Human Respiratory System

Description

Understanding the human respiratory system is paramount for students preparing for state and central government exams due to its relevance in various fields like healthcare, environmental science, and public policy. A thorough grasp of this topic aids in comprehending health-related questions, environmental regulations, and policy implications concerning air quality and pollution. Moreover, it equips candidates with foundational knowledge essential for roles in healthcare administration and public health management, making it indispensable for exam preparation.

Human Respiratory System

Â The human respiratory system, or respiratory system, is an important mechanism governing the respiratory activity of human beings. In this, respiration is an important part of the internal life process, which provides us with oxygen and excretes carbon dioxide from the body.

The human respiratory system mainlyÂ resembles processes such as acquiring and excreting the lungs, nose, throat, and lungs. This mechanism is controlled by the main organs for respiration as well as by the central control of the brain. When we breathe, Â the reactive processes that are snuffed send signals to the lungs that stimulate them to open and close, initiating air respiration. The narcissistic mechanism and the central control of the brain work together in driving this process.

The control of the nasculated apparatus to control the function of this system actually serves as a warning of the sedimentary needed from the nervous system to ensure the arrangement of the respiratory tract. Similarly, the central control of the brain aids in the adaptation of the human respiratory system to the oxygen and carbon dioxide levels of the atmosphere.

Thus, the human respiratory system provides the body with the necessary oxygen and exhales carbon dioxide, thereby operating the universal functions of the body.

Also Read – **Human Brain- Part & Their Functions**

Types of Respiration

On the basis of consumption of oxygen, respiration is of two types:

1. Aerobic respiration

2. Anaerobic Respiration

Aerobic respiration

Aerobic respiration occurs in all living cells. This type of respiration involves the use of O2 in the combustion of food .

Oxidationof molecules of glucose (C6H12O2) during respiration occurs as:

K6H12O2 + 6O2 â?? Â Â Â 6K2 + 6H2O + 5

In aerobic respiration, 38 ATP Â is formed from one molecule of glucose.

Anaerobic Respiration

Anaerobic respiration occurs in bacteria, fungi, germinating seeds, RBCs. It involves incomplete oxidation of glucose, forming CO2, ethyl alcohol or lactic acid as products. O2 is not necessary for the oxidation of carbohydrates in this respiration .

C6H12O2 + 6O2 â?? 6CO2 + C2H5OH+ à¤?à¤°à¥•à¤?à¤¾

Only 2 ATPs are formed from glucose molecules in anaerobic respiration.

Â Difference Between Aerobic Respiration and Anaerobic Respiration

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No.S.	**Aerobic respiration (Aerobic Respiration)**	**Anaerobic respiratio (Anaerobic Respirati**
1.	Use of O2 in combustion of food	No O2 requirement fo
2.	In all living cells	Bacteria, fungi, germi
3.	38 Creation of ATP	2 ATP
4.	Complete oxidation of glucose	Incomplete oxidation
5.	k6h12o2 + 6o2Â â??Â 6k2 + 6h2o +Â à¥«	C6H12O2 + 6O2 â?? 6

The respiratory system originates from the embryonic endoderm.

The respiratory system of human beings is divided into two parts:

(a) (Respiratory Path)

(b) (Respiratory organs)

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It is the path of air movement. It has the following parts:

1. External Nares
2. NASA Route (Nasal Tract)
3. Pharynx
4. Windpipe

1. **External Nasal Pore**

The number of nostrils is two. They open in the vestibule part of the nasal passage.

2. **NASA Tract**

There are three parts of NASA pathway â??

1. vestibule
2. Respiratory Part
3. Olfactory Part

Â vestibule

This is the shortest part of the nasal passage. It covered with a non-keratinized squamous epithelium.

Respiratory region

This is the middle of the nasal passage. Which opens in the olfactory part.

Olfactory region

It is the posterior upper part of the nasal passage, which is lined by the neurosensory epithelium. This epithelium is also called the olfactory epithelium or the Schneiderian membrane. Smell is detected by this epithelium.

