

Physiology Of The Heart And Kidney

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Role of the Heart in the Cardiovascular System

The human heart is undoubtedly an important and crucial part of the human body. It is a vital part of the human cardiovascular system. The cardiovascular system is composed of three parts, which include the heart, blood vessels, and blood. These are the main parts of the system and are essential for it as well. The heart is the core blood-pumping organ of humans. The blood vessels transport the blood throughout the body with the main fluid of blood flowing in them. Human blood contains water, minerals, nutrients and all essential elements like oxygen. The heart is structured in such a way that it first transports deoxygenated blood to the lungs for oxygenation and then pumps oxygenated blood to the entire body.

Chambers Valves and Circulatory Pathways

The heart is composed of four main parts, which include two atria and two ventricles. There exist two sides of the heart named as left and right sides, respectively. On one side of the heart, there is an atrium, and on the other side of the heart, there is a ventricle. Both are important parts of the human heart. The deoxygenated blood is transferred to the human heart from the body. Then, this deoxygenated blood goes from the right atrium to the right ventricle of the heart. It uses the medium of the tricuspid valve. The right ventricle is a part that is used for the process of oxygenation. The deoxygenated blood is transferred from the heart to the lungs. Then, the lungs pump this blood back to the heart. The medium used in this process is called pulmonary vasculature (Anderson, 2012).

Systemic Circulation and Oxygenated Blood

The oxygenated blood enters the left atrium from the pulmonary vein, and the atrium pumps this blood into the left ventricle through the bicuspid or mitral valve. Then, the major function of pumping the oxygenated blood into the aorta (a major blood vessel of the human body) is carried out by the left ventricle. The heart is encapsulated or protected from outside or inside trauma or shock by a protective layer known as pericardium. It is further divided into parietal and visceral layers, which are named according to their location (parietal refers to the outer lining of the organ, and the visceral membrane is in contact with the particular organ). The heart is one of the essential and vital organs of the human body, and its damage or disease of any kind seriously threatens human life (Buddiga, 2014).

Electrical Conduction and Heart Rhythm

The electrical conduction system of the heart is composed of the specialized muscle cells of the heart. These muscle cells are in the walls of the heart and send signals to the muscles of the heart, which in turn causes the muscles to contract. The human heart possesses a need for a source of power and uses electricity to carry on its conduction process. Fortunately, our heart is enabled to produce electrical impulses of its own and, through a specialized pathway of conduction, control the route of these impulses. The major components of this electrical conduction system of the heart are the Sinoatrial (SA) node, an Atrioventricular (AV) node, a bundle of His, bundle branches, and Purkinje fibers. The regular conduction cycle of the heart is coordinated by the contractions of the chambers. During this cycle, atrial contraction occurs first, but both atria contract together and similarly, both ventricles contract together. The human heart gets its rhythmic beat from the electrical conduction cycle, and for the heart to work efficiently, all of the events of this cycle must be coordinated.

Kidney Functions and Blood Filtration

On the other hand, kidneys also come in the line of important and vital organs of the body. In simple reference, the kidneys are referred to as the cleaning system of the body because they function to purify the human blood. It is the second organ that receives the largest amount of blood pumped from the heart (the first is the liver). Kidneys are retroperitoneal organs (located on the posterior and deeper side of the abdominal peritoneum), and there exists a pair of kidneys in humans on each side of the body.

Renal Anatomy and the Nephron

The kidney is bean-like in shape, and their size ranges from 9 to 13 cm. There are two major parts of a kidney, including an outer cortex and an inner medulla. The basic functional and structural unit of the kidney is its cells called 'nephrons.' Nephron has a simple structure consisting of small interconnecting units that are attached to the collecting tubules in the end. The whole blood of the body is screened or filtered through the kidneys on each side. As the blood passes through the kidneys, it is purified step by step as the kidneys isolate the additional substances with water from the blood and send the remaining blood with useful materials back into circulation (G. Mark, 2004).

Living With One Kidney and Renal Failure

The best thing about the human renal (kidney) system is that a person can live his life in an entirely normal way with only one kidney as well. If a kidney becomes dysfunctional because of some disease, the other kidney can bear a load of the whole body unless it encounters any disease itself. Kidneys, along with ureters, urinary bladder and urethra, form the entire excretory system of the human body.

References

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