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MORPHOLOGICAL ANALYSIS OF RESVERATROL INFLUENCE ON THE STATE OF NEURONS AND GLIAL CELLS IN THE NEOCORTEX IN RATS WITH METABOLIC SYNDROME

The study was performed as a part of research works "Systemic pharmacology of non-opioid analgetics and substances for drug protection of brain in conditions of experimental pathology" (state registration number 0114U000935).

ABSTACT. Background. Investigation of metabolic mechanisms of cerebrovascular and cognitive disorders in patients with metabolic syndrome are still relevant. According to different data Resveratrol is a powerful antioxidant that improves insulin sensitivity, prevents decline in cognitive and mental functions, inhibits oxidative stress, etc. **Objective.** To identify morphological changes in the neocortex of rats with experimental fructose-induced metabolic syndrome in conditions of course administration of Resveratrol. **Methods.** The study included 24 white rats weighing 180-220 g. Rats were randomized into 3 experimental groups: I - intact rats (control), n = 8; II - animals with MS induced by 60% fructose solution during 8 weeks, n = 8; III - animals with MS that were treated with Resveratrol (20 mg/kg/day) for 14 days. At the end of the treatment the experimental animals were euthanized, and their brains were investigated histomorphologically. The histological sections were stained with methylene blue-Azure II for evaluation by light microscope. The number of neurons, glial cells, normal and apoptotic neurons were counted using the program ImageJ. **Results.** Light optical microscopy of the rat cerebral cortex in control group showed significant violations of cytoarchitectonics. The experimental course of metabolic syndrome has led to significant changes in neurons, glia and blood vessels of the neocortex. After treatment with Resveratrol the density of neurons increased moderately, percentage of hypochromic neurons and neuroglial index were decreased. However, the increase in the percentage of piknomorphic neurocytes and density of apoptotic and destructively altered neurocytes indicated low neuroprotective potential of Resveratrol and antioxidant therapy of metabolic syndrome in general. **Conclusion.** The experimental model of metabolic syndrome in rats leads to significant impairment of neuronal and glial apparatus of the neocortex. Our results showed that two weeks of daily Resveratrol treatment does not ensure sufficient protection of neurons and glia in conditions of experimental metabolic syndrome.

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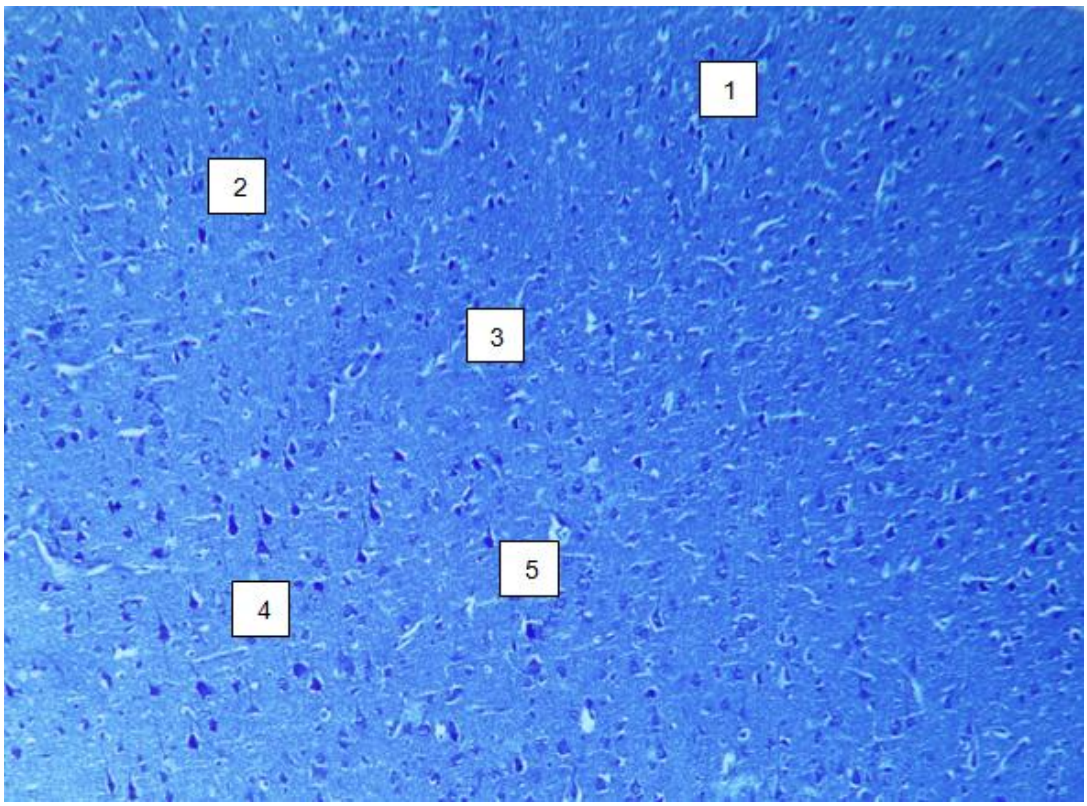

