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MECHANISM OF BACTERIAL LIPOPOLYSACCHARIDE EFFECT ON THE FUNCTIONAL ACTIVITY OF THE HEART IN VITRO. CORRECTION OF ITS EFFECTS BY THE CALCIUM REGULATING HORMONE SYSTEM

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*Received 26.02.2024; Accepted for printing 04.08.2024***ABSTRACT**

Bacterial lipopolysaccharides belong to the group of pathogen-associated molecular patterns such as alarmins. They can cause various dysfunctions of the cardiovascular system, including arrhythmia, myocardial hypertrophy, myocarditis, and heart failure.

The damaging effect of lipopolysaccharides on the myocardium can be a result of their direct action or ensured by uncontrolled secretion of endogenous alarmins and cytotoxic shock.

Lipopolysaccharides are perceived by specific caspases of host cells and activate the release of interleukins, and in maximum stimulation they lead to necrosis and/or pyroptosis of cells.

The mechanism of the action of bacterial lipopolysaccharide on the functional activity of the heart was studied in vitro using an isolated frog heart model. By the method of pharmacological blockade, the participation of calcium and potassium channels, phosphodiesterase and $\text{Na}^+\text{-K}^+\text{-ATPase}$ in the mechanism of the lipopolysaccharide influence on the inotropic and chronotropic activity of the heart was revealed.

In our experiments, we observed a dose-dependent negative effect of lipopolysaccharide on the inotropic and chronotropic functions of isolated frog heart, as well as a significant reduction in its viability.

It is assumed that the mechanism of the action of lipopolysaccharide on the heart involves calcium and potassium ions, $\text{Na}^+\text{-K}^+\text{-ATPase}$ and cAMP.

The study investigated the role of the calcium-regulating hormonal system (including parathyroid hormone, parathyroid hormone-related protein, calcitonin, and vitamin D_3) in preventing disturbances in the functional parameters of the isolated heart induced by bacterial lipopolysaccharide.

The protective role of these hormones in preserving the pacemaker and contractile functions of the heart under the influence of bacterial lipopolysaccharide has been shown. A particularly significant effect is exerted by vitamin D_3 , parathyroid hormone and parathyroid hormone-related protein, which maintain the functional activity of the isolated heart for a long time.

KEYWORDS: bacterial lipopolysaccharide, heart, calcium-regulating hormonal system, calcium and potassium channels, cAMP, $\text{Na}^+\text{-K}^+\text{-ATPase}$.

INTRODUCTION

Lipopolysaccharide (LPS) is an important component of outer membrane of gram-negative bacte-

ria. Bacterial lipopolysaccharides belong to the group of pathogen-associated molecular patterns

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