movement transports a continuous layer of mucous to the pharynx. Foreign particles will be traped in this mucous, so this will protect lungs from any particulate matter and any bacteria.

. 2- Mucous goblet cells: they are global in shape, and their apical part contains mucous droplets composed of glycoproteins.

3- Brush cells: they have numerous microvilli on their apical surface. They are considered as sensory receptors due to the presence of afferent nerve endings on their basal surface.

4- Basal (short) cells: small, rounded cells, lie on the basal lamina, but do not extend to the luminal surface of the epithelium. They are believed to be the generative cells for other cell types.

5- Small granule cells: small, rounded cells, with numerous granules, 100-300 nm in diameter, with dense core. They are part of the diffuse neuro endocrine system(DNES),. The function of granule cells is still not understood well, but they may function in reflexes regulating the air-way or vascular caliber.

Olfactory Epithelium:

On the roof of the nose is specialized epithelium called olfactory epithelium ,which detect and transmits odors .This epithelium consist of three cell types : supportive , basal , olfactory (sensory) .

Olfactory cells: (sensory bipolar neurons) between the more apical supportive cells and basal cell `. Their nuclei lie in a level bellow that of the supporting cells.. The afferent axons of bipolar

cells unite to form the olfactory nerve, Olfactory cells have a life span of one month, and they are replaced if injured, so they are the only neurons that replaced during postnatallife.Lamina propria of the olfactory epith.contains the glands of Bowman, a branched tubuloalveolar serous glands, which secretes a fluid around the olfactory cilia to facilitate the dissolve of odoriferous substances to stimulate olfactory cells.

NASOPHARYNX

It is the first part of the pharynx, lined by respiratory epith. At the contact with soft palate. It communicates with middle ear by Eustachian tube. Its wall is rich with lymphatic tissue.

LARYNX

An irregular tube that connects the pharynx to the trachea. The skeleton of the larynx is made of cartilage within the lamina propria. The large cartilages are hyaline, while the small ones are elastic. These cartilages support the larynx to maintain an open air way, and prevent swallowed food from entering the trachea, also they participate in sound production (phonation).

TRACHEA

Thin walled tube, about 10cm length, and 2.5 cm diameter, extends from the larynx into the thorax where it bifurcates into two primary bronchi. The wall consists of three layers:

1- Mucosa: consists of respiratory epith. and lamina propria of loose connective tissue, with diffuse lymphatic tissue, some times of nodular form.

2- Submucosa: loose connective tissue, rich in lymphatic tissue. It is separated from lamina propria by an elastic membrane. . Muco-serous glands; tracheal glands also present that produce mucous fluid.

BRONCHEAL TREE

The trachea divides into two main bronchi, each enters the lung through the hilum, where arteries, veins, and lymphatics enter and leave the lungs, where they are nvested by dense connective tissue.

Each primary bronchus course downwards dividing into three bronchi in the right lung, and two in the left lung, each supply a pulmonary lobe. These lobar bronchi divide repeatedly into bronchioles, then 5-7 terminal bronchioles3- Cartilage layer: There are 16-20 C- shaped hyaline cartilage to keep tracheal lumen opened.

Bronchus:

Primary bronchus has the same histological structure as trachea, except that the cartilage is a complete ring. At the level of secondary bronchus, the cartilage become as an isolated plates.Lamina propria is rich in elastic fibers, mucous and serous glands, lymphocytes, and lymphatic nodules. Well developed smooth muscle fibers also present.

Terminal bronchioles:

They are lined by simple columnar or simple cuboidal cells, ciliated with Clara cells.

Clara cells are non ciliated, and have an apical secretary granules that secrete glycosaminoglycans, which has a protective function against oxidative agents and inflammation, and has a detoxifying effect on noxious inhaled particulate matters. Goblet cells disappear above the level where ciliated cells disappear.Lamina propria has smooth muscle fibers and elastic fibers arranged in a helical crisscrossing pattern.

Respiratory bronchioles:

Each terminal bronchiole gives two or three respiratory bronchioles. These are lined by simple ciliated cuboidal cells, with non ciliated Clara cells.Lamina propria is rich in smooth muscle fibers and elastic fibers. The wall of respiratory bronchioles is interrupted by the alveolar sacs and alveolar ducts, where the epith. changes into simple seq. epith

Alveolar duct:It is a tubular structure that is connected to the respiratory bronchioles. It is lined by simple seq. epith.Lamina propria has smooth muscles which disappear distally, and replaced by elastic and reticular fibers.

Alveolar sac:It is a space where a group of alveoli open at each other. It is lined by simple seq. epith., and invested by elastic and reticular fibers. The elastic fibers are for the expansion and contraction, while reticular fibers prevent over distention.

Alveoli: Sac like evaginations of respiratory bronchioles, alveolar ducts, and sacs. They are about 200μm in diameter, and are specialized for O2 and CO2 exchange between air and blood.