ASSOCIATION OF BRAIN-DERIVED NEUROTROPHIC FACTOR (BDNF) PROTEIN EXPRESSION WITH THE NEURONAL DEATH IN THE POSTRESUSCITATIVE PERIOD

Avrushchenko M.Sh., Kuzovlev A.N., Ostrova I.V.

V. A. Negovsky Research Institute of General Reanimatology,
Federal Research and Clinical Center of Intensive Care Medicine and Rehabilitology, Moscow, Russia

- Endogenous neuroprotective factors play an important role in the brain recovery after ischemia-reperfusion.
- BDNF is currently considering as the key mediator of neuronal survival and recovery.

The aim of the study was to evaluate expression level of BDNF and its association with the postresuscitative neuronal death in highly hypoxia-sensitive brain regions.

Fig. 1. Dynamics of changes in the total density of pyramidal cells of the hippocampus (a) and Purkinje cells (b) postresuscitation.
*a: * — $Pu < 0,05$ versus control; b: * — $Pu < 0,025$ versus control.*

- Cardiac arrest in adult albino male rats was evoked by intrathoracic clamping of cardiac vascular bundle for 10 min.
- The hippocampus (pyramidal neurons) and cerebellum (Purkinje cells) were analyzed.
- The expression of BDNF protein was immunohistochemically determined by peroxidase-antiperoxidase method using polyclonal antibodies to BDNF.
- The level of BDNF expression in the neuron's cytoplasm was assessed using ImageJ 1.48v.
- A number of neurons with different BDNF expression as well as a total number of neurons were evaluated on the 1, 4, 7, and 14th days after resuscitation.
- Statistical data processing was performed using Statistica 7.0. The significance of differences was assessed by Student's t-test, Mann-Whitney test, Kolmogorov-Smirnov test.

Fig. 2. The change in the number of neurons with different levels of BDNF expression in the pyramidal cells of the hippocampus (a) and Purkinje cell population (b) in postresuscitative period
* - $Pu < 0,05$; # - $Pu \leq 0,1$ versus control ; & - $Pu < 0,05$ versus 4th day

- Decrease in the overall density of neurons in the hippocampus (a) - by day 7, in the cerebellum (b) – by day 4 after resuscitation

- In both neuronal populations at the stage of neuronal loss only BDNF-negative and BDNF-weak-positive neurons died.

The activation of BDNF expression contributes to preventing the postresuscitative neuronal loss. These facts confirm linking of BDNF expression and resistance of neurons to death after ischemia-reperfusion.