Fig. 1. Section of frontal cortex of rats intact group. The external granular layer (1), the pyramidal layer (2), the internal granular layer (3), the ganglionic layer (4), arterioles (5). Stained by methylene blue-Azure II. ×200.

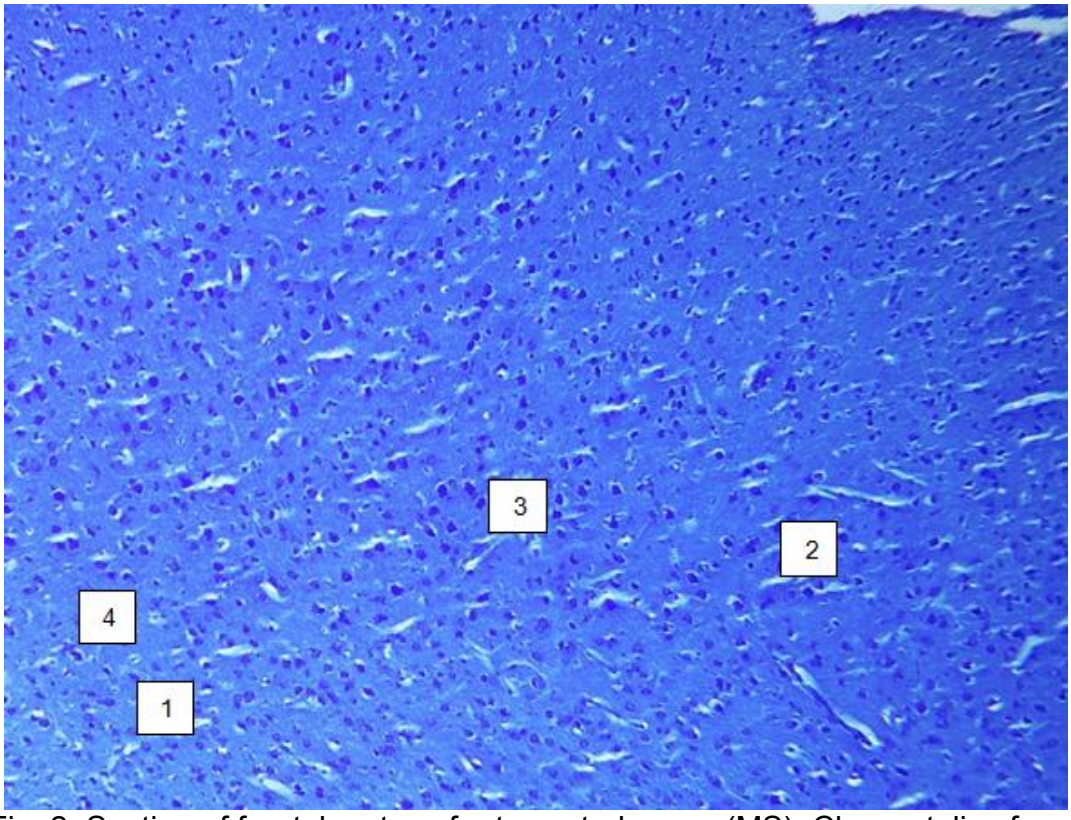

Fig. 2. Section of frontal cortex of rats control group (MS). Chromatoliz of neurocytes (1), moderate swelling of neuropile (2), hyperchromic neurons (3), shadow cells (4). Stained by methylene blue-Azure II. × 200.

