## Реферати

**ЗДОРОВЬЕ КАК ПРАВОВАЯ КАТЕГОРИЯ**
**Стефанчук Р.А., Янчук А.А., Стефанчук М.Н., Стефанчук М.А.**

В статье раскрывается содержание термина «здоровье» с правовой точки зрения. Анализируются различные подходы к освещению понятия здоровья физического лица в качестве неимущественного блага. Особое внимание уделено выяснению содержания понятия «здоровье» в соответствии с открытой концепцией здоровья. Кроме того, в статье приводится критика действующего легального определения здоровья с точки зрения его использования в правовой сфере. Обоснована необходимость включения в содержание понятия здоровья не только соматической, но и психической составляющей. Сделан вывод, что здоровье как личное неимущественное благо должно охватываться имеющимся соматическим и психическим состоянием жизнедеятельности организма, определяется системой качественных и количественных медицинских показателей.

**Ключевые слова:** здоровье, психическое здоровье, соматическое здоровье, неимущественное благо, право на здоровье, правоприменение.

**HEALTH AS A LEGAL CATEGORY**
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The article discloses the meaning of the term "health" from the legal point of view. Different approaches to disclosure of the concept of the physical person's health as a non-property benefit are analyzed. Particular attention is paid to clarifying the meaning of the concept of "health" in accordance with the open concept of health. In addition, the article criticizes the current legal definition of health from the point of view of its use in the legal field. The necessity of including not only the somatic, but also the psychic component into the notion of health content is substantiated. It is concluded that health as a personal non-property benefit should be covered by the existing somatic and mental state of the body, which is determined by the system of qualitative and quantitative medical indices.

**Key words:** health, mental health, somatic health, non-property benefit, right to health, law enforcement.

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# ZINC DEFICIENCY IN PATIENTS WITH ACUTE CEREBRAL INSUFFICIENCY REQUIRING INTENSIVE CARE: RISK FACTORS AND PREDICTIVE MARKERS

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A double reporting observational clinical study was conducted with the participation of 60 patients with acute cerebral insufficiency requiring intensive care. The following indicators were recorded for all patients: sex, age, clinical characteristics of the patient, drug support and zinc content in the blood. Among the examined patients, the frequency of registration of hypozincemia was equal to 35%. It was established that in these patients the sex, age, assessments of depth of consciousness disorders and the severity of the patient's condition, the presence of features of the syndrome of the systemic inflammatory response, gastrointestinal insufficiency, arterial perfusion pressure, need for artificial ventilation of the lungs and appointment of ataractics are risk factors for zinc deficiency occurrence, on the basis of which the model for predicting the development of zinc-deficient state was formed.

**Key words:** zinc, acute cerebral insufficiency, intensive therapy, prediction.

*The study is a fragment of the research project "Optimizing the quality of anaesthesia and intensive care of patients based on age and gender dimorphism clinical and functional, immune and metabolic changes", state registration No. 0114U006326.*

Zinc is an essential bio-regulator of basic metabolic reactions and gene expression. The importance of the biological role of zinc is demonstrated in all organs and tissues. In particular, zinc interferes with damage of the structures of the blood-brain barrier, modulates the activity of receptors in case of synaptic transmission, the cognitive activity of the brain, and reparative processes of the mucous membrane of the gastrointestinal tract [4, 6].

Most of the patients treated in the intensive care (IC) departments are the patients with acute cerebral insufficiency. Annually in the world about 7 million of cases of the acute cerebrovascular disorders and 1,4 million cases of craniocerebral trauma are registered being the main causes of primary acute cerebral insufficiency (ACI), are registered. At the same time, hypoxia and ischemia, which are universal pathogenetic mechanisms of development of critical states, cause the secondary ACI, facilitate the damaging of the gastrointestinal tract, impair the physiological intake of nutrients, including - zinc, forming the gastrointestinal insufficiency (GIN), which occurs in such patients in 62% of cases [2, 3, 6, 14].

**The purpose** of the study was to optimize the prediction of the development of zinc deficiency in patients with acute cerebral insufficiency requiring intensive care.

