

# GEORGIAN MEDICAL NEWS

---

ISSN 1512-0112

NO 6 (351) Июнь 2024

---

ТБИЛИСИ - NEW YORK



ЕЖЕМЕСЯЧНЫЙ НАУЧНЫЙ ЖУРНАЛ

Медицинские новости Грузии  
საქართველოს სამედიცინო სიახლენი

## GEORGIAN MEDICAL NEWS

Monthly Georgia-US joint scientific journal published both in electronic and paper formats of the Agency of Medical Information of the Georgian Association of Business Press.  
Published since 1994. Distributed in NIS, EU and USA.

**GMN: Georgian Medical News** is peer-reviewed, published monthly journal committed to promoting the science and art of medicine and the betterment of public health, published by the GMN Editorial Board since 1994. GMN carries original scientific articles on medicine, biology and pharmacy, which are of experimental, theoretical and practical character; publishes original research, reviews, commentaries, editorials, essays, medical news, and correspondence in English and Russian.

GMN is indexed in MEDLINE, SCOPUS, PubMed and VINITI Russian Academy of Sciences. The full text content is available through EBSCO databases.

**GMN: Медицинские новости Грузии** - ежемесячный рецензируемый научный журнал, издаётся Редакционной коллегией с 1994 года на русском и английском языках в целях поддержки медицинской науки и улучшения здравоохранения. В журнале публикуются оригинальные научные статьи в области медицины, биологии и фармации, статьи обзорного характера, научные сообщения, новости медицины и здравоохранения. Журнал индексируется в MEDLINE, отражён в базе данных SCOPUS, PubMed и ВИНТИ РАН. Полнотекстовые статьи журнала доступны через БД EBSCO.

**GMN: Georgian Medical News** – საქართველოს სამედიცინო სიახლენი – არის ყოველთვიური სამეცნიერო სამედიცინო რეცენზირებადი ჟურნალი, გამოიცემა 1994 წლიდან, წარმოადგენს სარედაქციო კოლეგიისა და აშშ-ის მეცნიერების, განათლების, ინდუსტრიის, ხელოვნებისა და ბუნებისმეტყველების საერთაშორისო აკადემიის ერთობლივ გამოცემას. GMN-ში რუსულ და ინგლისურ ენებზე ქვეყნდება ექსპერიმენტული, თეორიული და პრაქტიკული ხასიათის ორიგინალური სამეცნიერო სტატიები მედიცინის, ბიოლოგიისა და ფარმაციის სფეროში, მიმოხილვითი ხასიათის სტატიები.

ჟურნალი ინდექსირებულია MEDLINE-ის საერთაშორისო სისტემაში, ასახულია SCOPUS-ის, PubMed-ის და ВИНТИ РАН-ის მონაცემთა ბაზებში. სტატიების სრული ტექსტი ხელმისაწვდომია EBSCO-ს მონაცემთა ბაზებიდან.

### WEBSITE

[www.geomednews.com](http://www.geomednews.com)

## К СВЕДЕНИЮ АВТОРОВ!

При направлении статьи в редакцию необходимо соблюдать следующие правила:

1. Статья должна быть представлена в двух экземплярах, на русском или английском языках, напечатанная через **полтора интервала на одной стороне стандартного листа с шириной левого поля в три сантиметра**. Используемый компьютерный шрифт для текста на русском и английском языках - **Times New Roman (Кириллица)**, для текста на грузинском языке следует использовать **AcadNusx**. Размер шрифта - **12**. К рукописи, напечатанной на компьютере, должен быть приложен CD со статьей.

2. Размер статьи должен быть не менее десяти и не более двадцати страниц машинописи, включая указатель литературы и резюме на английском, русском и грузинском языках.

3. В статье должны быть освещены актуальность данного материала, методы и результаты исследования и их обсуждение.

При представлении в печать научных экспериментальных работ авторы должны указывать вид и количество экспериментальных животных, применявшиеся методы обезболивания и усыпления (в ходе острых опытов).

