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Effect and use of cardiac glycosides on the body

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Abstract The term cardiac glycosides (CG) combines plant substances and their semisynthetic derivatives that have specific cardiotonic and antiarrhythmic effects that are due to a common mechanism of action. For a long time, SG was used as the main drug for the treatment of chronic heart failure. SGs normalize cardiac function, which helps to increase stroke volume, increase exercise tolerance and reduce the risk of developing decompensation of chronic heart failure (CHF). SGs reduce excessive sympathetic activity and restore the sensitivity of cardiopulmonary reflexes. However, despite the fact that cardiotonics improve the quality of life of patients for some time, life expectancy is not only not extended, but when using many "non-glycoside" drugs it can even be shortened (partly as a result of their arrhythmogenic effect). Currently, cardiotonics continue to be used, but they are only one component in the complex treatment of chronic heart failure.

Keywords: Forensic-medical, lesions, Anatomical Nomenclature,

Introduction SGs differ in their pharmacokinetic properties, which determine the rate of development of their effects, duration of action and ability to accumulate in the body. The narrow therapeutic index of drugs and the numerous factors that change their pharmacokinetics and myocardial sensitivity to them create a high risk of developing toxic effects and necessitate regular monitoring of the effectiveness and safety of therapy. All SGs are based on a steroid core with an unsaturated lactone ring and one or more glycosidic residues (sugars). The main pharmacodynamic effects are due to the steroid structure of the molecule, and the properties of the sugar part determine many of the pharmacokinetic characteristics of SG, such as the rate and completeness of absorption, the strength of bonds with proteins, and metabolic features.

Highlight:Long-acting glycosides, when administered, the maximum effect when taken orally develops after 8-12 hours and lasts up to 10 days or more. When administered intravenously, the effect occurs within 30–90 minutes, the maximum effect appears after 4–8 hours. This group includes glycosides of digitalis purpurea (digitoxin, etc.), which have pronounced cumulation. Glycosides of medium duration of action, when administered, the maximum effect appears after 5–6 hours and lasts for 2–3 days. When administered intravenously, the effect occurs after 15–30 minutes, the maximum effect occurs after 2–3 hours. This group includes glycosides of foxglove woolly (digoxin, celagid, etc.), which have moderate accumulation. This property is possessed by glycosides of foxglove and adonis. Fast and short-acting glycosides are emergency medications. Administered only intravenously, the effect occurs within 7-10 minutes. The maximum effect appears after 1–1.5 hours and lasts up to 12–24 hours. This group includes glycosides of strophanthus and lily of the valley, which have practically no cumulative properties. The decrease in the activity of the sympathetic nervous system is not the result of the positive inotropic effect of SGs, but is due to their direct effect on the sensitivity of the carotid sinus. The effect of SG on excitability, conductivity and automaticity is explained by

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the suppression of Na+/K+ - ATPase, an increase in vagal tone and a decrease in the activity of the SNS. In therapeutic doses, SGs lengthen the effective refractory period and reduce the speed of impulses through the atrioventricular node. Lengthening of atrioventricular conduction is manifested by a decrease in the frequency of ventricular contractions during supraventricular arrhythmias and an increase in the P-Q interval during sinus rhythm. Further inhibition of conduction may lead to bradycardia or complete transverse block. It is important that heart function increases against the background of a decrease in heart rate (negative chronotropic effect) and prolongation of diastole. This creates the most economical mode of heart operation: strong systolic contractions are replaced by sufficient periods of "rest" (diastole), conducive to the restoration of energy resources in the myocardium. The slowing of the heart rate is largely associated with the cardio-cardiac reflex. Under the influence of cardiac glycosides, the endings of the sensory nerves of the heart are excited and, reflexively, through the system of vagus nerves, bradycardia occurs. It is possible that a certain role is played by increased reflexes on the heart from the mechanoreceptors of the sinoaortic zone during systole as a result of increased blood pressure. The ECG shows an increase in the P-P interval. In high doses, SGs can increase the activity of the sympathetic nervous system and directly affect the automaticity of the heart muscle (negative dromotropic effect). The refractory period of the atrioventricular (atrioventricular) node and atrioventricular bundle (bundle of His) increases. The P-Q interval becomes longer. These effects underlie the arrhythmogenic effect of SG, since a simultaneous increase in automaticity and suppression of conduction in the His-Purkinje system creates conditions for the development of tachyarrhythmias and ventricular fibrillation. In toxic doses, cardiac glycosides can cause atrioventricular block. The effect of SG on vascular tone is determined by both direct and indirect effects, which are realized differently in conditions of a healthy and decompensated heart. In the absence of CHF, SGs exhibit a direct myotropic vasoconstrictor effect on arterioles and veins.

Analysis Results : Side effects of SG are associated with an overdose of cardiac glycosides. This is more often observed when using digitalis preparations with a pronounced ability to cumulate. They include bradycardia, prolongation of atrioventricular conduction with the development of blocks of varying degrees, as well as an arrhythmogenic effect. However, the greatest danger is the possibility of developing glycoside intoxication. Since SGs are drugs with a low therapeutic index, even a slight excess of their concentration at the site of action can cause a pronounced toxic effect. The mechanism of glycoside intoxication is based on excessive (more than 60%) inhibition of the membrane Na+/K+ - ATPase of myocytes and neurons and the associated disruption of electrolyte transport. The accumulation of intracellular calcium and sodium and the depletion of intracellular potassium reserves lead to changes that are incompatible with the vital activity of the cell. The toxicity of SG is difficult to predict and diagnose, since the initial symptoms of intoxication are nonspecific, and monitoring of drug concentrations in plasma does not provide reliable results due to the pronounced variability of individual sensitivity to SG and a large number of factors that can change their pharmacokinetics. The first and most common symptoms of digitalis intoxication are loss of appetite, nausea, weakness, and bradycardia. FH intoxication can be manifested by any one symptom or a combination of dysfunctions of the gastrointestinal tract, central nervous system, heart or vision.

