STUDY OF THE EFFECTS OF BIOLOGICALLY ACTIVE SUBSTANCES ON THE SMOOTH MUSCLES OF THE AORTIC BLOOD VESSEL

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Annotation. *By now, diseases are rejuvenating and the reason for this depends on many factors. In this tactical situation, the preservation of our people's health is the highest goal. The prevention and treatment of each disease should be carried out separately from herbal remedies made from natural products, even a small amount of which gives a high result. Our goal is to contribute to this grand endeavor.*

Keywords: *smooth muscle, endothelium, sarcoplasmic reticulum, relaxing effect, contraction and relaxation, quercetin, receptor.*

Introduction. In our country, consistent measures are being implemented to prevent, treat, and control non-communicable diseases and their risk factors, as well as to reduce premature mortality and morbidity among the population.

At the same time, the absence of an effective system for coordinating preventive measures in the field of public health protection limits the ability to implement coordinated actions aimed at supporting the population's level of physical activity and promoting a healthy lifestyle. As the level of medical, sanitary, and hygienic culture among the population remains low, the main focus is being directed not toward prevention, but toward combating diseases.

In order to improve the mechanisms for organizing and managing the prevention of non-communicable diseases, the formation of a healthy lifestyle among the population, and the increase of physical activity, Resolution No. PQ-4063 dated December 18, 2018, was adopted.

Currently, diseases are becoming increasingly common among younger populations, and this is associated with many factors. In this alarming situation, preserving the health of our people is considered the highest priority. For the prevention and treatment of various diseases, it is necessary to isolate medicines from plants that are prepared from natural products and are capable of producing high therapeutic effects even in small doses. Our aim is also to contribute to this important work.

Aim of the study. To study the vasorelaxant effect of the flavonoid quercetin and its derivative on the smooth muscles of the aortic blood vessel, as well as to investigate the effect of quercetin on the contraction and relaxation mechanisms of aortic blood vessels.

Object and subject of the study. The object of the study consisted of aortic blood vessel preparations obtained from healthy white outbred male rats weighing 150–200 g, bred under conditions with access to standard food and water.

The subject of the study included the effects of dihydroquercetin, quercetin flavonoid, and its derivative on the smooth muscles of the aortic blood vessel, as well as the influence of biologically active substances on the contraction and relaxation mechanisms of smooth muscles.

Results of the study. It was determined that the vasorelaxant effect of quercetin is mediated by reducing the entry of Ca^{2+} ions into smooth muscle cells through potential-dependent and receptor-operated Ca^{2+} channels, as well as through the Na^{+}/Ca^{2+} exchanger.

Our experiments showed that biologically active substances exhibited a significantly stronger vasorelaxant effect compared with the control group. This can also be observed in more detail in the figure below.

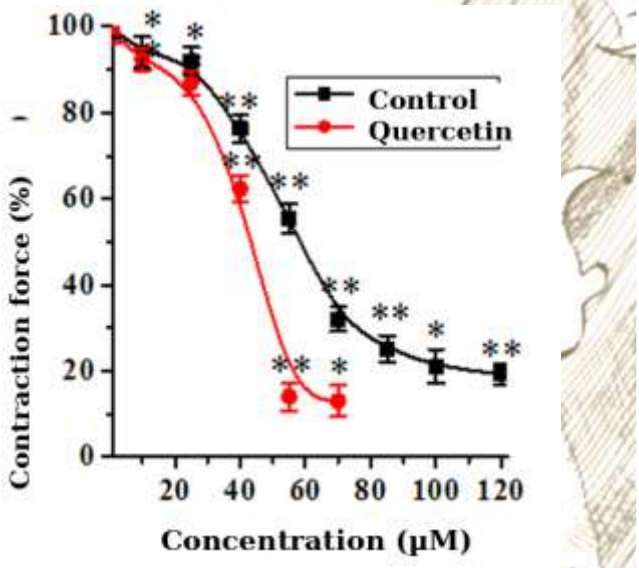

Figure 1. Determination of the involvement of sarcoplasmic reticulum inositol-1,4,5-trisphosphate receptors (IP_3R) and ryanodine receptors (RyR) in the relaxant effect of quercetin. In all cases, the level of statistical significance was *$p < 0.05$, **$p < 0.01$; $n = 6$.

Conclusion. The obtained data on the mechanisms of the relaxant effect of quercetin serve as a theoretical basis for developing scientifically grounded approaches to the purposeful creation of new-generation effective drugs for the prevention and treatment of cardiovascular diseases.

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