STRUCTURAL CHANGES OF THE BRAIN HISTAMINERGIC NEURONS IN 90-DAY OFFSPRING OF RATS, CONSUMING ETHANOL DURING PREGNANCY

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Relevance. Fetal alcohol syndrome combines various deviations in the psychophysical development of a child, both in combination and in severity, which first appear at birth and do not disappear with age. Their cause is the use of alcohol by a woman before and during pregnancy. The basis of the etiology and pathogenesis of fetal alcohol syndrome is the toxic effect of alcohol and its decay products on the fetus [1]. It should be noted that alcohol has a negative effect on the histaminergic neurotransmitter system of the brain. The pathways of ethanol and histamine metabolism in the brain have a common enzyme – aldehyde dehydrogenase, which is involved in the breakdown of acetaldehyde [2]. The high sensitivity of the developing brain to the toxic effects of alcohol has long been known [1, 3]. However, the study of the influence of long-term consequences of antenatal alcoholization on histaminergic neurons in postnatal ontogenesis has not been carried out.

Object. The aim of the study was to evaluate the effect of alcohol on the structure of histaminergic neurons in the E2 nucleus of the hypothalamus in 90-day-old offspring of rats that consumed alcohol throughout pregnancy.

Research methods. The study was carried out on 12 female outbred white rats and their offspring. Females of the experimental group during gestation consumed 15% ethanol solution as the only source of drinking, animals from the control group were offered water. Decapitation of offspring (15 animals) occurred on the 90^{th} day after birth. After decapitation, the brain was removed and the hypothalamus was isolated from it, which was frozen in liquid nitrogen vapor and stored in it. Then, using a cryostat, serial frontal sections of the posterior hypothalamus with a thickness of 12 μm were made. The brain structures were determined according to the schemes of the stereotaxic atlas [4]. To assess the structural features of histaminergic neurons, the obtained sections were stained according to the Nissl method (0.1% toluidine blue). For morphometric analysis, the minimum and maximum diameters, perimeter, area, volume, form factor (indicator of sphericity and roughness of the cell contour) and elongation factor (indicator of sphericity) were measured in the perikarya of histaminergic neurons. Comparison of groups on one basis was carried out using the Mann-Whitney test for independent samples (Mann-Whitney U-test). Differences between groups were considered statistically significant if the probability of an erroneous estimate did not exceed 5% ($p < 0.05$, where p is the critical value of the significance level).

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Results and discussion. In the course of studying the structural changes in the perikarya of the hypothalamus histaminergic neurons in 90-day-old offspring of rats that consumed alcohol during pregnancy, differences were found in the following morphological parameters: the maximum diameter, perimeter, area and volume of the histaminergic neurons perikarya were less to 20.58% ($p = 0.0106$), 16.93% ($p = 0.0176$), 26.38% ($p = 0.0176$), and 36.15% ($p = 0.0176$), respectively when compared with the control animal group. In addition, in the experimental group of animals, an increase in the form factor (by 7.59% at $p = 0.0176$) and a decrease in the elongation factor (by 15.2% at $p = 0.0446$) were observed. This indicates that the bodies of histaminergic neurons in rats that underwent antenatal alcoholization have a more rounded shape.

Conclusions. Thus, the revealed morphological changes in the histaminergic neurons of the experimental group indicate the presence of long-term disturbances in the structure of the studied cells and indicate a high sensitivity of the developing histaminergic neurons of the brain to alcohol.

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ТЯЖЕСТЬ КОРОНАВИРУСНОЙ ИНФЕКЦИИ И КАЧЕСТВО ЖИЗНИ ПАЦИЕНТОВ

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Relevance. Коронавирусная инфекция повлияла не только на физическое здоровье миллионов людей, но представляет угрозу психическому здоровью [1]. Многие исследования подтверждают, что у пациентов с COVID-19 был более высокий уровень стресса по сравнению с контрольными испытуемыми, причем даже через год у них был высокий уровень депрессии, тревоги, посттравматических симптомов. Следует полагать, что, данные симптомы приводят к снижению качества жизни и работоспособности [2, 3]. Сегодня постковидный синдром получил самостоятельную рубрику в Международной

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