Date: 29th May-2025

SUBSTANCES AFFECTING THE HEART AND VASCULAR SYSTEM

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Annotation: Substances affecting the heart and vascular system include a diverse group of pharmacological agents that influence cardiovascular function. These substances can modify heart rate, contractility, blood pressure, and vascular tone, thereby playing a crucial role in managing cardiovascular diseases such as hypertension, heart failure, arrhythmias, and ischemic heart conditions. They include positive and negative inotropes, vasodilators, vasoconstrictors, antiarrhythmics, and diuretics. Understanding the mechanisms, therapeutic uses, and potential side effects of these agents is essential for effective cardiovascular treatment and patient management.

Keywords: Cardiovascular drugs, Heart rate, Blood pressure, Inotropes, Vasodilators.

Digitoxin, digoxin, celanide, strophanthin K, strophanthin acetate, convallatoxin, adonizide, adonis herb tincture Glycosides are the most important and widely used substances in the treatment of cardiovascular failure. In heart failure, glycosides have such a strong healing effect that even great sages considered digitalis to be a thorn in the side of doctors, and if it were not for digitalis, they would have given up their wisdom. Cardiac glycosides are complex organic substances obtained from plants that selectively affect the heart.

Contains. Plants containing glycosides have been used in folk medicine since ancient times to induce urination, treat heart and nervous diseases. The ideas about the use of these plants in heart diseases and other diseases were presented in the 11th century in the books of Abu Ali ibn Sina "Tib Qanunasi", "Kitab al-Qalbiya", Abu Rayhan Beruni "Saydana". Academician N.K. Abubakirov, the first Uzbek woman in the field of pharmacology, Professor S.S. Azizovani, made a great contribution to the extraction of pure glycosides from plants growing in Central Asia, the pharmacological testing of cardiac glycosides, and their application in practice. Cardiac glycosides are obtained from several species of digitalis (Digitalis purpurae, Digitalis lanata), adonis (Adonis vernalis), lily of the valley (Convallaria majalis), strophanthus (Strophanthus Combe), oleander (Nerium oleander), hemp (Apocinum cannabinum) and other plants. Cardiac glycosides are similar in chemical structure, consisting of two parts: aglycone (sugar-free) and glycone (sugar-containing). The aglycone is the main cardiotropic part of the glycoside, and its base is a steroid cyclopentanone hydrophenanthrene.

In the 17th position of the steroid, an unsaturated 5-membered lactone ring is added, and in some glycosides, an unsaturated 6-membered lactone ring is added. A lactone ring is required for glycosides; if this ring is removed or in a different position, the selective effect of glycosides on the heart is lost. 5-lactone glycosides are called cardenolides, 6-

lactone glycosides are called bufadenolides. The glycone part of glycosides consists of various sugars: d-glucose, d-digitoxose, d-cymarose, L-rhamnose. The sugar part affects the solubility of glycosides, their permeability through cell membranes, biological activity and toxicity. The glycone can consist of one, two, three, or four sugars, in which case they are called mono-, di-, tri-, or tetraglycosides. By biological activity, glycosides can be placed in the following order: monoglycoside > diglycoside > tetraglycoside < aglycone. Chemically, cardiac glycosides are similar to steroid hormones, cholesterol, and bile acids produced in the body, but there are scientific hypotheses that cardiac glycosides themselves are also produced in the human body, or heart diseases occur due to a deficiency of these substances. Therefore, cardiac glycosides can rightly be called corhormones. Glycosides selectively affect the heart - cardiac and extracardiac. Cardiac effect of glycosides:

1. Positive inotropic - systolic effect: substances directly contract the heart muscle, the force of systole increases, and its duration is shortened. This effect has been proven in experiments conducted on isolated hearts, on pieces taken from the ends of the heart, and on the embryonic heart, in which the nervous and conductive systems are not developed. The mechanisms of systolic action of glycosides have not yet been fully elucidated. However, there are several scientifically proven hypotheses that are associated with the effect of glycosides on Na, K ATPase, located in the membranes of the heart muscle. Na, K ATPase is an enzyme located in the cytoplasmic membrane of cells and transports K and Na ions. Cardiac glycosides reduce the activity of the enzyme in therapeutic doses, due to which the number of sodium ions inside the cells increases, and the number of potassium ions decreases. Due to the increase in sodium ions inside the cells, their exchange with calcium ions located outside them also increases, in response to which additional calcium is released from the sarcoplasmic reticulum, the total amount of free calcium in the sarcoplasm increases. Calcium ions bind to the proteins tropomyosin and troprine, eliminating their inhibitory effect on contractile proteins, increasing the activity of the myosin ATPase enzyme, thus producing ATP necessary for myocardial contraction, myosin binds to actin, forming the contractile protein actomyosin, increasing the strength and duration of systole. The systolic effect of glycosides is also associated with an increase in catecholamines. It is known that calcium ions have the property of releasing catecholamines. Due to the systolic effect, the Q-T interval on the ECG decreases, and the voltage of the ECG waves increases.

2. Positive tonotropic effect: increased systole increases the contractility of the heart, especially the general tone of the dilated heart muscles due to insufficiency. The amount of blood in the ventricles of the heart decreases, and the total size of the organ decreases. Due to strong systole and positive tonotropic effect, the stroke and minute volume of the heart increase.

3. Negative chronotropic -diastolic effect: glipizides prolong the duration of diastole, -the heart rate decreases. During strong systole, blood flows out of the heart with great force and affects the baroreceptors of the carotid arteries, located in the aortic arch,

from here the impulses pass through the vagus nerve, at the end of which the mediator acetylcholine is released, and acetylcholine reduces the heart rate. Glycosides can also cause bradycardia by acting directly on vagus receptors located in the heart. Since the vagus is not well developed in young children (up to 3 years of age), cardiac glycosides may not reduce the heart rate in them. If the heart rate slows down after the administration of cardiac glycosides in infants, this indicates that the toxic effect of the substances has been suppressed.

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