**Material and methods.** An observational clinical study was conducted involving 60 patients with primary ACI who needed IC. The study included patients aged 18 and over with acute cerebrovascular disorders, craniocerebral traumas (sections of the International Classification of Diseases, the X revision, "Cerebrovascular syndromes in cerebrovascular diseases (G46), " Head traumas "(S00-S09), respectively),

which required the prosthesis of the vital functions in the conditions of IC departments. The criteria for exclusion from the study were the presence of gastrointestinal diseases, microelementoses and dermatological diseases in the past history.

Prior to the conduction of the study the patients or their legal representatives have been asked to provide the written statements that they were informed and that they agreed to take part in the study. During the study, the patients' rights were respected in accordance with the requirements of the Helsinki Declaration of 1975, as amended in 2005.

The gender, age, clinical characteristics of the patient, drug support, zinc content in the blood were fixed and recorded for all patients. In the process of the study; the level of consciousness was determined on the basis of the Full Outline of UnResponsiveness (FOUR) scale; the presence or absence of GIN was assessed according to the scale of the Working Group of the European Society of Intensive Medicine; the severity of the state was evaluated on the ground of the Simplified Acute Physiology Score (SAPS); the blood pressure was measured by non-invasive method of M.S. Korotkov; the concentration of zinc in the blood was determined by the colorimetric method [8, 9, 11, 15].

The lower boundary of normal zinc content in blood was equal to 13 mmol /l [1].

Depending on the content of zinc in the blood, the patients were divided into 2 groups. The 1st group, which was the main one (n = 21), included the patients with the zinc content less than 13 mmol /l; the 2nd group, which was the comparative one (n = 39), included the patients with the zinc content equal to or higher than the specified limit.

Descriptive statistics data were presented in the form of percentages and their absolute values to the extent of the group that was investigated, that is "% (n / N)". The statistical analysis was carried out by the regression analysis using the Normalized Intensity Indicator (NIP) method [5], which provided:

- calculation of the average frequency of detection of a specific feature in both groups of study as a whole ($F_{ave}$);
- calculation of the NIP for each clinical feature from the study groups ($NIP_{1,2}$) by dividing the frequency of the feature in each of the study groups ($F_{1,2}$) by the $F_{ave}$;
- calculation of the general group NIP ($NIP_{gen}$) by multiplying all NIPs and then by dividing them by the number of features;
- calculation of the features realization risk (FRR) in each group by multiplying $F_{ave}$ by $NIP_{gen}$.

**Results of the study and their discussion**. Among the examined patients, the frequency of registration of hypozincemia was equal to 35% (21/60). The results of the detection of the frequencies of clinical features that were studied are shown in table 1

Table 1

**Frequencies of detection of clinical features that were studied in the study groups**

| No | Feature | Total in the study groups, % (n/N) | Group 1, % (n/N) | Group 2, % (n/N) |
|---|---|---|---|---|
| 1. | Male sex of the patient | 63 (38/60) | 86 (18/21) | 51 (20/39) |
| 2. | Age over 60 years | 73 (44/60) | 95 (20/21) | 62 (24/39) |
| 3. | Signs of the syndrome of the systemic inflammatory response | 50 (30/60) | 86 (18/21) | 31 (12/39) |
| 4. | Presence of GIN | 57 (34/60) | 95 (20/21) | 36 (14/39) |
| 5. | Arterial perfusion pressure is less than 89 mmHg | 30 (18/60) | 38 (8/21) | 26 (10/39) |
| 6. | Conduction of artificial ventilation of lungs | 40 (24/60) | 48 (10/21) | 36 (14/39) |
| 7. | Need for appointment of ataractic drugs | 43 (26/60) | 57 (12/21) | 36 (14/39) |
| 8. | Level of consciousness is less than 10 points according to the FOUR scale | 63 (38/60) | 86 (18/21) | 51 (20/39) |
| 9. | Severity of the SAPS is more than 9 points | 67 (40/60) | 955 (20/21) | 51 (20/39) |

Taking into account the distribution of the frequencies of registration of clinical features depending on the presence of zinc deficiency, these features can be considered as the risk factors for zinc deficiency in patients with ACI. On their basis a predictive model of the risk of development of zinc-deficient state in a specified contingent of patients may be formed. The mass fraction of each of the features while predicting such a model can be established by calculating the NIP for each of the groups (table 2).

