

THE EFFECT OF DISUSE ON THE FUNCTIONAL CONDITION OF NEUROMOTOR SYSTEMS IN RATS

Fedianin A.O.^{1,3}, Sabirova D.E.², Baltin M.E.^{1,2}, Ahmetzyanova A.I.³, Baltina T.V.³, Sachenkov O.A.^{2,4}, Ereemeev A.A.^{2,3}

1 Scientific and Research Institute of Physical Culture and Sports, Volga Region University of Physical Culture, Sports and Tourism, Kazan, Russia

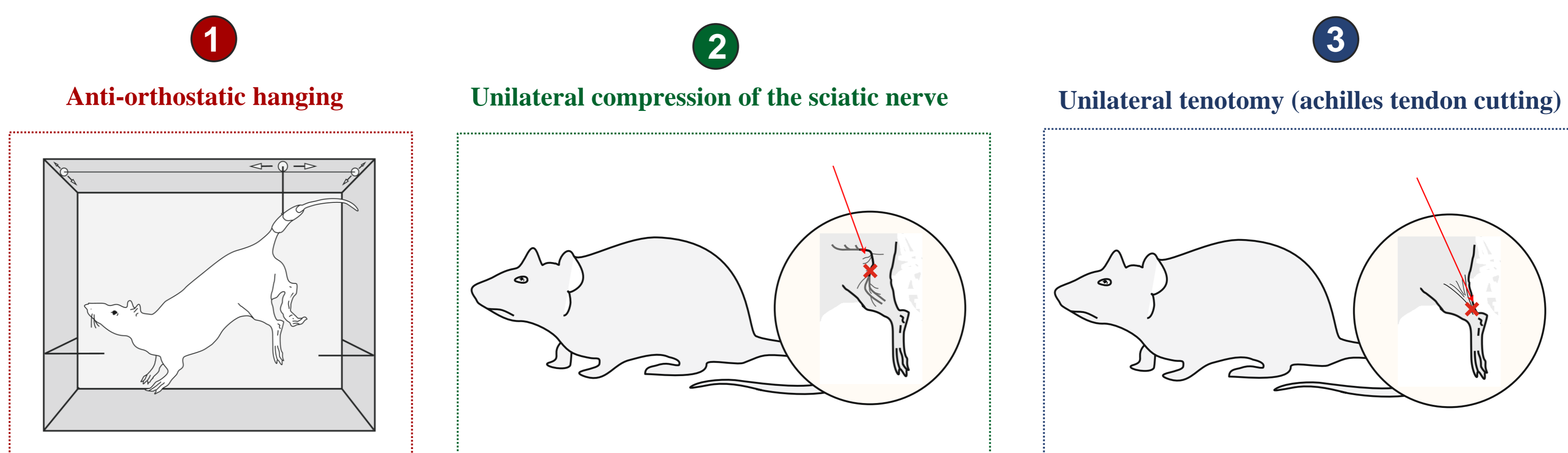
2 N.I. Lobachevsky Institute of Mathematics and Mechanics, Kazan Federal University, Kazan, Russia

