ЖУРНАЛ ЭВОЛЮЦИОННОЙ БИОХИМИИ И ФИЗИОЛОГИИ, 2020, том 56, № 7, с. 740–741

МАТЕРИАЛЫ КОНФЕРЕНЦИИ И ШКОЛЫ

THE ROLE OF BDNF AND proBDNF IN THE REGULATION OF PARAMETERS OF SPONTANEOUS ACETYLCHOLINE SECRETION IN MATURE AND NEWLY-FORMED MOUSE MOTOR SYNAPSES

© 2020 г. P. O. Bogacheva[1,*], E. S. Pravdivceva[1], A. I. Molchanova[1], A. E. Gaydukov[1], and O. P. Balezina[1]

[1] *Lomonosov Moscow State University, Moscow, Russia*

**e-mail: untergang@inbox.ru*

DOI: 10.31857/S0044452920071559

Introduction. Currently, the ability of skeletal muscles to synthesize and release brain neurotrophin BDNF and its progenitor proBDNF has been described, while their involvement in the regulation of synaptic transmission in motor synapses at different stages of their formation remains poorly understood. The aim of this work was to compare the ability of BDNF and proBDNF to exert acute regulatory effects on the parameters of miniature end plate potentials (MEPPs).

Methods. MEPPs were recorded in newly-formed synapses of reinnervating extensor digitorum longus muscle (m. EDL), and in functionally mature synapses

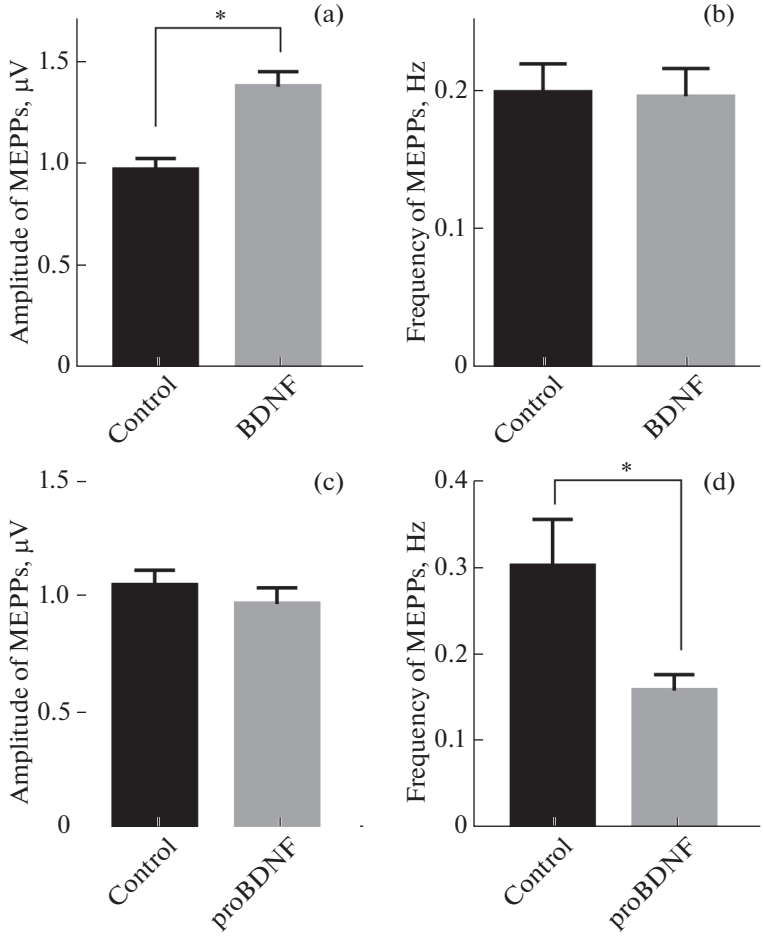

Fig. 1. Changes in amplitude and frequency of MEPPs in newly-formed motor synapses of mouse m. EDL in presence of BDNF (a, b) and proBDNF (c, d).

of mouse diaphragm using standard microelectrode techniques. MEPPs amplitude, time parameters, and frequency were analyzed.

Results. In newly-formed functionally immature synapses, BDNF (1 nM) caused a 50% increase in the MEPPs amplitude and did not affect their frequency. In mature synapses BDNF increased both the amplitude of MEPPs by 30%, and the frequency of the MEPPs by 40%. All BDNF-induced changes in MEPPs parameters in both types of synapses were prevented by inhibition of TrkB receptors. The increase in MEPPs frequency in mature synapses was due to activation of phospholipase C, while in the newly-formed synapses this enzyme was not involved in frequency regulation. BDNF did not affect MEPPs time course of in both types of synapses.

In presence of proBDNF (1 nM) in newly-formed synapses the amplitude of MEPPs did not change, but a decrease in MEPPs frequency by 50% was observed. The time course of MEPPs remained unchanged. In mature synapses, proBDNF did not cause changes in any of the studied parameters of MEPPs.

Conclusions. We have shown for the first time that in newly-formed motor synapses BDNF and proBDNF provide individual acute effects on different parameters of spontaneous secretion. In mature synapses BDNF has a wider spectrum of activity, while proBDNF does not seem to be directly involved in regulation of spontaneous acetylcholine secretion.

Supported by RFBR 19-04-00616a.