Since the $NIP_1$ indicator was calculated for patients with hypozincemia and the $NIP_2$ indicator - for patients with normal zinc concentration in blood, then the $NIP_1$ ratios can be considered to demonstrate the increase of the risk of developing zinc deficiency in the presence of a certain clinical feature and the $NIP_2$ ratios can be considered to demonstrate the decrease in the absence of such feature. The calculation of $NIP_{gen}$ makes it possible to determine the mean deviation of the frequency of development of zinc-

deficiency state in a particular patient from the average population value, and further calculation of FRR allows to directly calculate the risk of realization of this state in a particular patient at a specific time point.

For example, there is a conditional male patient (NIP = 1.4), aged 66 years (NIP = 1.3), with the features of a systemic inflammatory response syndrome (NIP = 1.7), GIN (NIP = 1.7), whose arterial perfusion pressure is equal to 96 mmHg (NIP = 0.9). The patient undergoes artificial ventilation of the lungs (NIP = 1.2), sedation with the ataractics for the synchronization with the device of artificial ventilation of the lungs (NIP = 1.3), the level of consciousness according to the FOUR sale is equal to 8 points (NIP = 1.4), the severity of the patient's condition according to the SAPS scale is equal to 15 points (NIP = 1.4). The number of the indicators, which are to be registered, is equal to 9.

Table 2

**Value of NIP for clinically significant features of the risk of developing zinc deficiency**

| No | Feature | $NIP_1$ | $NIP_2$ |
|---|---|---|---|
| 1. | Male sex of the patient | 1.4 | 0.8 |
| 2. | Age over 60 years | 1.3 | 0.8 |
| 3. | Signs of the syndrome of the systemic inflammatory response | 1.7 | 0.6 |
| 4. | Presence of GIN | 1.7 | 0.6 |
| 5. | Arterial perfusion pressure is less than 89 mmHg | 1.3 | 0.9 |
| 6. | Conduction of artificial ventilation of lungs | 1.2 | 0.9 |
| 7. | Need for appointment of ataractic drugs | 1.3 | 0.8 |
| 8. | Level of consciousness is less than 10 points according to the FOUR scale | 1.4 | 0.8 |
| 9. | Severity of the SAPS is more than 9 points | 1.4 | 0.8 |

The $NIP_{gen}$ is calculated for the development of zinc deficiency in this patient by multiplying the NIP for each of the indicators, followed by the dividing the obtained amount by the number of features that are registered. In this case, such indicator will be equal to 1.6. The multiplication of such indicator by the average population frequency of zinc deficiency (35%) determines the FRR of the development of zinc deficiency for this patient, which will be equal to 56%.

The literature data substantiate the predictive value of these clinical criteria. It is known that the decrease in zinc content is negatively reflected in the results of the assessment of the level of consciousness and severity of the patient's condition [14], and the ataractic agents block the release of cell zinc, reducing its free concentration in the blood [7]. Also it is known that there is a connection between the disorder of the zinc content and systemic inflammation, age or sex [10, 12, 13].

## Conclusions

Thus, optimization of prediction of the development of zinc deficiency in ACI patients who require intensive care has been achieved: it has been established that characteristics of sex, age, parameters of the respiratory, hemodynamic, gastrointestinal, nervous systems, state severity, drug support can be used to predict the development of zinc deficiency in these patients.