4. К статье должны быть приложены краткое (на полстраницы) резюме на английском, русском и грузинском языках (включающее следующие разделы: цель исследования, материал и методы, результаты и заключение) и список ключевых слов (key words).

5. Таблицы необходимо представлять в печатной форме. Фотокопии не принимаются. **Все цифровые, итоговые и процентные данные в таблицах должны соответствовать таковым в тексте статьи**. Таблицы и графики должны быть озаглавлены.

6. Фотографии должны быть контрастными, фотокопии с рентгенограмм - в позитивном изображении. Рисунки, чертежи и диаграммы следует озаглавить, пронумеровать и вставить в соответствующее место текста **в tiff формате**.

В подписях к микрофотографиям следует указывать степень увеличения через окуляр или объектив и метод окраски или импрегнации срезов.

7. Фамилии отечественных авторов приводятся в оригинальной транскрипции.

8. При оформлении и направлении статей в журнал МНГ просим авторов соблюдать правила, изложенные в «Единых требованиях к рукописям, представляемым в биомедицинские журналы», принятых Международным комитетом редакторов медицинских журналов - <http://www.spinesurgery.ru/files/publish.pdf> и [http://www.nlm.nih.gov/bsd/uniform\\_requirements.html](http://www.nlm.nih.gov/bsd/uniform_requirements.html) В конце каждой оригинальной статьи приводится библиографический список. В список литературы включаются все материалы, на которые имеются ссылки в тексте. Список составляется в алфавитном порядке и нумеруется. Литературный источник приводится на языке оригинала. В списке литературы сначала приводятся работы, написанные знаками грузинского алфавита, затем кириллицей и латиницей. Ссылки на цитируемые работы в тексте статьи даются в квадратных скобках в виде номера, соответствующего номеру данной работы в списке литературы. Большинство цитированных источников должны быть за последние 5-7 лет.

9. Для получения права на публикацию статья должна иметь от руководителя работы или учреждения визу и сопроводительное отношение, написанные или напечатанные на бланке и заверенные подписью и печатью.

10. В конце статьи должны быть подписи всех авторов, полностью приведены их фамилии, имена и отчества, указаны служебный и домашний номера телефонов и адреса или иные координаты. Количество авторов (соавторов) не должно превышать пяти человек.

11. Редакция оставляет за собой право сокращать и исправлять статьи. Корректур авторам не высылаются, вся работа и сверка проводится по авторскому оригиналу.

12. Недопустимо направление в редакцию работ, представленных к печати в иных издательствах или опубликованных в других изданиях.

**При нарушении указанных правил статьи не рассматриваются.**

## REQUIREMENTS

Please note, materials submitted to the Editorial Office Staff are supposed to meet the following requirements:

1. Articles must be provided with a double copy, in English or Russian languages and typed or computer-printed on a single side of standard typing paper, with the left margin of 3 centimeters width, and 1.5 spacing between the lines, typeface - **Times New Roman (Cyrillic)**, print size - 12 (referring to Georgian and Russian materials). With computer-printed texts please enclose a CD carrying the same file titled with Latin symbols.

2. Size of the article, including index and resume in English, Russian and Georgian languages must be at least 10 pages and not exceed the limit of 20 pages of typed or computer-printed text.

3. Submitted material must include a coverage of a topical subject, research methods, results, and review.

Authors of the scientific-research works must indicate the number of experimental biological species drawn in, list the employed methods of anesthetization and soporific means used during acute tests.

4. Articles must have a short (half page) abstract in English, Russian and Georgian (including the following sections: aim of study, material and methods, results and conclusions) and a list of key words.

5. Tables must be presented in an original typed or computer-printed form, instead of a photocopied version. **Numbers, totals, percentile data on the tables must coincide with those in the texts of the articles.** Tables and graphs must be headed.

6. Photographs are required to be contrasted and must be submitted with doubles. Please number each photograph with a pencil on its back, indicate author's name, title of the article (short version), and mark out its top and bottom parts. Drawings must be accurate, drafts and diagrams drawn in Indian ink (or black ink). Photocopies of the X-ray photographs must be presented in a positive image in **tiff format**.

