ELECTRIC ACTIVITY OF ALPHA2-ADRENE REACTIVE POPULATIONS OF THE NUCLEAR SOLITARY TRACT IN THE ENDOTOXEMIA CONDITIONS

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Escherichia coli endotoxins play a key role in the pathogenesis of various diseases of the central nervous system, such as Parkinson's disease, Alzheimer's disease, etc. It is believed that one of the triggers for the development of these pathologies is an increase in the endotoxin concentration in the blood, which is also observed during aging [1]. With age, the risk of developing hypertension increases. In this connection, studies of the central regulation of vital functions under conditions of endotoxemia modeling and the use of the antihypertensive first aid clonidine are promising.

The purpose of the study was an experimental analysis of the electrical activity of the neuronal populations of the solitary tract nucleus during changes of the functional status of alpha 2-adrenoreceptors under endotoxemia.

Acute experiments were performed on anesthetized (nembutal and urethane in the proportion of 30 and 500 mg / kg intraperitoneally) male Wistar rats weighing 280-320 g (n=32). Lipopolysaccharide of *Escherichia co*li was slowly injected into the right femoral vein (LPS; 1,10,100 μg/kg/ ml). After 2 minutes, clonidine was administered intranasally (50 μl, 0.01% of solution). An apyrogenic physiological solution was used as a solvent for LPS, and it was used as a control. The coordinates of the solitary tract nucleus were calculated using the brain atlas of Wistar rats: 13.3 - 13.5 mm caudal to Bregma, 1.0 mm lateral to the midline and 8.0 8.1 mm ventral to the surface of the skull [2]. Neural activity was recorded by a glass-insulated tungsten electrode (2-3 MΩ). An electrocardiogram was recorded in the II standard lead in order to control the functional state of the animals. Background activity was recorded for 15 minutes, then LPS was administered by intravenous injection for 1 minute and then clonidine was intranasally instilled. The total registration time was 120 minutes. All experiments were carried in compliance with the recommendations of the European Convention on Humane Treatment of Laboratory Animals [3].

Intranasal administration of apyrogenic physiological solution against endotoxemia (LPS 1 μg/kg/ml) at 60 minutes of the experiment was found to be accompanied by a decrease in the frequency of neuronal discharges compared with background activity (from 5.9 ± 1.4 pulses/s to 2.8 ± 0,7 pulses/s, $p < 0.05$, n=8). No significant effects were observed at doses of 10 and 100 μg/kg/ml. Heart rate (HR) increased by 50± beats per minute (bpm) with LPS infusion at a dose of 1 μg/kg/ml at the 40th minute of the experiment.

Intranasal application of clonidine after intravenous infusion of LPS at a dose of 1 μg/kg/ml by the 60th minute of the experiment was characterized by a decrease in the frequency of neuronal discharges compared with background activity (from 1.8 ± 0.5 pulses/s to 0.6 ± 0, 2 pulses/s, $p < 0.05$, n = 8), while the HR decreased 80 to 120 minutes from 400 ± 50 bpm to 235 ± 28 bpm ($p < 0.05$) compared to with background.

Intravenous infusion of LPS at a dose of 10 μg / kg / ml in combination with the intranasal administration of clonidine by the 120th minute of the experiment was accompanied by an increase in the frequency of neuronal discharges compared with background activity (from 2.9 ± 1.1 pulses/s to 5.2 ± 1.1 pulses/s, $p < 0.05$, n=8) and a decrease in heart rate also at the 120th minute of the experiment (from 370 ± 70 bpm to 260 ± 40 bpm, $p < 0.05$)

Intranasal administration of apyrogenic physiological solution with simultaneous intravenous administration of LPS at a dose of 100 μg / kg / ml by the 40th minute of the experiment caused a decrease in the frequency of neuronal discharges compared with background activity (from 3.8 ± 0.8 pulses/s to 2.1 ± 0.4 pulses/s, $p < 0.05$, n=8) with a subsequent increase in neural activity by the 120th minute of the experiment. The heart rate decreased from 389 ± 32 bpm to 300 ± 20 bpm ($p < 0.05$) by the 60th minute of observation.

The experiments have demonstrated that intranasal application of clonidine against endotoxemia is accompanied by a change of the heart rate and neuronal electrical activity of the solitary tract nucleus, indicating disruptions in the central and cardiovascular systems after injection of endotoxin Escherichia coli into the bloodstream. Therefore, it can be assumed that it is advisable to investigate the level of LPS in the blood before prescribing antihypertensive drugs.

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