*Prospects for further studies lie in the assessment of the effectiveness of the developed methodology in the clinical practice.*

## References

1. Alyeva TU, Fedorov SV, Svyrydov SV. Kontsentratsiya tsinka i medi v plazme krovi u bolnykh s gnoynymi ranami myagkikh tkaney. Anesteziologiya i reanimatologiya. 2010; 3:8-12. [in Russian]
2. Delva MYu, Lytvynenko NV, Delva TT. Insulty ta monohenna patolohiya (etiopatohenez, klinika, diahnostyka, likuvannya, profilaktyka) : navch. posib. dlya likariv-interniv i likariv - slukhachiv zakladiv (fakultetiv) pislyadyplomnoyi osvity MOZ Ukrayiny. Poltava: Ukrpromtorhservis, 2016. 104 s. [in Ukrainian]
3. Lekmanov AU, Yerpuleva YuV. Ispolzovaniye immunnogo pitaniya u patsiyentov v kriticheskikh sostoyaniyakh (obzor literatury). Vestnik intensivnoy terapii. 2010;3:68-71. [in Russian]
4. Marushko YuV, Asonov AO. Rol defitsytu tsynku u klinichniy praktytsi. Novaya meditsina tysyacheletiya. 2011;3:3-9. [in Ukrainian]
5. Stepanchenko KA. Prognozirovaniye riska razvitiya golovnoy boli napryazheniya u podrostkov. Zaporozhskiy meditsinskiy zhurnal. 2016;4(97):51–4. [in Russian]
6. Teriv PS, Shkurupiy DA. Tsynk-zalezhni vplyvy pry intensyvniy terapiyi u khvorykh z nevrolohichnoyu patolohiyeyu. Visnyk problem biolohiyi i medytsyny. 2014;2,3(109):48-52. [in Ukrainian]
7. Blakemore LJ, Trombley PQ. Zinc as a Neuromodulator in the Central Nervous System with a Focus on the Olfactory Bulb. Front Cell Neurosci. 2017 Sep 21; 11:297.
8. Bruno MA, Ledoux D, Lambermont B, Damas F, Schnakers C, Vanhaudenhuyse A, et al. Comparison of the Full Outline of UnResponsiveness and Glasgow Liege Scale/Glasgow Coma Scale in an intensive care unit population. Neurocrit Care. 2011 Dec; 15(3): 447-53.
9. Burtis CA, Ashwood ER, Bruns DE. Tietz Textbook of Clinical Chemistry and Molecular Diagnostics. 5th ed. St. Louis: Missouri; 2013. 2256 p.

10. Cabrera ÁJR. Zinc, aging, and immunosenescence: an overview. Pathobiol Aging Age Relat Dis. 2015 Feb; 5: 10.
11. Desa K, Peric M, Husedzinovic I, Sustic A, Korusic A, Karadza V, et al. Prognostic performance of the Simplified Acute Physiology Score II in major Croatian hospitals: a prospective multicenter study. Croat Med J. 2012 Oct; 53(5): 442-9.
12. Ghasemi A, Zahediasl S, Hosseini-Esfahani F, Azizi F. Gender differences in the relationship between serum zinc concentration and metabolic syndrome. Ann Hum Biol. 2014 Sep-Oct; 41(5): 436-42.
13. Kartheek K, Baliga BS, Subodhshetty, Mithra P, Yadav C. Nutrient deficiencies (Copper, Zinc, Iron, Magnesium) among children with SIRS/sepsis-a hospital based cross sectional study. Int J Contemp Pediatr. 2017 May; 4(3): 933-8.
14. Khazdouz M, Mazidi M, Ehsaei MR, Ferns G, Kengne AP, Norouzy AR. Impact of Zinc Supplementation on the Clinical Outcomes of Patients with Severe Head Trauma: A Double-Blind Randomized Clinical Trial. J Diet Suppl. 2018 Jan; 15(1): 1-10.
15. Reintam BA, Malbrain MLNG, Starkopf J, Fruhwald S, Jakob SM, De Waele J, et al. Gastrointestinal function in intensive care patients: terminology, definitions and management. Recommendations of the ESICM Working Group on Abdominal Problems. Intensive Care Medicine. 2012; 38(3): 384–94.

