Primedia eLaunch

PROCEEDINGS OF THE V INTERNATIONAL SCIENTIFIC AND THEORETICAL CONFERENCE

SCIENTIFIC FORUM: THEORY AND PRACTICE OF RESEARCH

05.04.2024

VALENCIA
KINGDOM OF SPAIN

SCIENTIA
COLLECTION OF SCIENTIFIC PAPERS

UDC 082:001
S 40

https://doi.org/10.36074/scientia-05.04.2024

Chairman of the Organizing Committee: Goldenblat M.

Responsible for the layout: Bilous T.
Responsible designer: Bondarenko I.

S 40 **Scientific forum: theory and practice of research**: collection of scientific papers «SCIENTIA» with Proceedings of the V International Scientific and Theoretical Conference, April 5, 2024. Valencia, Kingdom of Spain: International Center of Scientific Research.

ISBN 979-8-88955-787-6 (series) Bowker
DOI 10.36074/scientia-05.04.2024

Papers of participants of the V International Multidisciplinary Scientific and Theoretical Conference «Scientific forum: theory and practice of research», held on April 5, 2024 in Valencia are presented in the collection of scientific papers.

The conference is included in the Academic Research Index ReserchBib International catalog of scientific conferences and registered for holding on the territory of Ukraine in UKRISTEI (Certificate № 74 dated January 5th, 2024).

UDC 082:001

ISBN 979-8-88955-787-6

SECTION 13.
PHYSICAL CULTURE, SPORTS AND PHYSICAL THERAPY

Shuliatnikova Tetiana Volodymyrivna
MD, PhD., Associate Professor, department of pathological anatomy and forensic medicine
Zaporizhzhia State Medical and Pharmaceutical University, Ukraine

Tumanskyi Valerii Oleksiiovych
MD, DSc, Professor, department of pathological anatomy and forensic medicine,
Vice-Rector for Research, Honorary Scientist and Engineering Worker of Ukraine
Zaporizhzhia State Medical and Pharmaceutical University, Ukraine

Tumanska Liubov Mykhailivna
MD, PhD., Associate Professor, department of pathological anatomy and forensic medicine
Zaporizhzhia State Medical and Pharmaceutical University, Ukraine

REGIONAL ALTERATION OF ASTROGLIAL GFAP IN THE BRAIN OF SEPTIC PATIENTS WITH SEPSIS-ASSOCIATED ENCEPHALOPATHY: POSTMORTEM STUDY

Sepsis-associated encephalopathy (SAE) refers to acute diffuse brain dysfunction in response to dysregulated systemic inflammation in the absence of direct infection to the CNS [1]. Its clinical manifestations vary widely from degrees of delirium to coma [2]. The current pathogenesis includes BBB damage, amino acids and neurotransmitters imbalance, ischemia, mitochondrial dysfunction, and neuroinflammation [3, 4]. Glial fibrillary acidic protein (GFAP) is a type III intermediate filamentous protein representing the core component of the astrocyte cytoskeleton [5]. Astroglia being the primary parenchymal outpost of the brain facing all types of agents invading the BBB during sepsis quickly become reactive [1, 6]. GFAP is widely considered to be the hallmark of the reactive astrocytosis and astrogliosis in a spectrum of neuropathologies and this respond has been generally convinced to be heterogeneous in different brain regions [7, 5]. Moreover, the latter was evidenced in our previous studies of experimental CLP-septic rats and in deceased septic patients without specifying the presence of SAE [8, 9]. To clarify the mode of these differences in SAE brain, we studied postmortem brains of deceased patients with abdominal sepsis associated with SAE (n=35) – «SAE» group. 57.14% of patients also had clinical features of sepsis-associated liver injury (SALI). The relative area of GFAP-immunopositive material (IPM) (%) was investigated immunohistochemically in the cerebral cortex, white matter (WM), hippocampal dentate gyrus, thalamus, striatum, and cerebellum and showed statistically significant ($p<0,05$) increase compared to control deceased patients (n=30) who died from acute heart failure without associated toxic-metabolic pathologies. $GFAP^+$ IPM occupied bigger area in the cortex – 4.03-fold (by 303.31 %), white matter – 2.81-fold (by 181.64 %), hippocampus – 2.19-fold (by 119.29 %), thalamus – 1.83-fold (by 83.64 %), striatum – 2.03-fold (by 103.37 %), cerebellum – 2.02-fold (by 102.86 %) respectively. As it was shown, cortical region reflects the trend in more intense growth of GFAP expression compared other five brain regions. It can indicate a suspected more sensitive local cortical astroglial populations upon the neurotoxic impact of the systemic inflammatory factors as well as the brain region of the most active neuroinflammatory processes in SAE. The respectively lesser increase in GFAP expression in thalamic region might indicate the presence of partial astroglial structural remodeling under action of ammonia accumulation which predominantly affect thalamic region during liver injury in septic patients, which was shown previously [9].

References:

1. Shulyatnikova, T., & Verkhratsky, A. (2020). Astroglia in Sepsis Associated Encephalopathy. *Neurochemical research*, 45(1), 83–99. https://doi.org/10.1007/s11064-019-02743-2
2. Chaudhry, N., & Duggal, A. K. (2014). Sepsis Associated Encephalopathy. *Advances in medicine*, 2014, 762320. https://doi.org/10.1155/2014/762320
3. Dumbuya, J. S., Li, S., Liang, L., & Zeng, Q. (2023). Paediatric sepsis-associated encephalopathy (SAE): a comprehensive review. *Molecular medicine (Cambridge, Mass.)*, 29(1), 27. https://doi.org/10.1186/s10020-023-00621-w
4. Tauber, S. C., Djukic, M., Gossner, J., Eiffert, H., Brück, W., & Nau, R. (2021). Sepsis-associated encephalopathy and septic encephalitis: an update. *Expert review of anti-infective therapy*, 19(2), 215–231. https://doi.org/10.1080/14787210.2020.1812384
5. Sofroniew, M. V. (2014). Astrogliosis. *Cold Spring Harbor perspectives in biology*, 7(2), a020420. https://doi.org/10.1101/cshperspect.a020420
6. Gao, Q., & Hernandes, M. S. (2021). Sepsis-Associated Encephalopathy and Blood-Brain Barrier Dysfunction. *Inflammation*, 44(6), 2143–2150. https://doi.org/10.1007/s10753-021-01501-3
7. Pekny, M., & Pekna, M. (2014). Astrocyte reactivity and reactive astrogliosis: costs and benefits. *Physiological reviews*, 94(4), 1077–1098. https://doi.org/10.1152/physrev.00041.2013
8. Shulyatnikova, T.V., & Tumanskiy, V.O. (2021). Immunohistochemical analysis of GFAP expression in the experimental sepsis-associated encephalopathy. *Pathologia*. 18(3), 295-302. DOI: https://doi.org/10.14739/2310-1237.2021.3.240033
9. Shulyatnikova, T. & Tumanskiy, V. (2023). Immunohistochemical expression of GFAP, GS, AQP4, Alzheimer-2-astrocytosis and brain ammonia levels in deceased septic patients without liver failure and those with sepsis-associated liver injury. *Art of Medicine*, 2(26), 138-145. http://dx.doi.org/10.21802/artm.2023.2.26.138