

# Effect of poisons on heart rhythm

**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 some **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, with the nectar collected by bees, reaches their honey, which becomes poisonous. Many **peptide toxins** of snakes also have a cardiotoxic effect, e.g. cardiotoxin from cobra venom, cardiotoxins from sea anemones, toxic peptides from hummingbirds 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.

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

## Andromedotoxin (Grayanotoxin)

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

## 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 of 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 dependent on its dose and timing.<sup>[2]</sup> The mechanism of cardiotoxic action is not known, although several hypotheses have already appeared, for example coronary artery spasm caused directly by the drug or an allergic reaction or a direct toxic effect on the myocardium and pericardium <sup>[3]</sup>. 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 , ST-T wave changes, and atrial fibrillation . Rarely, ventricular fibrillation or sudden death can occur.

## Links

## Odkazy

## Reference

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3. NOVOTNÝ, Jan. Kardiotoxicita 5-fluorouracilu [online]. ©2002. [cit. 22. 9. 2009]. <[www.koc.cz/](http://www.koc.cz/)>.

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- 2.
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