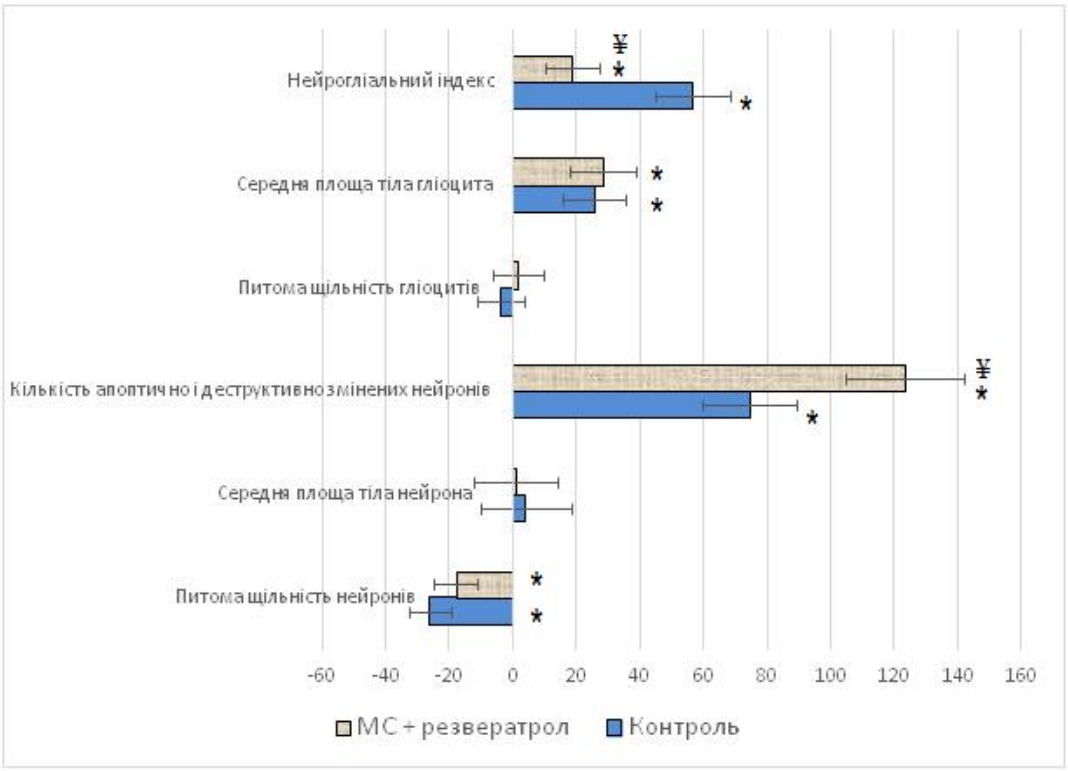

Fig. 3. Effect of resveratrol on morphofunctional indicators IV-V layers of the neocortex in rats with experimental MS (M ± m)

Notes: * - significant difference (p <0,05) compared with intact rats group; ¥ - significant difference (p <0,05) compared with the control group of rats.

