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STRUCTURE AND FUNCTION OF THE HEART. HEART DISEASES

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Abstract

This article provides detailed information about the heart — the most vital organ of the human body — its complex structure, functions, and common diseases. The article analyzes the anatomical structure of the heart (atria, ventricles, valves), the physiological processes that ensure its function (cardiac cycle, electrical system), and its role in blood circulation.

It also scientifically explains major pathologies such as ischemic heart disease, hypertension, and arrhythmia, including their causes and consequences. At the end of the article, rare conditions such as dextrocardia and important recommendations for the prevention of cardiovascular diseases are presented. This material is intended for medical students, biologists, physicians, and anyone interested in their health, helping to gain deep and systematic knowledge about heart function.

The Human Heart: A Deep Look into Cardiology

Fundamental Principles of Heart Anatomy

The heart is not only a vital organ but also a complex and functional unity. Its anatomical structure is designed to ensure continuous blood circulation.

Topographic location:

The heart is located in the mediastinum, a space in the middle of the chest cavity. Its apex points downward, to the left, and forward. Because of this position, we feel the heartbeat on the left side of the chest.

Wall structure:

The heart wall consists of three main layers:

• Epicardium (visceral pericardium): The outer thin layer.

• Myocardium: The middle and thickest layer, composed of specialized striated muscle tissue. The mechanical pumping function of the heart is performed by the myocardium. The left ventricular myocardium is 10–15 mm thick, which is 2–3 times thicker than that of the right ventricle.

• Endocardium: The inner smooth layer covering the heart chambers and valves. Its smooth surface prevents blood clot formation.

Chambers and valves:

• Atria: These are receiving chambers with relatively thin walls. The right atrium receives deoxygenated blood from the body, while the left atrium receives oxygenated blood from the lungs.

• Ventricles: These are pumping chambers with thicker walls. The right ventricle pumps blood to the lungs, while the left ventricle pumps blood throughout the body.

• Valves: These act as one-way gates for blood flow. The mitral and tricuspid valves are located between the atria and ventricles. The aortic and pulmonary valves are located between the ventricles and major arteries.

Physiological Function and Regulation of the Heart

The work of the heart is based on the coordination of complex electrical and mechanical processes, which together form the cardiac cycle.

Cardiac cycle:

It consists of two main phases:

• Systole (contraction): The ventricles contract and pump blood into the arteries. This includes the phase of isovolumetric contraction (rapid pressure increase without volume change) and the ejection phase.

• Diastole (relaxation): The heart relaxes and fills with blood. This includes isovolumetric relaxation and ventricular filling phases.

Conduction system:

The automatic activity of the heart is controlled by its electrical system:

• Sinoatrial (SA) node: The natural pacemaker of the heart, located in the right atrium. It generates impulses at a rate of 60–100 beats per minute.

• Atrioventricular (AV) node: Delays the impulse by about 0.1 seconds before transmitting it to the ventricles, allowing the atria to fully empty into them.

• Bundle of His and Purkinje fibers: Rapidly distribute impulses throughout the ventricles, ensuring their simultaneous contraction.

Key indicators:

• Heart rate (HR): Number of heartbeats per minute.

• Cardiac output: The volume of blood pumped by the heart per minute (5–6 liters at rest). It equals stroke volume multiplied by heart rate.

Common Cardiovascular Diseases

Heart diseases are the leading cause of death worldwide. The main cause is atherosclerosis.

References:

1. Sechenov, I.M. Reflexes of the Brain. Moscow: Medicine, 1952.

2. Sapin, M.R. Human Anatomy. Moscow: Medicine, 2004.

3. Tkachenko, B.I. Normal Human Physiology. Moscow: Medicine, 2001.

4. Chazov, E.I. Cardiovascular Diseases. Moscow: Medicine, 2003.

5. Myasnikov, A.L. Clinical Cardiology. Moscow: Medicine, 2005.

6. Robbins, S.L., Cotran, R.S. Robbins and Cotran Pathologic Basis of Disease. Moscow: Logosfera, 2014.