

NEET Biology Short Notes

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In this article, we are providing you with short notes on Body Fluids and Circulation for <u>NEET</u> <u>2019 examination</u>. This is one of the important chapters to pay attention from the unit of Human Physiology. Every year 2-3 questions have been asked from this chapter in various medical examination like NEET, AIIMS, JIPMER. So, let us begin with a brief introduction about the Human Circulatory System.

BODY FLUIDS AND CIRCULATION

HUMAN CIRCULATORY SYSTEM

The human circulatory system comprises of the blood vascular system and the lymphatic system. These systems are if closed type, that is, the fluids flow in the definite channels of vessels.

HEART

The human occupies the position in the pericardial cavity locates within the thoracic cavity. It contains hollow chambers and it is made up of cardiac muscle cells that are known for autorhythmicity. The lower part is conical and is called the apex. It is tilted towards left. The upper part is called the base and it is broader.

STRUCTURE OF THE HEART

- 1. Sulci: The surface features show grooves called the sulci. The sulcus between the upper chambers is called the interatrial sulcus. The upper and lower chambers are separated by the atrioventricular sulcus. The interventricular sulcus is present between the lower chambers. The coronary and interventricular sulci contain the coronary blood vessels.
- 2. Atria: These are the upper chambers of the heart. The right atrium is connected with the vena cava and the coronary sinus that bring the deoxygenated blood to it. The left atrium is connected with the pulmonary vein which brings the oxygenated blood from the lungs. The two atria are separated by the interatrial septum which bears a depression called the fossa ovalis.
- 3. Atrioventricular valves: The right atrium and the right ventricle are separated by the means of tricuspid valve. The left atrium and left ventricle are separated by the means of bicuspid valve or the mitral valve.
- 4. Ventricles: These are the lower chambers. The left ventricle is thicker and larger. It supplies oxygenated blood to the aorta. The right ventricle provides deoxygenated blood to the pulmonary artery. Both the ventricles are separated by the means of interventricular septum. The ventricular walls bear the papillary muscles which are connected to the chordae tendineae of the atrioventricular valves.
- 5. Semilunar valves: The valve present between the right ventricle and pulmonary artery is called the pulmonary semilunar valve. The valve present between the left ventricle and aorta is called the aortic semilunar valve.



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HISTOLOGY OF THE HEART

The outermost layer around the heart is called the visceral epicardium. It is followed by a thick and muscular myocardium. The innermost layer is the endocardium. The parietal pericardium encloses the pericardial cavity in which the heart is located. It is filled with the pericardial fluid.

CONDUCTING SYSTEM OF THE HEART

The heart is made up of two types of muscle fibres called the contractile cells and the conducting cells. The contractile cells make up major portion and they are responsible for the conduction of the impulse which originates in the conducting cells. These are autorhythmic cells.

- 1. Sinoatrial Node (SA Node): It is situated in the right corner of the right atrium. It is place of the origination of the heartbeat impulse. It is called the pacemaker.
- 2. Atrioventricular Node (AV Node): It is situated in the atrioventricular septum. It receives the impulse from the SA Node.
- 3. Bundle of His: It is connected with the AV node in the interventricular septum. It is further divides into the left and right bundle branches.
- 4. Purkinje Fibres: The left and right branches extend to the walls of the ventricles in the form of Purkinje fibres that conduct impulse to the ventricles.

CARDIAC CYCLE

It is made up of a single event of the contraction and relaxation of the heart which is called the heartbeat. The contraction is called the systole and the relaxation is called the diastole. One cardiac cycle completes in 0.8 seconds. It has the following stages:

- 1. Atrial systole: The contraction of the right and left atria due to the activity of the SA node results in forcing of the blood to the ventricles. The atrioventricular valves are open during this stage.
- 2. Initiation of ventricular systole: As the impulse passes to the AV Node from the SA node, there is a delay of 0.09ms so that the ventricles are appropriately filled with the blood. The ventricular systole then begins and the atrioventricular valves are closed. This closure produces the first sound of the heartbeat.
- 3. Completion of ventricular systole: It is marked by the flow of blood to the pulmonary artery and aorta by the right and left ventricle respectively.
- 4. Initiation of ventricular diastole: The semilunar valves close during this stage and the second heartbeat sound is made.
- 5. Joint diastole: During this stage, the atria, as well as the ventricles, are relaxed. The atrioventricular valves are open and the semilunar valves remain closed.

HEART SOUNDS

The closure of the valves during the different stages of the cardiac cycle produces the heart sounds that are monitored through the stethoscope. The first sound of the heartbeat is produced by the closure of the atrioventricular valves as 'lubb'. It is low-pitched. The second sound is produced by the closure of semilunar valves as 'dup'. it is high-pitched.



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Any damage to the atrioventricular valves results in the production of hissing noise called the heart murmur. This murmur is also produced when the semilunar valves are damaged.

RENAL PORTAL SYSTEM

The network of blood vessels in the kidneys are as follows:

The oxygenated blood enters the kidneys through the renal artery – it divides into series of arteries – the afferent arteriole supplies to the nephron – glomerulus is formed – the efferent arteriole leaves the glomerulus – it divides into peritubular capillaries – these capillaries then join to the renal venules – the venules lead to the renal venu.

HYPOPHYSEAL PORTAL SYSTEM

It connects the hypothalamus with the pituitary gland and is located in the infundibulum. It follows the following path:

The hypophysial artery enters the hypothalamus – it branches into capillaries – these capillaries lead to the hypophyseal portal veins – these veins form the capillaries in the anterior pituitary- these capillaries leave the system via the hypophysial vein.

HEPATIC PORTAL SYSTEM

This system joins the liver with the intestines, stomach, pancreas and spleen. These organs receive the oxygenated blood via their respective arteries. The deoxygenated blood flows into the hepatic portal vein which is gathered by the superior mesenteric vein (from the stomach and small intestines) and splenic vein (from pancreas and large intestine). The hepatic portal vein then enters the liver and forms the network of capillaries with the hepatocytes. The deoxygenated blood then leaves the liver via the hepatic vein which joins the inferior vena cava.

DISORDERS OF THE CIRCULATORY SYSTEM

- 1. Heart attack: It occurs when the blood supply to the heart tissues is interrupted due to the blockage of the coronary blood vessel system. The myocardial tissues die of suffocation that results in heart attack. It is also called the myocardial infarction.
- 2. Heart block: It occurs when there is any damage to the conducting system of the heart and the heartbeat impulse is not generated.
- 3. Angina Pectoris: It refers to the shooting pain felt in the chest region when the heart muscles are subjected to restricted oxygen supply.
- 4. Varicose vein: This is the condition of twisted and over-sized veins. It causes ache in the lower limbs, cramps and skin discolouration around the veins.
- 5. Heart failure: It occurs when the pumping of the blood is not sufficient to provide blood to the different parts of the body.

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