Accurately numbered subtitles for each illustration must be listed on a separate sheet of paper. In the subtitles for the microphotographs please indicate the ocular and objective lens magnification power, method of coloring or impregnation of the microscopic sections (preparations).

7. Please indicate last names, first and middle initials of the native authors, present names and initials of the foreign authors in the transcription of the original language, enclose in parenthesis corresponding number under which the author is listed in the reference materials.

8. Please follow guidance offered to authors by The International Committee of Medical Journal Editors guidance in its Uniform Requirements for Manuscripts Submitted to Biomedical Journals publication available online at: [http://www.nlm.nih.gov/bsd/uniform\\_requirements.html](http://www.nlm.nih.gov/bsd/uniform_requirements.html)  
[http://www.icmje.org/urm\\_full.pdf](http://www.icmje.org/urm_full.pdf)

In GMN style for each work cited in the text, a bibliographic reference is given, and this is located at the end of the article under the title "References". All references cited in the text must be listed. The list of references should be arranged alphabetically and then numbered. References are numbered in the text [numbers in square brackets] and in the reference list and numbers are repeated throughout the text as needed. The bibliographic description is given in the language of publication (citations in Georgian script are followed by Cyrillic and Latin).

9. To obtain the rights of publication articles must be accompanied by a visa from the project instructor or the establishment, where the work has been performed, and a reference letter, both written or typed on a special signed form, certified by a stamp or a seal.

10. Articles must be signed by all of the authors at the end, and they must be provided with a list of full names, office and home phone numbers and addresses or other non-office locations where the authors could be reached. The number of the authors (co-authors) must not exceed the limit of 5 people.

11. Editorial Staff reserves the rights to cut down in size and correct the articles. Proof-sheets are not sent out to the authors. The entire editorial and collation work is performed according to the author's original text.

12. Sending in the works that have already been assigned to the press by other Editorial Staffs or have been printed by other publishers is not permissible.

**Articles that Fail to Meet the Aforementioned  
Requirements are not Assigned to be Reviewed.**

## ავტორთა საქურაღებოლ!

რედაქციაში სტატიის წარმოდგენისას საჭიროა დაიცვათ შემდეგი წესები:

1. სტატია უნდა წარმოადგინოთ 2 ცალად, რუსულ ან ინგლისურ ენებზე დაბეჭდილი სტანდარტული ფურცლის 1 გვერდზე, 3 სმ სიგანის მარცხენა ველისა და სტრიქონებს შორის 1,5 ინტერვალის დაცვით. გამოყენებული კომპიუტერული შრიფტი რუსულ და ინგლისურენოვან ტექსტებში - **Times New Roman (Кириллица)**, ხოლო ქართულენოვან ტექსტში საჭიროა გამოვიყენოთ **AcadNusx**. შრიფტის ზომა – 12. სტატიას თან უნდა ახლდეს CD სტატიით.

2. სტატიის მოცულობა არ უნდა შეადგენდეს 10 გვერდზე ნაკლებს და 20 გვერდზე მეტს ლიტერატურის სიის და რეზიუმეების (ინგლისურ, რუსულ და ქართულ ენებზე) ჩათვლით.

3. სტატიაში საჭიროა გაშუქდეს: საკითხის აქტუალობა; კვლევის მიზანი; საკვლევი მასალა და გამოყენებული მეთოდები; მიღებული შედეგები და მათი განსჯა. ექსპერიმენტული ხასიათის სტატიების წარმოდგენისას ავტორებმა უნდა მიუთითონ საექსპერიმენტო ცხოველების სახეობა და რაოდენობა; გაუტკივარებისა და დაძინების მეთოდები (მწვავე ცდების პირობებში).

