Effects of poisons on heart rhytm

This article has been translated from WikiSkripta; ready for the **editor's review**.

Cardiotoxic substances, i.e. substances poisonous to the heart, are all substances that interfere with its proper function.

The cardiovascular system is the site of specific action of certain **alkaloids** and so-called cardiac glycosides, such as digitalis (see Effect of drugs on heart rhythm) or andromedotoxin, which is contained, for example, in azaleas and rhododendrons, and from them, together with nectar collected by bees, reaches their honey, which becomes poisonous. Many **peptide** snake **toxins** also have a cardiotoxic effect, e.g. cardiotoxin from cobra venom, cardiotoxins from sea anemones, toxic peptides from textile cones and the like. All substances that disrupt the heart rhythm or interfere in some way with the electrical activity of the heart act as cardiotoxins.

A number of **drugs** also have a cardiotoxic effect, such as the chemotherapeutic agent 5-fluorouracil (a pyrimidine analogue), anthracycline antibiotics, fenfluramine, etc. Other "cardiac poisons" include, for example, mercury or cocaine.

Andromedotoxin (Grayanotoxin)

It is a toxin (polyhydroxylated cyclic diterpene) found in rhododendrons and other plants from the Ericaceae family. It binds to the sodium channels of cell membranes and prevents the inactivation of excitable cells, leaving them depolarized [1].Initial symptoms of poisoning are hypotension and sinus bradycardia. In higher concentrations, it also causes bradycardia, ventricular tachycardia and Wolff-Parkinson-White syndrome. Atropine or vasopressors can be used for therapy.

Anthracycline

Anthracycline cardiotoxicity is characteristic of this chemotherapeutic agent. It can be caused by several factors - interference with the ryanodine receptors of the sarcoplasmic reticulum of cardiomyocytes, the formation of free radicals or the formation of metabolic products of anthracycline in the heart. Cardiotoxicity is manifested by changes on the ECG and arrhythmias or cardiomyopathy leading to congestive heart failure. Dexrazoxane is sometimes used to reduce cardiotoxic effects.

Mercury

Mercury intoxication is cumulative, acute poisoning occurs when mercury vapor is inhaled. Since mercury blocks the degradation process of catecholamines (inactivates S-adenosylmethionine and thus prevents the catabolism of catecholamines by catechol-o-methyltransferase), an excess of adrenaline causes, among other things, tachycardia and hypertension.

Cocaine

It is an alkaloid from the South American coca bush. In addition to other effects, it increases blood pressure and heart rate (stimulant of the central nervous system). It temporarily increases the production of dopamine and serotonin. Cocaine overdose causes high blood pressure and abnormalities in heart function (contractions are either extremely fast or slow; too strong or weak). This can lead to death, especially in people who already have heart disease.

5-fluorouracil

The incidence of cardiotoxicity associated with 5-fluorouracil (5-FU) is dose- and timing-dependent. [2] The mechanism of the cardiotoxic effect is unknown, although several hypotheses have already appeared, for example, spasm of the coronary arteries caused directly by the drug or an allergic reaction, or a direct toxic effect on the myocardium and pericardium[3]. Adenosine analogs have several hemodynamic effects including changes in left ventricular contractility or peripheral vasodilation or vasoconstriction. The most common symptoms of poisoning include chest pain, unstable angina pectoris, ST-T wave changes, and atrial fibrillation. Rarely, ventricular fibrillation or sudden death can occur.

Links

References

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