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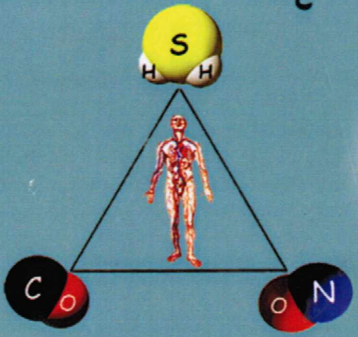

Gasotransmitters : Physiology and Pathophysiology

Газомедиаторы: физиология и патофизиология

Сборник тезисов

DOPAMINE AND A CONTRACTILITY OF A MYOCARDIUM

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Regulatory effect of the monoamine dopamine on the contractility of a myocardium has studied not enough, especially in the ontogenesis. It is known that dopamine realizes its influence through different subtypes of the dopamine receptors: D1-like receptors, including D1 and D5 subtypes, and D2-like receptors, that combine D2-, D3-and D4-receptors. Dopamine is an agonist of the D2-receptor, at high doses, and D1-receptors, as well as α-and β-adrenergic receptors. Intensity of the effect is determined by the dose.

The question is of interest because in the ontogeny of Parkinson's disease there is a great importance has a violation of cholinergic neurotransmitters and dopaminergic processes in the brain. On the before symptomatic and early symptomatic stages of the Parkinson's disease in the heart the shifts in the concentration of dopamine were detected (Nigmatullina et al., 2014). Perhaps any changes in the contractility of the myocardium under the action of the dopamine can serve as a potential markers of Parkinsonism.

The aim of this research was to study the influence of the dopamine in different concentrations on the contractility of the myocardium of the immature rats during the blockade of adrenergic and dopaminergic receptors. The experiments were performed on the white laboratory 21-day-old rats on strips of the atrial myocardium and ventricular fibrillation in compliance with bioethical norms. Isometric contraction of the strips of the atrial myocardium and ventricular fibrillation were registered on the installation «Power Lab» (ADInstrumets) with a force sensor "MLT 050 / D" ("ADInstruments"). It was determined the reaction of the myocardial contraction force both atrium and ventricle to the increasing concentrations of dopamine («Sigma») in the range 10^{-9}–10^{-5}M. For the α-adrenoceptor blockade was used a phentolamine on 10^{-6}M concentration, for β-adrenoceptor – a propranolol on the concentration of 10^{-6}M and d-receptor - droperidol («Sigma»). The reaction of the contraction force in response to dopamine has calculated as a percentage of the initial one, which was taken as 100%. The significance of differences was calculated by Student t-test.

It was established that in 21-day old rats the dopamine at a concentration of 10^{-9}M has a positive inotropic effect on the myocardium of the atria and ventricles. The elevated concentrations of dopamine (10^{-7}M, 10^{-6}M, 10^{-5}M) lead to the negative inotropic effect. After the α-adrenoceptor blockade the dopamine on concentration of 10^{-9} to 10^{-5}M has caused a decrease in the strength of myocardial contractility and ventricular fibrillation. Probably, the positive inotropic effect is caused by the activation of α-adrenergic receptors. Under the action of all tested concentrations the dopamine has caused the most pronounced negative inotropic effects on the background of the β-adrenoceptor blockade. Consequently, dopamine at high concentrations causes a positive inotropic reaction through the activation of β-adrenergic receptors. At high doses of droperidol the negative inotropic effects of the dopamine disappear. Consequently, at this stage of the ontogenesis in the formation of the sympathetic regulation of the heart the dose-dependent effect of dopamine is realized through different types of receptors.