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Студентське наукове товариство

**МАТЕРІАЛИ XXII НАУКОВОЇ КОНФЕРЕНЦІЇ  
СТУДЕНТІВ ТА МОЛОДИХ УЧЕНИХ**

# **«НОВИНИ І ПЕРСПЕКТИВИ МЕДИЧНОЇ НАУКИ»**

**ЗБІРНИК НАУКОВИХ РОБІТ**

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До збірника увійшли тези та статті наукових робіт, надані авторами та авторськими колективами вищих медичних навчальних закладів та науково-дослідних установ України. Наукові роботи висвітлюють сучасні проблеми, новітні технології, напрямки та перспективи розвитку у різних галузях медицини. Рекомендується для студентів, аспірантів, наукових працівників, викладачів вищих медичних навчальних закладів, лікарів.

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місце мають: рецептор людського епідермального фактора росту 2 типу (HER2) та рецептор естрогену (ER), однак, якщо у пухлині наявні обидва рецептори, то така пухлина є зляккіснішою.

S.M.A.Khan, Yu.V.Kozlova, V.V.Koldunov  
**CHANGES OF Cu/Fe RATIO IN THE CEREBELLUM IN FIRST DAY AFTER EXPERIMENTAL BLAST-INDUCED TRAUMATIC BRAIN INJURY**

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 Department of Pathological Physiology

The pathogenesis of blast brain injury and the subsequent course of blast-induced traumatic brain injury (bTBI) is being actively studied by scientists around the world. This is due to the use of explosive devices in military conflicts, particularly in Ukraine today, as a result of which explosions injure both military and civilians. This is due to the use of explosive devices in military conflicts, particularly in Ukraine today, as a result of which explosions injure both military and civilians.

**The aim** of the study was to establish changes in the ratio of Cu/Fe in the cerebellum of rats with bTBI in 1 day of the post-traumatic period.

To achieve this goal, the following tasks are set:

1. Reproduce in an experiment in bTBI rats.
2. Determine the Cu / Fe ratio in the forebrain of control and experimental rats.
3. Using statistical analysis to assess the nature of changes in relevant indicators in the control and experimental groups of animals.
4. Given the Cu / Fe function draw conclusions.

**Materials and methods:** The study involved 12 adult male Wistar rats, weighing 220-270 g, aged 6-7 months, which were kept in standard conditions and diet of the DSMU vivarium. Animals were divided into 2 groups: Sham (n = 6) and experimental (n = 6), which simulated bTBI by a single exposure to a shock wave with an overpressure of  $26.4 \pm 3.6$  kPa. Rats during the experiment were under halothane inhalation anesthesia (Halothan Hoechst AG, Germany) and were fixed in a horizontal position on the abdomen, head to muzzle at a distance of 5 cm. Euthanasia of rats was performed 24 hours a day by halothane overdose. An energy-dispersive X-ray fluorescence method was used to determine the Cu/Fe concentration. To determine the degree and nature of the relationship between the parameters of the study used comparative analysis (Student's t-test) at confidence thresholds  $p < 0,01$ .

**Results.** It was found that on the 1st day of the post-traumatic period the ratio of Cu/Fe in the cerebellum of rats of the experimental group (Cu/Fe = 0.1) was decrease by 24% compared with Sham group data (Cu/Fe = 0,0.131), ( $p < 0,01$ ).

It's known that the role of Fe and Cu for the brain is grand. In the CNS, Fe in several proteins is involved in many important processes such as oxygen transportation, oxidative phosphorylation, myelin production, and the synthesis and metabolism of neurotransmitters. Abnormal iron homeostasis can induce cellular damage through hydroxyl radical production, which can cause the oxidation and modification of lipids, proteins, carbohydrates, and DNA.

In it's turn the copper is an essential element for the activity of a number of physiologically important enzymes. Enzyme-related malfunctions may contribute to severe neurological symptoms and neurological diseases: copper is a component of cytochrome C oxidase, which catalyzes the reduction of oxygen to water, the essential step in cellular respiration.

Thus, we believe that the decrease in the ratio of Cu/Fe in the cerebellum of rats with bTBI indicates the involvement of these biometals in the mechanisms aimed at restoring energy production and reducing neuronal damage and myelination of nerve fibers by free radicals.

**Conclusions.** The obtained changes in the Cu/Fe ratios indicate the involvement of relevant biometals in the processes of compensation for energy disruption and confirm their antioxidant role.

Yu.Lozyniak, Yu.V.Kozlova, N.S.Trysak  
**CHANGES OF RB/ZR RATIO IN THE FOREBRAIN IN EXPERIMENTAL BLAST-INDUCED TRAUMATIC BRAIN INJURY**

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 Department of Pathological Physiology

Damage to the brain is a common cause of injuries, not only in combat but also in peacetime. It ranks second in the structure of morbidity after injuries to the extremities by shells. And due to recent events in Ukraine and around the world, the relevance of the study of the pathogenesis of blast-induced traumatic brain injury (bTBI) is growing. Of particular interest are changes in the balance of macronutrients and micronutrients in the brain. After all, it is known that their role is extremely important for the normal functioning of neurons, and the established imbalance is essential for the diagnosis and treatment of various diseases, including mild bTBI.

**The aim** of the study was to establish changes in the ratio of Rb/Zr in the forebrain of rats with bTBI on the 1st day of the post-traumatic period.

To achieve this goal, the following tasks are set:

- Reproduce in an experiment in bTBI rats.
- Determine the Rb/Zr ratio in the forebrain of control and experimental rats.
- Using statistical analysis to assess the nature of changes in relevant indicators in the control and experimental groups of animals.

Given the Rb/Zr function draw conclusions.

**Materials and methods:** The study involved 12 adult male Wistar rats, weighing 220-270 g, aged 6-7 months, which were kept in standard conditions and diet of the DSMU vivarium. Animals were divided into 2 groups: Sham (n = 6) and experimental (n = 6), which simulated bTBI by a single exposure to a shock wave with an overpressure of  $26.4 \pm 3.6$  kPa. Rats during the experiment were under halothane inhalation anesthesia (Halothan Hoechst AG, Germany) and were fixed in a horizontal position on the abdomen, head to muzzle at a distance of 5 cm. Euthanasia of rats was performed 24 hours a day by halothane overdose. An energy-dispersive X-ray fluorescence method was used to determine the Rb / Zr concentration. To determine the degree and nature of the relationship between the parameters of the study used comparative analysis (Student's t-test) at confidence thresholds  $p < 0,01$ .

**Results.** It was found that on the 1st day of the post-traumatic period there is a decrease in the ratio of Rb/Zr in the forebrain of rats of the experimental group (Rb/Zr = 0.09) by 88% compared with Sham group (Rb/Zr = 0.75), ( $p < 0,01$ ).

To date, the biological role of Zr has not been well studied. However, according to the literature, Rb has the ability to inhibit prostaglandins and histamine, which are pro-inflammatory mediators.

Thus, we believe that the decrease in the Rb/Zr ratio in the experiment is due to the participation of these metals in the mechanisms aimed at suppressing the inflammation that developed in mild bTBI in the acute period.

**Conclusions.** The obtained changes in the Rb/Zr ratio indicate the involvement of relevant trace elements in the inflammatory process caused by brain damage by the blast wave, and confirm their anti-inflammatory effect.