

The concentration of D-lactate in patients of the main group was 0.69 (0.35-2.0) mmol/l, in the control group - 0.16 (0.12-0.20) mmol/l ( $p < 0.001$  U Test by Mann-Whitney). When studying the levels of D-lactate excreted by pathogens and its comparative analysis, the reliable difference between *Staphylococci*, *Streptococci*, *Enterococci*, *Enterobacteria* and HGOP was not established ( $p > 0.05$  U Test by Mann-Whitney). To calculate the point (the value of D-lactate in the CSF) of diagnostic separation and the determination of the diagnostic value, a ROC analysis was performed, which allowed the diagnostic level of D-lactate in the CSF to be set to more than 0.26 mmol/l (sensitivity 92.45% (95% CI : 81.8-97.9), specificity 96.67% (95% CI: 88.5-99.6), area AUC = 0.993 (95% CI: 0.956-1,000),  $p < 0.0001$ ).

**Conclusions.** D-lactate biomarker can be used as an express method for diagnosing bacterial ME with high sensitivity ( $p < 0.0001$ ) and specificity ( $p < 0.0001$ ).

**Prospects for further research.** Inclusion of D-lactate levels in the protocols of management of patients with inflammatory diseases of the brain membranes will allow an early differential diagnosis of the etiology of the inflammatory process and a prescription of an effective therapy.

### References:

1. Costerus J.M., Brouwer M.C., Bijlsma M.W., van de Beek D.L. (2017) Community-acquired bacterial meningitis. *Current Opinion in Infectious Diseases*, vol. 30, no 1, pp. 135-141.
2. Vengerov Yu., Nagibina M., Kovalenko T., Matosova S., Rusin P., Smirnova T. (2018) Actual aspects of pathogenesis, diagnosis and treatment of bacterial purulent meningitis. *Infectious diseases: news, opinions, training*, vol. 7, no 1, pp. 78-85.
3. Chen Z., Wang Y., Zeng A., Chen L., Wu R., Chen B., Chen M., Bo J., Zhang H., Peng Q., Lu J., Meng Q.H. (2012) The clinical diagnostic notice of cerebrospinal fluid d - lactate for bacterial meningitis. *Clinica Chimica Acta*, vol. 413, no 19-20, pp.1512-1515.

**Key words:** meningitis, D-lactate, neurosurgery, neurology, microorganism

DOI: 10.29256/v.03.01.2019.escbm43

## STRUCTURAL AND FUNCTIONAL STATE OF THE LIVER IN ONE-MONTH-OLD RATS PRENATALLY EXPOSED TO THE ACTION OF STRESS AGENTS

Kuznetsova M.

Kharkiv National Medical University, Ukraine

Over the past few years, the proportion of hepatobiliary system pathologies in the structure of morbidity in children and adolescents has increased [1,2]. A hypothesis that the origins of many liver diseases in adults trace their roots back to the intrauterine period of development [3-5] is actively discussed, which determines the relevance of research in this field. It has been shown that the main place among the liver-damaging factors belongs to stress. The effect of prenatal stress on the morpho-functional state of the liver in offspring has not been studied yet. The aim of this work was to study the morpho-functional state of the liver in newborn offspring of rats who were prenatally exposed to chronic stress.

**Materials and Methods.** The experiment was conducted on 4-month-old WAG population female rats. Modeling of the stress factor on rats was carried out by immobilization in plastic cases at different times of the day and for different time intervals. The offspring of rats in both groups were sacrificed at the age of: 1 month (40 animals), group 2, 50% of which were in the control group. The young rats were subdivided into two groups: group 1 (control): those obtained from mothers who were kept in the standard vivarium conditions (20 heads); group 2 (main): from mothers who

were under chronic stress during pregnancy (20 heads). A complex of morphological and immunohistochemical (IGH) studies of the liver tissue was carried out, as well as an analysis of biochemical parameters of the liver homogenate. The morphological study was carried out according to conventional methods. Expression of nitrogen oxide metabolism markers was detected by IGH-method in liver tissue specimens: eNOS and iNOS using sets by Thermo scientific (Germany). Fractional composition of lipids in liver tissue homogenates was determined by thin-layer chromatography on Silufol plates, and glycogen – by spectrophotometric method (according to V. G. Asatiani). All manipulations with animals were carried out in accordance with the rules and international recommendations of the European Convention for the protection of vertebrates used for experiments or other scientific purposes (Strasbourg, 1986). Statistical processing was carried out using program GraphPadPrism5.

