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Lecture title: Respiratory system

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Summary: **The respiratory system** is a series of organs by which animals obtain and use oxygen O_2 and eliminate carbon dioxide (CO_2). O_2 is one of the most vital requirements of animals, the animal's body need O_2 for oxidation of nutrients to produce energy.CO_2 is produced as a result of this oxidation.

Respiratory system

The respiratory system is a series of organs by which animals obtain and use oxygen O_2 and eliminate carbon dioxide (CO_2). O_2 is one of the most vital requirements of animals, the animal's body need O_2 for oxidation of nutrients to produce energy.CO_2 is produced as a result of this oxidation.

- **The primary functions of the respiratory system are:**

1- Supply O_2 to the body
2- Removing CO_2 from the body

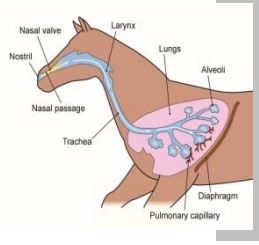
*Several separate issues are involved in this process, which including:

1- <u>Chemical factors</u> associated with oxygen uptake and carbon dioxide production

2- <u>Mechanical and physical aspects</u> concerned with ventilation of the lungs, transport of gases between the lungs and blood and between the blood and tissues, and the regulation of ventilation.

***The secondary functions of the respiratory system are:**

1. Regulation of the acidity of body fluids.
2. Temperature control.
3. Elimination of water.



4. Phonation (voice production).

- Structure of respiratory system

The respiratory system is composed of: -

1. Nostrils and nasal cavities
2. Pharynx
3. Larynx
4. Trachea
5. Bronchi
6. Bronchioles
7. Lung and alveoli of the lungs

- **The trachea mainly contains cilia and mucous gland, which play very important role in:**

1-Prevent inhalation of foreign objects.

2-The secretion of the mucous glands and the motion of the cilia help to clean the trachea from dust and other foreign matters.

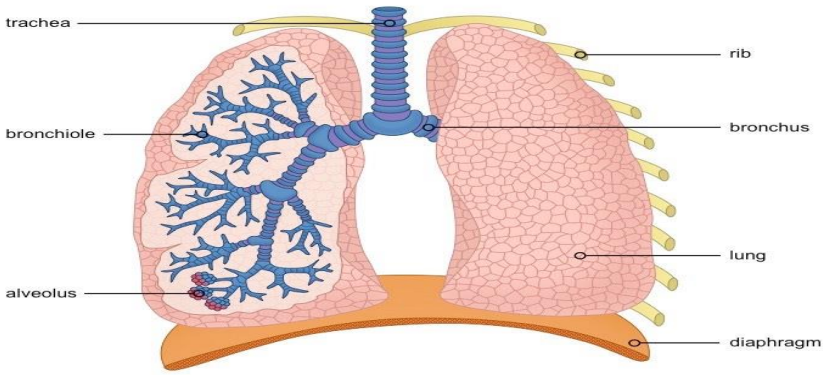
- **Alveoli lined with types of epithelial cells:**

1-Type I the primary lining cells

2-Type II the granular pneumocytes.

- **The lungs also contain:**

1. Pulmonary alveolar macrophages (PAMs)
2. Lymphocytes
3. Plasma cell
4. Mast cells.



- Each lung is surrounded by a double serous membrane known as **pleura**, that part of the membrane covering the lungs is the **visceral pleura,** other part which lines the thoracic cavity is the **parietal pleura.** The space between two layers is known as the **plural cavity**, this cavity contains a small amount serous (watering) fluid which acts as lubricant to reduce friction between the lungs and other structures of the thorax.
- **Surfactant** is a phospholipid agent synthesized in the type II alveolar epithelial cells it helps to:

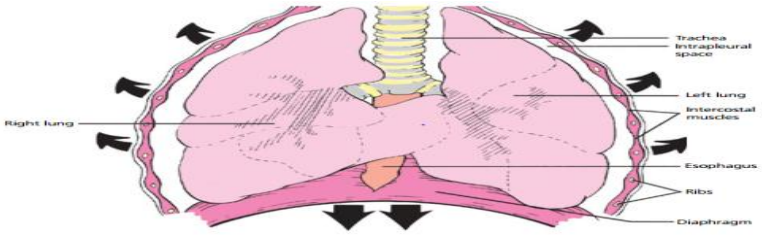
1-Reduce the surface tension caused by the fill of fluid laying the alveoli.

2- Helps to prevent their collapse, so that the surfactant maintains the stability of alveoli

- **Respiratory cycle: -**

- A respiratory cycle consists of an inspiratory phase followed by an expiratory phase.
- **Inspiration:**

Inspiration is an active part of the breathing process. In normal quite breathing, during inspiration, the external intercostal muscles (muscles located between the ribs) contract, ribs and sternum move upward and width of the chest increases from side to side and front to back, the **diaphragm** contract (The diaphragm the musculo-tendinous separation between the thorax and abdomen), the pressure between pleural surface (interpleural pressure) is reduced and enabling to draw air into lungs. The lungs expand to fill the enlarged thorasic cavity producing corresponding greater degrees of lungs inflation this process called inhalation**.**



- **Expiration:**

In normal quite breathing, expiration is passive no muscle contract when external intercostal muscle relaxes, ribs and sternum move downward and inward. The capacity of the thorax is decreasing, intrathoracic pressure rises and pressure between pleural surface is increased. The volume of the thoracic cavity decreases, and the pressure inside increase, which expels the air in what is called an exhalation.

- Type of breathing: -

There are two types of breathing abdominal and costal. **Abdominal breathing** is characterized by visible movements of the abdomen, in which the abdomen protrudes during inspiration and recoils during expiration. Normally the abdominal type of breathing predominates. The other type is called **costal breathing**; it is characterized by pronounced rib movements.

- Respiratory process: -There are two type respiratory process. **External respiration:** the absorption of O2 and removal of CO2 from the body whole (between lung and environment) **Internal respiration:** the gas exchange between the cells and their fluid medium (between blood and cell)