4. სტატიას თან უნდა ახლდეს რეზიუმე ინგლისურ, რუსულ და ქართულ ენებზე არანაკლებ ნახევარი გვერდის მოცულობისა (სათაურის, ავტორების, დაწესებულების მითითებით და უნდა შეიცავდეს შემდეგ განყოფილებებს: მიზანი, მასალა და მეთოდები, შედეგები და დასკვნები; ტექსტუალური ნაწილი არ უნდა იყოს 15 სტრიქონზე ნაკლები) და საკვანძო სიტყვების ჩამონათვალი (key words).

5. ცხრილები საჭიროა წარმოადგინოთ ნაბეჭდი სახით. ყველა ციფრული, შემაჯამებელი და პროცენტული მონაცემები უნდა შეესაბამებოდეს ტექსტში მოყვანილს.

6. ფოტოსურათები უნდა იყოს კონტრასტული; სურათები, ნახაზები, დიაგრამები - დასათაურებული, დანომრილი და სათანადო ადგილას ჩასმული. რენტგენოგრამების ფოტოასლები წარმოადგინეთ პოზიტიური გამოსახულებით **tiff** ფორმატში. მიკროფოტოსურათების წარწერებში საჭიროა მიუთითოთ ოკულარის ან ობიექტივის საშუალებით გადიდების ხარისხი, ანათალების შედეგის ან იმპრეგნაციის მეთოდი და აღნიშნოთ სურათის ზედა და ქვედა ნაწილები.

7. სამამულო ავტორების გვარები სტატიაში აღინიშნება ინიციალების თანდართვით, უცხოურისა – უცხოური ტრანსკრიპციით.

8. სტატიას თან უნდა ახლდეს ავტორის მიერ გამოყენებული სამამულო და უცხოური შრომების ბიბლიოგრაფიული სია (ბოლო 5-8 წლის სიღრმით). ანბანური წყობით წარმოდგენილ ბიბლიოგრაფიულ სიაში მიუთითეთ ჯერ სამამულო, შემდეგ უცხოელი ავტორები (გვარი, ინიციალები, სტატიის სათაური, ჟურნალის დასახელება, გამოცემის ადგილი, წელი, ჟურნალის №, პირველი და ბოლო გვერდები). მონოგრაფიის შემთხვევაში მიუთითეთ გამოცემის წელი, ადგილი და გვერდების საერთო რაოდენობა. ტექსტში კვადრატულ ფხიხლებში უნდა მიუთითოთ ავტორის შესაბამისი N ლიტერატურის სიის მიხედვით. მიზანშეწონილია, რომ ციტირებული წყაროების უმეტესი ნაწილი იყოს 5-6 წლის სიღრმის.

9. სტატიას თან უნდა ახლდეს: ა) დაწესებულების ან სამეცნიერო ხელმძღვანელის წარდგინება, დამოწმებული ხელმოწერითა და ბეჭდით; ბ) დარგის სპეციალისტის დამოწმებული რეცენზია, რომელშიც მითითებული იქნება საკითხის აქტუალობა, მასალის საკმაობა, მეთოდის სანდოობა, შედეგების სამეცნიერო-პრაქტიკული მნიშვნელობა.

10. სტატიის ბოლოს საჭიროა ყველა ავტორის ხელმოწერა, რომელთა რაოდენობა არ უნდა აღემატებოდეს 5-ს.

11. რედაქცია იტოვებს უფლებას შეასწოროს სტატია. ტექსტზე მუშაობა და შეჯერება ხდება საავტორო ორიგინალის მიხედვით.

12. დაუშვებელია რედაქციაში ისეთი სტატიის წარდგენა, რომელიც დასაბეჭდად წარდგენილი იყო სხვა რედაქციაში ან გამოქვეყნებული იყო სხვა გამოცემებში.

აღნიშნული წესების დარღვევის შემთხვევაში სტატიები არ განიხილება.