Pharynx

Pharynx is an integral part of both the respiratory system and the Digestive System. It consists of three parts-

1. Nasopharynx
2. Oral pharynx (Oropharynx)
3. Larynx: pharynx

Windpipe

This tube is the main part of the movement of air into the lungs. This tube is divided into two parts:

1. Larynx
2. Trachea

Larynx or Sound box

It is the anterior metamorphic part of the respiratory tract. It is also called the sound producing organ. It is made up of 9 types of cartilages, in which vocal cords or vocal cards are found in which when air passes through it, it vibrates, which produces sound

Glottis

The larynx opens as a slit aperture in the throat, which is called glottis. It is located at the ventral of the pharynx.

Air enters the larynx through the glottis.

Epiglottis

It is the membranous lid found on the glottis that covers the glottis orifice when swallowing food. It is made up of elastic cartilage.

Cartilage of the larynx

The throat is formed by 9 pieces of cartilage. Which is as follows-

1. Thyroid cartilage is also called Adam’s Apple.
2. Cricoid cartilage
3. Arotinoids
4. Cartilage of Santorini
5. Cuneiform cartilage

Vocal cord

The larynx also performs the function of sound production along the respiratory pathway.Â Â It contains vocal cords for sound production. Which are membranous.

Trachea

The trachea is a tube made up of cartilage rings in the shape of C. It goes into the thoracic cavity and divides into two branches, right and left, which are called bronchi. The Pseudo Stratified Ciliated Columnar Epithelium is found in the trachea.

Each trachea goes into the lungs and divides into small tubes, which are called secondary bronchi, tertiary bronchi respectively.

The tertiary bronchi is divided into small tubules, branched tubules. These are called bronchioles.

The end of these trachea opens into the alveoli.

Respiratory organs

Lungs

The lungs are located in the pleural cavities. They are conical, pink solid and spongy in number.

The pleural cavity is filled with lymph, which is called pleural fluid. Which is a glycoprotein and is secreted by the pleura.

Each pleural cavity surrounds the pleural membrane or pleura. This pleural membrane has two parts.

1. Parietal pleura body veil
2. Visceral pleura lung covering

There are two lobes in the left lung of a human. Those which have superior and inferior bodies and three bodies in the right, which are called superior, middle, inferior bodies.

Between the two lungs is a recess called media stenum.

Alveoli

TheÂ Â end of the bronchioles goes into each lung to form balloon-like structures called alveoli. About 30-35 crore alveoli are found in the lungs of humans.

Alveoli are the structural and functional unit of the lungs.

The thin wall of alveoli is made of Squamous epithelium. Â Micro pores are found in the walls of alveoli. These are called “pores of Kuhn”.

Mechanism of respiration in human beings

Inspiration

During inhalation, there are contractions in the diaphragm and intercostal muscles. The diaphragm flattens and slides towards the abdominal cavity. The ribs shift outwards and upwards, and the sternum shifts ventral and forearm.

The volume of the thoracic cavity increases, and the pressure of body cavity fluid on the lungs decreases, the

lungs expand and the air pressure in the lungs decreases by 1-3mmHg compared to the atmospheric pressure and the outside air goes into the lungs through the following route â??

Nostrils â?? nasal passages â?? pharynx â?? glottis â?? trachea â?? primary trachea â?? secondary trachea â?? tertiary trachea â?? â?? trachea â?? â?? alvea

à¤¬à¤¾à¤¹à¤°à¥•à¤µà¤¸à¤¨ Expiration)

During exhalation, the diaphragm intercostal musclesÂ Â relax, causing the diaphragm, sternum and ribs to return to their previous position. The volume of the thoracic cavity decreases, the air pressure of the lungs increases compared to the suppressed atmospheric pressure. Due to this, the air filled in the lungs goes out through the respiratory tract.

Exchange of gases

Exchange of gases in humans takes place in two ways. Which can be called external and internal respiration.

Exchange of gases in alveoli

The exchange of O2 and CO2 in the lungs in alveoli is called external respiration. This respiration is also called “hematosis”.

