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МАТЕРІАЛИ ВОСЬМОЇ ВСЕУКРАЇНСЬКОЇ НАУКОВО-ПРАКТИЧНОЇ КОНФЕРЕНЦІЇ З МІЖНАРОДНОЮ УЧАСТЮ

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of the human skull. During the acute phase of morphological visual examination, we primarily observed swelling, hyperemia, and hemorrhages in the fibrous tissue of the eyeball. Histologically, the study of the eyeball in experimental animals revealed greater retinal damage. We examined specific layers of neurons forming the retina using hematoxylin and eosin staining, which interact with lipids and proteins to highlight significant morphological differences. At the histological level in the retina, degenerative changes were observed during the acute and early periods after exposure to the blast wave – swelling of the neuronal cell layer, their reorganization, deformation, and breakdown, categorized by severity (mild, moderate, severe, and catastrophic) and level (percentage of damage). Based on the results of the experimental study of the eyeball at the morpho-histological level, we observed retinal damage demonstrating signs of degeneration of neuronal cell layers of the retina and individual neurons connected to the pigment epithelium of the retina lining the vascular membrane in the posterior part of the eye. Following damage to this connection that nourishes the cells, neurodegenerative changes occur. Therefore, the conditions of modelled blast wave impact and histopathological injuries specific to the eyeball membranes indicate that the rat model may be useful for studying therapeutic and surgical interventions, providing theoretical justification for potential anti-inflammatory measures to counteract the primary effects of the blast on eye membranes, particularly on the retina.

EFFECT OF PRENATAL HYPOXIA AND ITS PHARMACOLOGIC CORRECTION ON THE LEVEL OF APOPTOSIS-ASSOCIATED PROTEINS IN THE BRAIN OF RAT OFFSPRING

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Apoptosis in the developing organism maintains tissue homeostasis by a balance of active cell proliferation and programmed cell death. In response to negative factors, including oxygen deficiency, in the cells pro-apoptotic caspases are activated, triggering the mechanisms of apoptosis. Hypoxia during the intrauterine period can lead to irreversible changes in the structure and function of the developing brain and nervous system. The search for approaches of pharmacological correction of these negative effects is currently an actual direction of medicine. The aim of this study was to investigate the changes in the levels of apoptosis-associated proteins caspase 3 and caspase 8 in the rat brain of rats after prenatal hypoxia (PH) and its pharmacological correction.

Materials and methods. The study was conducted on 50 female Wistar rats using a model of hemic nitrite-induced chronic PH. Pregnant female rats were injected subcutaneously with sodium nitrite solution at a dose of 50 mg/kg daily from days 16 to 21 of gestation. Control animals received physiological solution in the same volume. The offspring were divided into four groups: I - control animals from females with normal pregnancies, injected with physiological solution; II - offspring after PH, with postnatal administration of physiological solution; III - offspring after

PH, which were administered with angiolin for a course (from 1 to 30 days of life) [(S)-2,6-diaminohexanoic acid 3-methyl-1,2,4-triazolyl-5-trioacetate, "Farmatron", Ukraine] intraperitoneally at a dose of 50 mg/kg; IV - offspring after PH, which were administered with piracetam for a course (from 1 to 30 days of life) (200 mg/mL, "Farmak", Ukraine) intraperitoneally at a dose of 500 mg/kg.

Histological samples were taken from offspring on days 1, 30, and 60 of life, fixed in 10% neutral formalin, and embedded in paraffin following standard procedures. The expression and distribution of caspase 3 in the sensorimotor cortex and hippocampus was assessed using immunohistochemical methods with primary anti-caspase 3 polyclonal antibodies (Thermo Fisher Scientific) and secondary antibodies (Goat anti-Rabbit IgG, HRP, Thermo Fisher Scientific). Immunohistological and morphometric analyses were performed using an Olympus Primo Star FL ILED microscope with ZEISS ZEN 3.5 software (blue edition). The content of caspase 8 was determined in brain homogenate by solid-phase enzyme-linked immunoassay ELISA using ELISA Kit test systems. Statistical data analysis was performed using the software "STATISTICA® for Windows 13.0" and "Microsoft Office Excel 2010". Differences were considered significant at $p<0.05$.