**Results.** Visually, in the liver of 1-month-old prenatally stressed offspring of rats, significant differences were found compared to the control group, which were manifested by brownish-yellowish color, fine-grained structure at incision, and uneven full-blood of the hepatic veins. Observational microscopy in the liver tissue of one-month-old rats of the main group revealed significant disorders of histoarchitectonics in the form of marked discomplexation of radial lobular structure and expansion of sinusoids, mainly around the portal tract zone. The hepatocytes had a foamy dyschromic cytoplasm, irregular nuclei pyknosis, and fine optically empty vacuoles. These structural changes indicate the development of fatty degeneration of hepatocytes, caused by the development of uteroplacental circulation disorders and chronic hypoxia with prolonged maternal stress. All this indicates severe damage to the liver parenchyma and signs of fatty hepatitis development. The data obtained were confirmed by the results of the study of regenerative activity of the liver (determined by the ratio of the number of binuclear hepatocytes to mononuclear forms): in one-month-old rats, their increase by 126.47%,  $p < 0.0001$ , was recorded, which along with an increased relative volume of stroma and SPI (1.4-times increased) testified to large parenchymal losses and a decrease in functional activity of the liver. In the study of the functional state of the endothelium in the liver vessels, a decrease in the expression of endothelial nitric oxide synthase (eNOS) was revealed, which was manifested by the alternation of poorly stained areas of endothelial structures with areas of pronounced eNOS expression, as well as the presence of foci of delamination and endothelial desquamation in the central veins. Accumulation of inducible nitric oxide synthase (iNOS) in sinusoid endothelial cells, muscular walls of blood vessels, stroma of portal tracts and hepatocytes was also noted. The nature of the changes revealed indicates a high degree of endothelial damage of the liver vessels and large parenchymal losses, which was manifested by a decrease in the functional activity of the liver in the offspring of the main group rats. The study of the fractional composition of lipids and glycogen in liver homogenates of one-month-old rats of the main group revealed an increase in the level of C – by 62.5%,  $p < 0.0001$ ; TG – by 82.54%,  $p < 0.0001$ ; UEFA – by 46.23%,  $p < 0.0001$ , and a decrease in PL – by 12.66% ( $p < 0.0482$ ), compared with the control. Disorders in the lipid spectrum revealed are likely to be associated with disorders in synthesis, transport, and reuptake of lipids in the liver. The level of glycogen in the liver of one-month-old rats of Group 2 was reduced by 20.98%,  $p < 0.0481$  compared with the rats of the control group, indicating ratio distortions between the processes of glycogen synthesis and degradation, which are likely to be associated with increased utilization of glucose for energy purposes.

Thus, the research conducted testify to the negative influence of chronic stress on the morpho-functional state of the liver of one-month-old offspring of rats, which was manifested by the development of a number of structural changes and metabolic disorders that can lead to the formation of various organic pathologies.

Prospects for further research. The results of the study indicate the prospects of scientific development in this field, as at the moment the issues of both, further

morphological and functional changes in the liver, and their mechanisms in the offspring of rats prenatally exposed to prolonged stress are still not fully clarified; the significance of these changes for the state of other organs and the body as a whole in animals, as well as the health of their offspring, the real threat of persistent metabolic disorders and chronic liver disease development in rats at a mature age. The solution of these issues at the level of experimental studies is extremely important in order to deepen the knowledge of the mechanisms of pathogenesis of organ damage being under conditions of chronic stress in adults and children, necessary to optimize the methods of prevention and treatment of liver diseases.

### References:

1. Бобков АИ, Решетняк ДВ, Никушкин ЕВ. О компенсированных и декомпенсированных гормональных и биохимических нарушениях при клиническом стрессе. *Клиническая лабораторная диагностика*. 2009. 9: 42-3.
2. Datson NA, van den Oever JM, Korobko OB et al. Previous history of chronic stress changes the transcriptional response to glucocorticoid challenge in the dentate gyrus region of the male rat hippocampus. *Endocrinology*. 2013. 9 (154): 3261-72.
3. Harris A, Seckl J. Glucocorticoids, prenatal stress and programming of disease. *Hormones and behavior*. 2011. 59: 279-89.
4. Lesage J, Del-Favero F, Leonhardt M, Louvarf H, Maccari S, Vieau D, Darnaudery M. Prenatal stress induces intrauterine growth restriction and programmes glucose intolerance and feeding behaviour disturbances in the aged rat. *Journal of Endocrinology*. 2004. 181: 291-96.
5. Rostamkhani F, Zardooz H, Zahediasl S et al. Comparison of the effects of acute and chronic psychological stress on metabolic features in rats. *J Zhejiang Univ Sci B*. 2012.11 (13): 904-12.

**Key words:** liver, pregnant rats, offspring, immobilization stress, experiment.

DOI: 10.29256/v.03.01.2019.escbm44

## REGULATORY ACTION OF NATURAL BIOADDITIVE CONTAINING SELENIUM ON THYROID FUNCTION

Bulimaga V., Zosim L., Bacalov I., Crivoi A., Para I.  
Institute of Research and Innovation, Moldova State University

Selenium is an important element with antioxidant properties that protects us from malignant diseases, helps maintain tissue elasticity, regenerates heart muscle, regulates heart rhythm, maintains pancreas function and, in particular, thyroid gland by including it in responsible enzymes for conversion of thyroxine into triiodothyronine [1]. As a component of glutathione peroxidase (GSH-Px), selenium belongs to the first and second levels of antioxidant protection of the cell. Selenium is a component of the deiodinase enzymes that convert T4 to T3. Thyroxine (T4) is the main hormone secreted by the thyroid gland that plays an important role in the hypothalamo-pituitary regulating thyroid system and has an influence on general metabolism. Serum concentration of T3 (triiodothyronine) reflects more the functional status of the peripheral tissues than the secretory performance of the thyroid gland [1]. It is known the ability of cyanobacterium *Spirulina platensis* to bioconvert inorganic selenium into organic by including it in amino acids - cysteine and methionine, substituting sulfur to obtain Se-cysteine and Se-methionine, as well as incorporation in other compounds (proteins, polysaccharides, lipids [2,3]. In previous research the influence of an aqueous phytoextract SNCM-4 in regulation of the level of hormones T3 and T4 in hypothyroidism in rats has been studied [4]. The composition of the phytopreparation is described in the research conducted by A. Crivoi et al. [5]. The aim of the present research was to study effect of natural bioadditive, containing selenium obtained in the base of spirulina biomass on thyroid function.