Tan Minh Hoang, Hung Dinh Kieu, Vu Nguyen, Trung Kien Tran, Tan Chor Ngee, Ha Dai Duong. CLINICAL AND IMAGING OUTCOMES OF XLIF SURGERY FOR LUMBAR SPINAL STENOSIS.....	6-11
Nino Totadze, Rishu Bansal. NUTRITION AND PHYSICAL ACTIVITY OF PREGNANT WOMEN INCLUDING BARIATRIC SURGERY.....	12-17
Arpine Muradyan. THE EFFECT OF DIFFERENT FITNESS TRAINING PROGRAMS AND FREQUENCY ON HEALTH-RELATED QUALITY OF LIFE.....	18-22
Serhii Terekhov, Andrii Proshchenko, Nina Proshchenko. ANALYSIS OF THE USE OF COMPLEX DIGITAL TECHNOLOGIES IN THE DIAGNOSIS AND TREATMENT OF OCCLUSAL ANOMALIES.....	23-32
Vahe Ashot Ter-Minasyan. FERTILITY FUNCTIONS IN 4VHPV VACCINATED ARMENIAN COHORT.....	33-37
Alaa S. Mahdi, Ahmed H. Salman, Zahraa K. Al-Hassani, Hayder A.H. Jalil. DECODING PEDIATRIC MENINGITIS UNRAVELING THE INTRICACIES OF ANTIMICROBIAL RESISTANCE IN IRAQI PEDIATRIC PATIENTS.....	38-43
Rajab A. Alzahrani, Soliman shreed Soliman, Saadi Rabea Saadi AlGhamdi, Mohammed Abdullah S Alzahrani, Abdullah Mohammed B Alghamdi, Ibrahim Abdulaziz A Alghamdi, Essam Mohammed S Alghamdi, Musab Mohammed B Alzahrani, Yahya Ahmed Salem Alzahrani, Mujtaba Alrayah Fadlalla, Mohammed A. Alghamdi. EFFECT OF ENLARGED ADENOIDS AND TONSILS ON BLOOD OXYGEN SATURATION IN AL BAHA, SAUDI ARABIA.....	44-48
Sivakumar Palanisamy, Priyatharshni Subramani, Prabhu Narasimman, Manikkampatti Palanisamy Murugesan. ADVANCEMENT IN ALPHA-SYNUCLEIN PROTEOMICS: EXPLORING ANALYTICAL TECHNIQUES AND THEIR CLINICAL IMPLICATIONS IN PARKINSON'S DISEASE.....	49-54
Teremetskiy VI, Frolova OH, Batryn OV, Myrza SS, Matviichuk AV, Ryzhenko OS. VECTORS OF DEVELOPMENT OF THE UNIFIED MEDICAL INFORMATION SPACE.....	55-60
Rajaa Hussein Fayadh, Rawnaq Thamer Kadium, H. N. K. AL-Salman, Falah Hassan Shari. HPLC METHOD FOR THE QUANTIFICATION OF SOME ACTIVE FLAVONOIDS IN ETHYL ACETATE EXTRACT OF LEAVES OF BUTEA MONOSPERMA LINN.....	61-64
Tchernev G, Ivanov L, Broshtilova V. MULTIPLE KERATINOCYTIC CANCERS AFTER INTAKE OF ANTIHYPERTENSIVES (LISINOPRIL/ BISOPROLOL/HCT) AND ANTIARRHYTHMICS (PROPAFENONE): THE IMPORTANT NEW LINKS TO THE NITROSO-CONTAMINATION AND THE METABOLIC REPROGRAMMING OF THE FUTURE CANCER CELL.....	65-71
Maryam A. Faiq, Nehad N. Hilal, Mohammed T. Dawood. LEVELS OF OSTEOPROTEGERIN AND IRISIN IN POSTMENOPAUSAL OSTEOPOROSIS WOMEN.....	72-75
Tianhua Du, Guangren Zhou, Shouzhi Wu, Haining Ni. UNDERSTAND THE CURRENT SITUATION OF STUDENTS' PHYSICAL FITNESS TEST AND MEASURES TO IMPROVE THEIR PHYSICAL FITNESS TEST SCORES.....	76-79
Sosonna L.O, Boiagina O.D, Yurevych N.O, Schevtsov O.O, Avilova O.V, Konoval N.S, Sukhina I.S. INDIVIDUAL ANATOMICAL VARIABILITY OF THE ANTEROPOSTERIOR LATERAL DIMENSIONS OF THE FACIAL SKULL IN MATURE ADULTS.....	80-84
Zhanat Ispayeva, Raikhan Bekmagambetova, Mereke Mustafina, Elena Kovzel, Galiya Tusupbekova, Marina Morenko, Timur Saliev, Shynar Tanabayeva, Ildar Fakhraiyev. RELIABILITY AND VALIDITY OF THE KAZAKH-LANGUAGE ACT QUESTIONNAIRE AS AN ASTHMA CONTROL TOOL.....	85-90
Khitaryan D.S, Stepanyan L.S, Khachatryan M.M, Barbaryan M.S. JUDO AS AN ALTERNATIVE INTERVENTION MODEL TO PREVENT BULLYING AT SCHOOLS: A PILOT STUDY.....	91-95
Rania M. Tuama, Entedhar R. Sarhat. THE ROLE OF MYONECTIN IN PATIENTS WITH TYPE 2 DIABETES MELLITUS.....	96-99
Rongmin Xu, Shundong Li, Anhua Zheng, Lianping He. EFFECT OF XIAOYAO PILLS COMBINED WITH ALENDRONATE ON BONE DENSITY IN POSTMENOPAUSAL PATIENTS WITH OSTEOPOROSIS.....	100-101
Nino Kiria, Teona Avaliani, Nino Bablshvili, Nino Chichiveishvili, Giorgi Phichkhaia, Lali Sharvadze, Nana Kiria. EFFICACY AND SAFETY OF SILVER NANOCOMPOSITES ON RIFAMPICIN-RESISTANT M. TUBERCULOSIS STRAIN.....	102-108