3 Institute of Fundamental Medicine and Biology, Kazan Federal University, Kazan, Russia

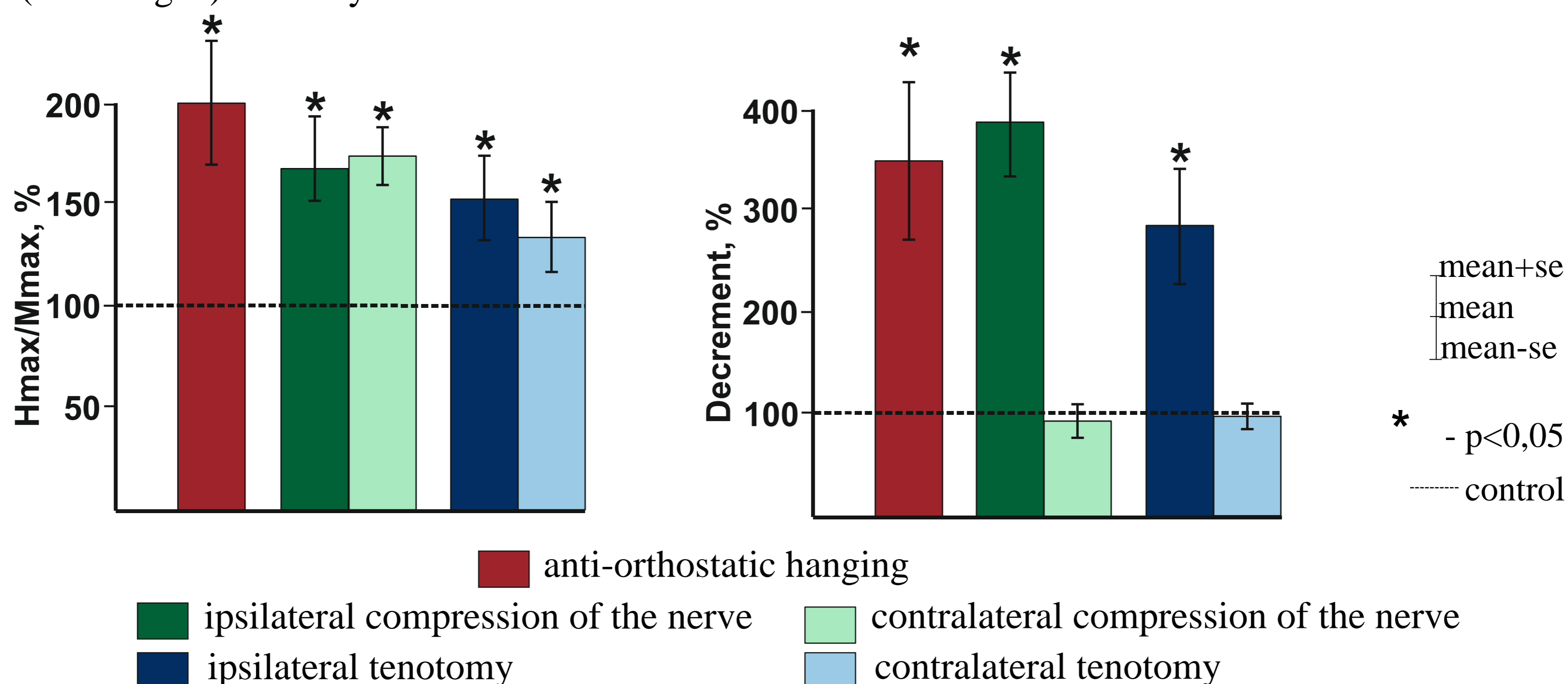
4 Institute of Mechanics and Mechanical Engineering, Federal Research Center «Kazan Scientific Center of Russian Academy of Sciences», 420111, Kazan, Russia

Introduction: An important and urgent problem of neuroscience and medicine is the understanding of the mechanisms of reorganization of motor function under conditions accompanied by a restriction of the functional use of skeletal muscles. The aim of the study was to assess the condition of the neuromotor apparatus of the rat's calf muscles in conditions of simulated disuse.

Material and Methods: All experiments were carried out in strict accordance with generally accepted bioethics norms. The animals were divided into experimental groups: 1) unilateral compression of the sciatic nerve (n=5); 2) unilateral tenotomy (unilateral achilles tendon cutting) (n=5); 3) antiorthostatic hanging (n=5). After 7 days, the electromyographic characteristics of the gastrocnemius, soleus and tibialis anterior muscles were recorded. Data from intact animals served as a control (n=5).



Results: An increase in the reflex excitability of spinal cord motor neurons and a violation of the reliability of synaptic transmission were detected, regardless of the procedure for modeling disuse of the muscle. The transformations were more pronounced in the neuromotor apparatus of the extensor muscles. In addition, in nerve injury and tenotomy, changes in the state of spinal motor centers were also recorded in the contralateral (undamaged) motor system.



The diagrams show the average values of electromyographic parameters obtained during testing of the studied calf muscles (gastrocnemius, soleus and tibialis).

CONCLUSION:

Thus, the disuse of skeletal muscle initiates the transformation of the functional state of all links of symmetrical neuromotor systems. The main reason for the detected effects is assumed to be the restriction of peripheral afferentation, including support; activation of intraspinal bilateral connections.