Results. It was found that in newborn animals after normal physiologic pregnancy and after PH action, single diffusely located cells showing positive reaction to caspase-3 were observed in the molecular and polymorphic layers of CA1 area of hippocampus, indicating irreversible death of these cells by caspase-dependent apoptosis mechanism. In the sensorimotor cortex of intact animals, few diffusely located cells expressing caspase-3 were observed. Some of the caspase 3-positive neurons were large pyramidal neurons located in layer V, another part can be attributed to small and medium pyramidal cells of the cortical complex of layers II-III. The number of caspase 3-positive cells in the experimental group exceeded intact values by 18% in CA1 of the hippocampus and by 1.6 times in the sensorimotor cortex. On the day 30 after birth, the number of caspase-3-positive cells per unit area of the section in all groups significantly decreased due to a decrease in the density of neurons and glial cells, but the level of caspase-3 expression in the hippocampus and sensorimotor cortex of animals after PH was statistically higher compared to the control group (1.3-fold in the hippocampus and almost 2-fold in the cortex). By the day 60 the expression level of caspase-3 did not change significantly and approached the control parameters. In the groups of animals treated during the first month of life, significant differences from the control were established only for the group of animals administered angiolin on the day 30 of life.

The content of caspase 8 in brain tissue in animals after normal physiologic pregnancy did not significantly change with age and ranged from 2.384±0.03 to 2.392±0.04 ng/ml. PH causes a 2.5-fold increase in caspase 8 levels in newborns, a 3-fold increase in one-month-old pups, and a 3-fold increase in 2-month-old animals. In contrast to caspase 3, the content of caspase 8 in experimental animals by the end of the 2nd month of life remains significantly different from intact values. A decrease in the concentration of caspase 8 in the brain was observed in animals after a course of drug administration, and the administration of piracetam decreased this parameter by 18% on the day 30 and by 16% on the day 60 of life, whereas the administration of angiolin by 54% and 53%, in corresponding cases. However, these values remained significantly higher (by 43%) than intact levels.

Conclusions. PH leads to activation of apoptosis in sensorimotor cortex and hippocampus of the brain of experimental animals, which is manifested by increased expression of apoptosis-associated proteins caspase 3 and caspase 8. The action of PH has a prolonged character and the found changes are not leveled during the studied period of postnatal life. Pharmacological correction with angiolin and piracetam demonstrates a positive effect in reducing the level of caspase 8 and caspase 3 expression with the most significant changes after angiolin treatment.

MORPHOLOGICAL FEATURES OF KIDNEY DEVELOPMENT WITH ADDITIONAL RESEARCH METHODS

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A clear understanding of the main stages of embryogenesis and the temporal dynamics of structural transformations of urinary system sources in the prenatal period of human ontogenesis will allow practicing doctors to clearly understand the features of the eriopathogenesis of malignant neoplasms of its organs and structures, to differentiate the remnants of embryonic tissues in the surgical material from tumors, to rationally apply the immunohistochemistry method in cancer diagnosis .

The aim of the study – to determine the peculiarities of the sources of the rudiments and the chronological sequence of topographical and anatomical transformations of the organs and structures of the human urinary system.

The material for the study was 12 series of consecutive histological sections of specimens of human embryos and prefetuses (4.4-66.4 mm parietal-coccygeal length (PCL)) aged from 4th to 7th weeks of intrauterine development (IUD). A complex of modern methods of morphological research (anthropometry, morphometry, microscopy, 3D computer reconstruction, statistical analysis) were applied.

The first signs of mesonephric duct diverticula formation are determined in human embryos of the 5th week of the IUD (embryos 7.3-7.8 mm PCL). It is represented by an ampoule-like blind expansion of the diverticulum – the primary lining of the renal pelvis, which is surrounded by a condensed mesenchyme, which is the source of the formation of the renal parenchyma – a nephrogenic blastema. Starting from the embryos of the middle of the 5th week of IUD, due to 3D computer reconstruction, the first topographical and anatomical features of the primordia of the structures of the definitive kidney are determined. The rudiments of the renal pelvises – paired ampoule-like blind expansions of the diverticulum of the mesonephric duct – are immersed in the metanephric blastema, which has the shape of a drop due to the upper narrowed end. Starting from the end of the 6th week of IUD, there is an evagination of the wall of the blind end of the diverticulum (the rudiment of the renal pelvis) in the cranial and caudal directions, i.e., the rudiments of major calyces appears. The rudiments of the minor cups is formed by the evagination of the wall of the major calices and appears in prefetuses at the beginning of the 7th week of IUD.