

**COMPARATIVE ASSESSMENT OF THE INFLUENCE OF LONG-TERM
ADMINISTRATION OF ADRENALINE AND SELECTIVE
 β_2 -ADRENOAGONIST FORMOTEROL ON THE FUNCTIONAL CONDITION
OF THE SKELETAL MUSCLE OF WHITE RATS**

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Research objective consisted in the comparative research in the model experiments on animals of the influence of long-term administration (from 10 to 60 days) of the adrenaline (A, 0,2 mg/kg/days) and selective β_2 -adrenoagonist formoterol (F, 1,5 mkg/kg/days) on the functional parameters of a skeletal muscle of the mixed type (*m. tibial anterior*).

Method. Experiments were performed on sexually mature rats-females of 4–5 monthly age divided into 3 groups: control (n=10, K-group), the I-st experienced (n=30, A-group), animals of which received the adrenaline hydrochloride ("Zdorov'e", Ukraine, 0,2 mg/kg/days), and the II-nd experienced (n=30, F-group), animals of which received the selective β_2 -adrenoagonist formoterol (Foradil, "Novartis", Switzerland, 1,5 mkg/kg/days). The adrenoagonists were administered daily hypodermically for 10, 30 and 60 days. Thus, animals of each experienced group in the subsequent have been divided into 3 subgroups (n=10 in everyone) which have received different quantity of the adrenoagonists' injections: 10 (groups 10A and 10F), 30 (groups 30A and 30F) and 60 (groups 60A and 60F).

Upon termination of the terms of adrenoagonists' administration on the anesthetized animals (sodium thiopental, 100 mg/kg, intraperitoneally) made the acute experiment during which studied the electrophysiological, ergometrical and power parameters of the forward tibial muscle in the conditions of the caused its contraction. The muscle's contraction was induced by the irritation of the fibular nerve by superthreshold electric current.

Results. The long-term adrenergic stimulation which was modeled by daily hypodermic introduction of adrenaline (0,2 mg/kg/days) or formoterol (1,5 mkg/kg/days) was followed already the first 10 days of the medicines' use by the shortening of the latent

period of the M-response of the muscle (for 14–18 %) and by the increase in its amplitude (for 38–82 %) against the background of invariable duration at rats 10A- and 10F-groups, respectively, that specifies in the favor of the possible acceleration and facilitation of synaptic transmission, the improving of the level of synchronization of muscle fibers' excitement and the increase in its irritability. This improving of the electrophysiological parameters of the muscle remained throughout all further 2-month period of adrenoagonists' administration with the much more expressed increase in amplitude of M-responses at animals of 30F- and 60F-groups (for 95–137 %) in comparison with 30A- and 60A-groups (for 46–61 %).

Upon termination of the 2-month period of adrenoagonists' administration the significant shortening concerning the control of the latent period (for 15–16 %) and the shortening phase (for 19–16 %) of single contraction and also the increase in the amplitude of tetanic contraction (for 33–35 %) of the muscle of animals 60A- and 60F-groups, respectively, was watched that specifies in a favor of the possible increase in the level of synchronization of excitement and contraction in the muscle, improving of electromechanical coupling in its fibers and energetic support of the contracting act.

Throughout the entire period of adrenoagonists' administration (from 10 to 60 days) the increase in the speed of tetanic contraction, essential in comparison with control (for 229–207 % at rats of 10A- and 10F-groups and for 128–566 % at animals of 60A- and 60F-groups) and the lengthening of the periods of the maximum (for 63–88 % at rats of 10A- and 10F-groups and for 77–83 % at animals of 60A- and 60F-groups) and submaximum (for 67–65 % at rats of 10A- and 10F-groups and for 84–87 % at animals of 60A- and 60F-groups) capacity of the muscle took place. The increase in the speed of tetanic contraction testifies in a favor of the possible improvement of electromechanical coupling in the muscle fibers and the increase in the speed of actin-myosin interaction, and the lengthening of the periods of the maximum and submaximum working capacity – in favor of improvement of the power support of the contracting act. At the same time, already the first 10 days of adrenoagonists' administration the increase in temperature cost of muscular work, significant in comparison with control (for 25–36 % at animals of 10A- and 10F-groups) was observed, which remained up to the end of the 2-month period of its administration (for 41–47 % at rats of 60A- and 60F-groups) and indicated in a favor of the decrease in the efficiency of muscular contraction. Throughout the entire period of adrenoagonists' administration (from 10 to 60 days) the muscle of experienced animals showed the higher in comparison with control resistance to fatigue. In favor of it the absence at rats of A-group of significant decrease of the quantity of the activated motive units of the muscle, less expressed decrease of the amplitude of M-responses against the background of the absence of significant increase in its duration and less expressed lengthening of the latent period of single contraction after execution of the tiring work in comparison with those at control animals demonstrated. Increase in the muscle's resistance to fatigue was more expressed at animal of F-group in comparison with A-groups in a favor of what the total absence at rats of F-group of decrease of amplitude of M-responses and single contraction of the muscle after execution of the tiring work testifies.

The selective β_2 -adrenoagonist formoterol caused the more expressed increase in amplitude of the M-response, speed of tetanic contraction of the muscle and its resistance to fatigue in comparison with the effect of adrenaline.

Keywords: skeletal muscle, catecholamine, adrenaline, formoterol, rats.

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