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Toxic effects of SG Cardiac disorders (various disturbances of conduction and heart rhythm arrhythmias - ventricular extrasystole, atrioventricular block of varying degrees, excessive slowing of the ventricular rhythm in atrial fibrillation, accelerated atrioventricular rhythm, supraventricular and ventricular tachycardia, atrial fibrillation, ventricular fibrillation, partial or complete atrioventricular block, ventricular fibrillation, trough-shaped decrease in the ST segment on the ECG).

Extracardiac disorders: Gastrointestinal: anorexia, discomfort and abdominal pain, dyspeptic symptoms (nausea, vomiting, diarrhea). Psychoneurological: headache, fatigue, weakness, insomnia, confusion, pain and paresthesia in the extremities, anxiety, apathy, delirium, hallucinations, rarely convulsions. Visual: loss of visual fields, impaired color perception.

Others: increased pulmonary ventilation in response to hypoxia, rarely gynecomastia. The severity of the toxic effects of SG to a certain extent depends on the level of extracellular potassium, which prevents the binding of SG to Na+/K+ - ATPase. Thus, by increasing the level of extracellular potassium it is possible to weaken the effect of SG. With the most frequent manifestations of intoxication (single ventricular extrasystoles, extrasystoles from the atrioventricular junction, first degree atrioventricular block, bradysystolic form of atrial fibrillation), temporary withdrawal of SG, ECG monitoring and subsequent dose adjustment of the drug are necessary to avoid recurrent violations.With frequent ventricular extrasystoles and paroxysms of tachyarrhythmias, potassium preparations are prescribed intravenously even in the absence of hypokalemia. They are contraindicated in cases of impaired atrioventricular conduction and chronic renal failure. For the treatment of ventricular arrhythmias caused by digitalis intoxication and threatening cardiac hemodynamic disturbances, lidocaine (100 mg intravenously as a bolus) and phenytoin (100 mg intravenously slowly, then 100 mg 4-6 times a day orally) are used, which have a minimal effect on atrioventricular conduction. node. Antiarrhythmic drugs of the quinidine group may be useful, but their use is associated with a high risk of developing new arrhythmias and conduction block. For supraventricular rhythm disturbances, β-blockers are used. For II-III degree atrioventricular blockades, atropine (0.5-1 mg intravenously) is administered. Electrical pulse therapy for SG intoxication is ineffective. To eliminate digitalis intoxication, unithiol or an immunological detoxification method is also used - the introduction of monoclonal antibodies to cardiac glycosides, which neutralize the drug itself. Thus, among the antidotes of digoxin is one of these drugs, Digoxin immune fab. Digitalis intoxication can develop not only as a result of an overdose of drugs, but also when taking therapeutic doses due to increased sensitivity to them or changes in their pharmacokinetics. Many diseases and conditions can change the sensitivity of the myocardium to FH. There are diseases and conditions that increase the risk of developing digitalis intoxication.

Conclusion In conclusion, it can be said that Cardiac glycosides have a calming effect on the central nervous system, normalization of excitability and inhibition processes. It is important for us to learn about its use in acute and chronic heart and vascular insufficiency and various heart diseases, myocarditis, hypertension, myocardial infarction, coronacardiosclerosis, and the substances that affect them.

List of user literature:

1.Hochrein H. [Letter: Liver toxicity of digitalis glycosides]. Dtsch Med Wochenschr 1975 Apr 18; 100 (16): 913. German. [PubMed]

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VOLUME-4, ISSUE-1

2.Bigger JT Jr. Digitalis toxicity. J Clin Pharmacol 1985; 25: 514-21. [PubMed]

3.Digitalis Investigation Group. The effect of digoxin on mortality and morbidity in patients with heart failure. N Engl J Med 1997; 336: 525-33. [PubMed]

4.Turakhia MP, Santangeli P, Winkelmayer WC, Xu X, Ullal AJ, Than CT, Schmitt S, et al. Increased mortality associated with digoxin in contemporary patients with atrial fibrillation: findings from the TREAT-AF study. J Am Coll Cardiol 2014; 64: 660-8. [PMC free article] [PubMed]

5.Chalasani N, Bonkovsky HL, Fontana R, Lee W, Stolz A, Talwalkar J, Reddy KR, et al.; United States Drug Induced Liver Injury Network. Features and outcomes of 899 patients with drug-induced liver injury: The DILIN Prospective Study. Gastroenterology 2015; 148: 1340-52. [PMC free article] [PubMed]

6.Norqobilov, SYL (2022). BOLALARDA QORINCHALAR ARO TO 'SIQ DEFEKTLARINING D-EXOKG IMKONIYATLARI. XALQARO KONFERENTLARDA (1-jild, 21-son, 364-368-betlar).