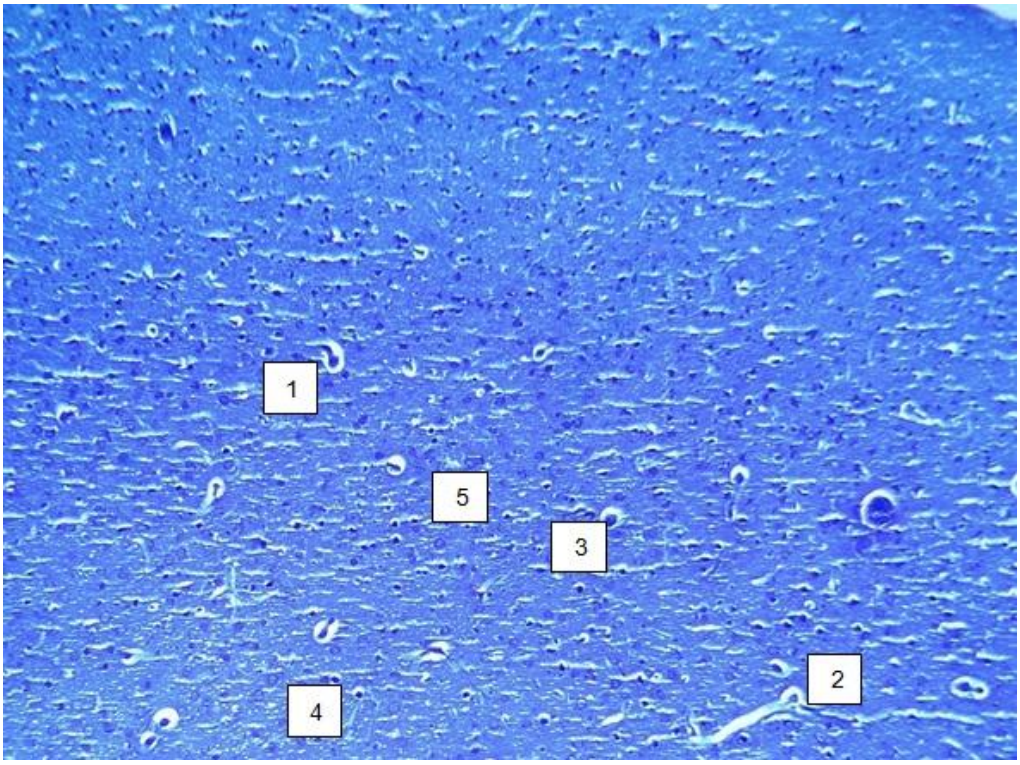

Fig. 4. Section of frontal cortex of rats with MS conditions at reception of resveratrol. Center of perivascular edema (1), desolation of vessels (2), and desolation of capillarostasis zone (3). Piknomorph neurons (4). Stained by methylene blue-Azure II. ×200.

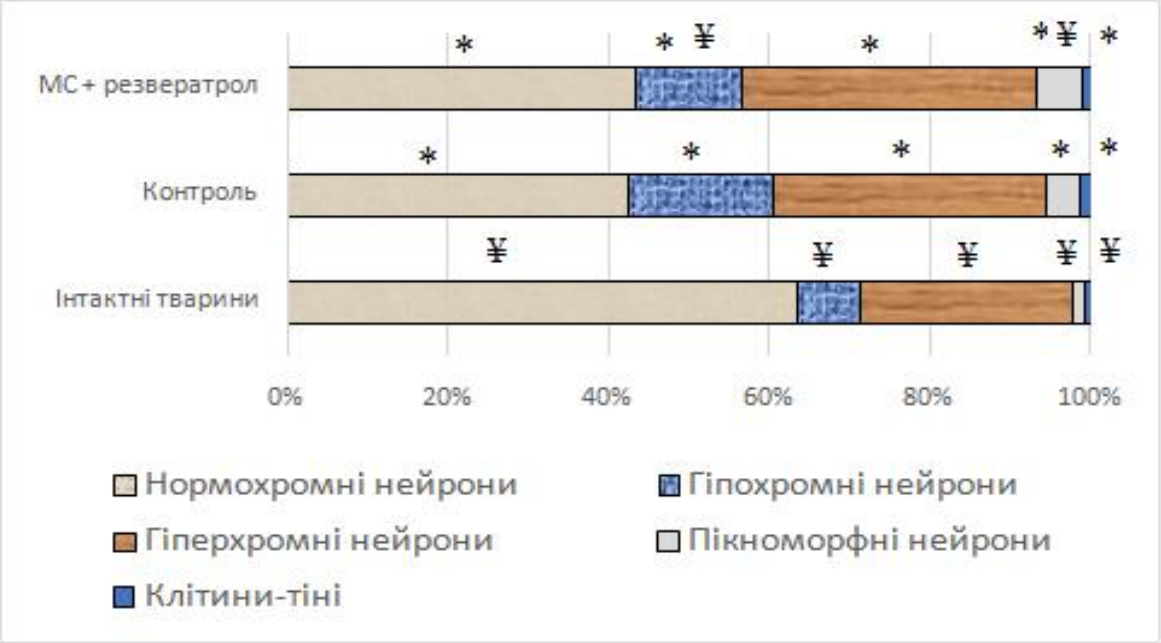

Fig. 5. Ratio of morphological forms of the neocortex nerve cells in rats with experimental MS conditions at reception of resveratrol.

Notes: * - significant difference (p <0,05) compared with intact rats group; ¥ - significant difference (p <0,05) compared with the control group of rats.

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