The partial pressure (PO2) of O2 present in the alveoli is 104 mmHg and its value in arterial blood is 40 mm of Hg, due to which O2 is released from the alveoli and goes into the arterial blood.

The partial pressure of CO2 present in the alveoli is (PCO2) mmHg while in arterial blood its value is 46 mmHg, due to which CO2 comes out of the arterial blood and into the alveoli.

Exchange of gases in tissue

The oxygenated blood carries O2 to the tissues. There is exchange of gases between tissues and blood. Which is called internal respiration.

The partial pressure of O2 in tissues (PO2) is 40mmHg while in the artery is 95mmHg so that blood moves from the artery to the tissues. Similarly, the partial pressure of CO2 in tissues (PCO2) is 45mmHg while in the vein is 40 mmHg so that blood moves from the tissues to the vein.

Transport of gases

Transportation of oxygen

O2 is transported in two forms â??

1. Transport of O2 in the dissolved state with plasma

100ML of oxygenated blood contains 20ml of oxygen. Out of this, 0.3ml to 0.6ml oxygen is transported in a dissolved state with plasma.

1. Transport of O2 as oxyhemoglobin

97-99%Â of oxygen is transported in the form of oxyhemoglobin.

Hemoglobin

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Hemoglobin is an important protein found in the blood and helps transport oxygen to different parts of the body. It is found in red blood cells and stores them to transport most of their oxygen.

Hemoglobin contains a special protein chain, heme, which has the ability to waste oxygen. When oxygen binds to blood cells, oxygen molecules are added to hemoglobin in the expected type, allowing hemoglobin to transport oxygen more effectively.

The important function of hemoglobin is to replenish various organs and tissues of the body with the required oxygen. When the blood generates rhythm from hemoglobin, oxygen is delivered to tissues and tissues at a level suitable for normal life functions.

In addition, hemoglobin is also useful for the transport of other very important iron-rich substances, such as carbon dioxide. Thus, hemoglobin is important for the useful transport of oxygen and carbon dioxide in the body through the blood stream.

IMPORTANT FACTS RELATED TO HIMOGLOBIN:

Hemoglobin is a respiratory pigment found in RBC, it contains heme prosthetic group and globin protein.

Iron in the heme prosthetic group is in the Fe2+ state.

O2 binds with hemoglobin and aids in its transport.

The work drawn between the percentage saturation of hemoglobin and the concentration of O2 is called the “dissociation curve”.

If the concentration of CO2 increases, the saturation of hemoglobin decreases.

At high concentrations of CO2, the dissociation curve shifts to the right, also known as the “Bohr effect”.

Hemoglobin has 230-250 times more binding capacity with CO than O2 , due to which hemoglobin forms a carboxy hemoglobin with CO, its color is black, iron in carboxyhemoglobin comes to Fe3+ state. Which is deadly. Due to this, the human dies.

Transport of carbon dioxide

CO2 is transported in three ways:

1. In plasma dissolved state (7%): Blood reacts with water present in plasma to form carbonic acid and 7% CO2 is transported in this dissolved state.

NOTE: 100 ml of blood transports about 0.3 ml CO2 in the dissolved state with plasma.

2. Bicarbonate (70%): The carbonic acid formed in the blood plasma quickly dissociates into H+ and HCO32- due to excessive ionization.
3. Carbo-Mino-Hemoglobin (23%): About 20-25 % of CO2 is borne by hemoglobin in the form of carbanion-hemoglobin. This bond depends on the partial pressure of CO2.

Regulation of Breathing

The control of respiration is an important action for the body, which provides the necessary oxygen and removes carbon dioxide.

Respiration is controlled by the respiratory system, which works simultaneously with the narcissistic system and the central control of the brain.

Respiration is controlled by signals that open and close the respiratory passages, initiating air respiration.

Necessary signals are sent from the central control of the brain that control the rate of respiration, such as yoga asanas or in a state of tranquility that respiration can be deeper and slower.

Thus, the control of respiration ensures the balance and functions of the body.

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Date
2024/11/21
Date Created
2024/03/28
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