

Diploma in Pharmacy 1st Year

Human Anatomy & Physiology Practical

To study the given model of human respiratory system

Aim:

To study the given model of human respiratory system

Reference :

Dr. Gupta G.D , Dr. Sharma Shailesh , Dr. Sharma Rahul Kumar ,
“Practical Manual of Human Anatomy and Physiology” Published by Nirali
Prakashan , Pg.No 129 - 133

Theory :

The exchange of gases between body tissues and the external environment is known as respiration. Respiration is the only way to get oxygen into the tissues and get carbon dioxide out.

The functions of respiration are:

- 1) Transport of oxygen to tissues and excretion of CO₂
- 2) Excretion of volatile substances like ammonia.
- 3) Regulation of temperature through loss of heat in the expired air.
- 4) Maintenance of pH of blood.

The respiratory system is made up of the following structures:

1. Nasal Cavity: The nasal septum divides the cavity into right and left halves. Mucous membrane lines the nasal cavity. The anterior nares form the entrance to the nasal cavity (nostrils). They have tiny hairs that act as dust screens. The posterior nares are located in the back of the nasal cavities.

They constitute the nasopharyngeal entrance

2. Pharynx: It is divided into three parts:

- Behind the nasal cavities is the Nasopharynx. On the lateral wall, it has Eustachian tube apertures.
- Oropharynx, which is connected to the mouth in the front and the laryngeal section of the pharynx in the back. Tonsils are located on the lateral wall
- Laryngopharynx which is the lowest part, behind the larynx.

3. Larynx: It is located between the pharynx and the trachea. The following cartilages make up the structure:

- Thyroid cartilage which is the largest
- Below the thyroid cartilage is the cricoid cartilage.
- At the back of the cricoid, there are two arytenoid cartilages.
- Epiglottis is linked to thyroid cartilage's top surface.

4. Trachea (Wind Pipe): This is a cylindrical tube with a length of around 11cm. It starts at the bottom of the pharynx. It splits into two bronchi at the 5th thoracic vertebra level. The trachea is made up of sixteen to twenty incomplete C-shaped cartilages. Fibrous tissue connects these cartilages at the rear. The mucous membrane of the trachea is made up of ciliated epithelium.

5. Bronchi: The trachea ends in two bronchi, the right and left bronchi. They pass to the corresponding lung. The bronchus on the right is narrower and shorter than the one on the left. Bronchi are formed up of entire cartilage rings.

6. **Bronchioles:** Bronchioles are generated when bronchi are divided. Bronchioles are the bronchi's finest branches. Bronchioles are lined by cuboidal epithelium rather than cartilage.
7. **Alveoli (Air Sacs):** These are the bronchi's final terminations. A thin layer of epithelial cells is present, which is bordered by many capillaries. Gases are exchanged through the walls of these capillaries

Lungs

The lungs are the most important organ for breathing. They are in pairs, one on each side of the chest cavity. The heart and other mediastinum components divide the two lungs in the middle.

- 1) **Shape:** The shape of the lungs is conical. The apex of the lungs is above rising slightly over the clavicle. The diaphragm is close to the base of the lung.
- 2) **Lobes:** Fissures separate each lung into lobes. Three lobes make up the larger right lung. The left lung is divided into two lobes. Each lobe is made up of many lobules. A tiny bronchial tube is seen in each lobe.
- 3) **Pleura:** The pleura is a serous membrane that surrounds the lungs. There are two layers to it. The visceral layers are the inner layers. It is

right next to the lungs. The outermost layer is the parietal layer. Pleural fluid fills the area between these two layers.

Root of the Lungs

The hilum is a vertical slit on the medial surface of each lung. Blood vessels, nerves, and lymphatic vessels all flow through the hilum.

The root of lungs is formed by:

1. Pulmonary arteries which carry impure blood to the lungs from the heart.
2. Pulmonary veins which carry oxygenated blood from lungs to the heart.
3. Bronchial arteries which are branches of thoracic aorta.
4. Bronchial veins which returns venous blood of lungs to superior vena cava.
5. Bronchi which divide into bronchioles.
6. Lymphatic vessels and lymph glands.
7. Nerves, sympathetic and vagus nerve which supply the lungs.

Blood Vessels of Lungs

- **Pulmonary Arteries:** These vessels transport contaminated blood from the right ventricle to the lungs. Arterioles are formed when these arteries divide and subdivide.
- **Pulmonary Veins:** They are formed by the fusion of capillaries in the lungs. These veins transport oxygenated blood to the heart's left atrium
- **Bronchial Arteries:** These vessels transport oxygenated blood from the thoracic aorta to the lungs.
- **Bronchial Veins:** These veins return venous blood from the lungs to the superior vena cava.

Mechanism of Respiration

It involves two stages

1. **Inspiration:** It is an active process. It is produced by contraction of following muscles:
 - i. Diaphragm, which expands the chest chamber vertically when it contracts.

- ii. When the intercoastal muscles contract, the ribs and sternum are elevated.
 - iii. At this point, the lungs expand and fill the extra space. The pressure in the lungs is now lower than the atmospheric pressure. As a result, air enters the lungs
- 2. Expiration:** It is a passive process. It is caused by the diaphragm and intercoastal muscles relaxation. The chest cavity shrinks as a result of this As a result, the pressure in the lungs rises, forcing the air out. Adults breathe at a rate of 16 to 18 times per minute. The rate is higher in children.

Result: The given model of human respiratory system was studied.