SAWA UNIVERSITY

عنوان المحاضرة

جامعة ساوة

كلية العلـــــــــــوم

قسم علوم الأدلة الجنائية

المرحلة الثانية

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Respiratory system

Respiration is a metabolic process in which cells obtain energy through the oxidation of organic molecules, involving the exchange of gases between an organism and its environment, where oxygen is absorbed to support cellular energy production and carbon dioxide is released as a metabolic by-product.

This process involves

- Intake of environment oxygen
- Oxidation of food
- Elimination of carbon dioxide and water
- Conservation of energy in the form of ATP.

Exchange of gases between the blood and the lungs is called external respiration and that between the blood and the cells is called internal respiration.

Function of respiration

1. Diffusion of oxygen and carbon dioxide among the alveoli and the blood.

2. Transport of oxygen and carbon dioxide in the blood and the body fluid to and from the body tissue cells.

3. Regulation of ventilation.

Respiratory tract

It consists of pair of external nostrils, nasal cavity, internal nares, nasopharynx, larynx (voice box), trachea (windpipe), bronchi, bronchioles, alveolar duct and alveolar sac.

Pharynx

The pharynx is a 12–14 cm muscular tube located behind the nasal cavity, oral cavity, and larynx. It functions in both the respiratory and digestive systems: air passes into the larynx, while food moves into the esophagus. During swallowing, the epiglottis closes the laryngeal opening to prevent food from entering the airway.

Nasopharynx: Upper part where the internal nares open.

 Oropharynx: Middle, oral portion of the pharynx.

 Laryngopharynx: Lower, laryngeal portion of the pharynx.

Larynx (Voice Box)

The larynx is a small box-like structure in the neck, located in front of the esophagus and supported by the thyroid (Adam’s apple), and arytenoid cartilages.

How the larynx works:

1. When no sound is produced, the vocal cords are position at an acute angle. For sound production, the laryngeal muscles bring the vocal cords close together and parallel.

2. Air from the lungs passes through the cords, causing them to vibrate and produce sound. This sound is then shape into speech by the mouth, lips, and cheeks.

Trachea (Windpipe)

The trachea is a 12 cm tube supported by C-shaped rings to keep it open. It lies in front of the esophagus and divides into two bronchi in the chest.

Bronchi and Bronchioles

- The bronchi enter the lungs and branch into smaller bronchioles.
- Bronchioles lead to alveolar ducts and then to alveolar sacs.
- The total alveolar surface area is about 100 m^2.

Lungs

Lungs is situated in thoracic cavity, each lung is soft, spongy, elastic and pinkish in color. Left lung is enclosed into two membrane. Inner membrane is called pleura and outer is called parietal pleura space between these two membranes is called pleural cavity, which is filled by pleural fluid, it prevents the lungs. The total number alveolar sac is about 300-400 million through which exchange of respiratory gases occur.

Mechanism of Breathing

1) Lungs do not have their own well-developed musculature. Therefore, breathing is brought about by the change in the size of chest cavity.

2) Mechanism of breathing involves alternate contraction of the chest cavity, which lead to intake of oxygen called inspiration, and outgo of carbon dioxide is called expiration.

Following structures take part in breathing mechanism

- Two sets of intercostal muscles.
- Abdominal muscles
- Muscles diaphragm present between the chest and abdominal muscles.

Inspiration (Inhalation)	Expiration (Exhalation)
External intercostal muscles contract	Internal intercostal and abdominal muscles contract
abdominal muscles relax	External intercostal muscles relax
Diaphragm flattens	Diaphragm moves upward
Chest cavity volume increases	Chest cavity volume decreases
Air pressure in lungs decreases	Air pressure in lungs increases
Air enters the lungs	Air leaves the lungs