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**COMPARATIVE ANALYSIS OF MORPHOLOGICAL CHANGES IN THE
FRONTAL REGION OF THE CEREBRAL HEMISPHERES IN EXPERIMENTAL
OUTBRED RATS UNDER CONDITIONS OF CHRONIC CARBON MONOXIDE
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Aim of the study. To identify morphological and morphometric alterations developing in the frontal region of the cerebral hemispheres in experimental outbred rats of different ages exposed to chronic carbon monoxide intoxication and to compare the obtained findings with those of the control group.

Materials and methods. The study was conducted on 40 outbred male rats aged 3 and 18 months. The animals were divided into control and experimental groups according to age and study design. Chronic carbon monoxide intoxication was modeled by exposing the experimental animals to carbon monoxide concentrations of 0.01-0.05 mg/L in specially designed airtight chambers for two months. At the end of the experiment, brain tissue samples were collected, fixed in formalin, and processed using standard histological techniques. Paraffin sections were stained with hematoxylin and eosin and subsequently subjected to morphological and morphometric examination using light microscopy.

Results. In young rats, chronic carbon monoxide exposure resulted in neuronal polymorphism, increased cytoplasmic basophilia, enlargement of intercellular spaces, and the development of reactive gliosis within the frontal cortex. A decrease in neuronal density accompanied by proliferation of glial elements was observed in several cortical layers. In aged animals, the pathological alterations were considerably more pronounced and were characterized by a marked reduction in neuronal population, extensive chromatolysis, deformation of pyramidal neurons, cytoplasmic atrophy, and hyperchromatic changes. Morphometric assessment demonstrated a significant decrease in the thickness of the molecular, external granular, and external pyramidal layers in 18-month-old rats compared with age-matched controls.

Conclusions

Chronic carbon monoxide intoxication induces progressive neurodystrophic and neurodegenerative alterations in the frontal region of the cerebral hemispheres. The severity of morphological damage is directly associated with age, with older animals exhibiting more profound pathological changes. The observed structural abnormalities appear to be related to prolonged hypoxia, oxidative stress, and microcirculatory

disturbances, which collectively contribute to the development of destructive processes within the central nervous system.

References:

1. Belyaeva E.A., Sokolov A.A., Makarov I.V. Cellular mechanisms of hypoxic brain injury under carbon monoxide exposure. *Bulletin of Experimental Biology and Medicine*. 2020;169(4):512–516.
2. Mirzaev A.M., Khasanov Sh.T. Morphofunctional changes in aging neurons during chronic intoxication. *Morphology*. 2021;159(2):73–79.
3. Zhai J., Li M., Wang X. Oxidative stress-mediated neuronal injury induced by carbon monoxide poisoning. *Oxidative Medicine and Cellular Longevity*. 2021;2021:Article ID 9945231.