## Реферати

**ДЕФІЦИТ ЦИНКУ У ПАЦІЄНТІВ З ГОСТРОЮ ЦЕРЕБРАЛЬНОЮ НЕДОСТАТНІСТЮ, ЯКІ ПОТРЕБУЮТЬ ІНТЕНСИВНОЇ ТЕРАПІЇ: ФАКТОРИ РИЗИКУ І ПРОГНОСТИЧНІ МАРКЕРИ**

**Терів П.С., Удовицька Н.О.**

Проведене подвійне констатуюче обсерваційне клінічне дослідження за участю 60 пацієнтів з гострою церебральною недостатністю які потребували інтенсивної терапії. У всіх пацієнтів фіксували стать, вік, клінічні характеристики пацієнта, медикаментозну підтримку, вміст цинку в крові. Серед обстежених пацієнтів частота реєстрації гіпоцинкемії становила 35%. Встановлено, що у зазначених хворих стать, вік, оцінки глибини порушень свідомості, тяжкості стану пацієнта, наявність ознак синдрому системної запальної відповіді, гастроінтестинальної недостатності, артеріальний перфузійний тиск, потребу в штучній вентиляції легень і призначенні атарактиків є факторами ризику виникнення цинкового дефіциту, на основі яких було створено модель прогнозування розвитку цинк-дефіцитного стану.

**Ключові слова:** цинк, гостра церебральна недостатність, інтенсивна терапія, прогноз.

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**ДЕФИЦИТ ЦИНКА У ПАЦИЕНТОВ С ОСТРОЙ ЦЕРЕБРАЛЬНОЙ НЕДОСТАТОЧНОСТЬЮ, НУЖДАЮЩИХСЯ В ИНТЕНСИВНОЙ ТЕРАПИИ: ФАКТОРЫ РИСКА И ПРОГНОСТИЧЕСКИХ МАРКЕРЫ**

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Проведенное двойное констатирующее обсервационное клиническое исследование с участием 60 пациентов с острой церебральной недостаточностью, нуждающихся в интенсивной терапии. У всех пациентов фиксировали пол, возраст, клинические характеристики пациента, медикаментозную поддержку, содержание цинка в крови. Среди обследованных пациентов частота регистрации гипоцинкемии составляла 35%. Установлено, что у указанных больных пол, возраст, оценки глубины нарушений сознания, тяжести состояния пациента, наличие признаков синдрома системного воспалительного ответа, гастроинтестинальной недостаточности, артериальное перфузионное давление, потребность в искусственной вентиляции легких и назначении атарактиков являются факторами риска возникновения цинкового дефицита, на основе которых была создана модель прогнозирования развития цинк-дефицитного состояния.

Ключевые слова: цинк, острая церебральная недостаточность, интенсивная терапия, прогноз.

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# CLINICOMORPHOLOGICAL CHARACTERISTICS OF THE WOUND PROCESS AT THE EARLY POSTOPERATIVE PERIOD AFTER RADICAL URANOSTAPHYLOPLASTY

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The purpose of the paper was to study the clinical situation and the morphological structure of the biopsy material of the hard palate mucoperiosteal grafts in children with the congenital cleft palate before surgery and at the early postoperative period after radical uranostaphyloplasty. The study of clinical characteristics and general somatic state of children with this pathology before operative intervention enables to reveal the marked anatomical and functional disorders. The study of the wound process at the early postoperative period after radical uranostaphyloplasty with the help of morphological structure of the biopsy material of the hard palate mucoperiosteal grafts enables to predict the degree of probability of the formation of dense scar and make individual plan of treatment-and-prophylactic and rehabilitation measures for this category of patients.

**Keywords:** children, congenital cleft palate, reparative regeneration.

*The work is a fragment of the research project "Integrative-differentiated substantiation of selecting the best methods for surgical interventions and the volume of therapeutic measures in the surgical pathology of the maxillofacial area", state registration No. 0116U003821.*

Congenital malformations of the maxillofacial area are the most common among other facial defects where congenital cleft lip and palate account for 90% of all cases. The degree of severity of anatomical abnormalities of the palate significantly affects the progress of the postoperative period, the frequency of occurrence and severity of complications, differentiation of the upper jaw bone frame [1, 2, 6, 9].