Dubivska S.S, Hryhorov Y.B, Lazyrskiy V.O, Dotsenko D.G, Lebid P.B. THE INFLUENCE OF CHANGES IN CARBOHYDRATE METABOLISM INDICATORS IN PATIENTS WITH POLYTRAUMA COMPLICATED BY ALCOHOLIC DELIRIUM ON THE CHOICE OF THE SEDATION METHOD.....	109-115
Karapetyan A.G, Danielyan M.H, Badalyan B.Yu, Simonyan K.V, Grigoryan V.S, Simonyan M.A, Dallakyan A.M, Simonyan G.M, Simonyan R.M. PROTECTIVE EFFECT OF A NEW SUPEROXIDE-PRODUCING ENZYME COMPLEX FROM RASPBERRY IN RATS WITH THIRD- DEGREE THERMAL BURNS.....	116-124
Sura Z. Salih, Nehad N. Hilal. EVALUATION OF SERUM VASPIN LEVEL IN IRAQI WOMEN WITH GESTATIONAL DIABETES MELLITUS.....	125-130
Tchernev G, Ivanov L. MUSTARDE ROTATION FLAP AS ADEQUATE OPTION FOR HIGH-RISK BCC NEAR THE LOWER EYE LID: THE ADDITIONAL INTAKE OF N-NITROSO-FOLIC-ACID AND N-NITROSO-RIVOROXABAN AS COFACTORS/ TRIGGERS OF THE METABOLIC REPROGRAMMING OF THE FUTURE CANCER CELL.....	131-137
Nazym Ailbayeva, Aliya Alimbaeva, Saule Rakhyzhanova, Nazym Kudaibergenova, Duman Berikuly, Sayat Tanatarov, Zaure Dushimova, Timur Saliev, Shynar Tanabayeva, Sergey Lee, Ildar Fakhradiyev. THE IMPACT OF BIRTH WEIGHT ON INFANT MORTALITY IN KAZAKHSTAN.....	138-145
Voloshyn-Gaponov I.K, Lantukh I.V, Mikhanovska N.G, Gulbs O.A, Malieieva O.V, Dikhtiarenko S.Yu, Kobets O.V, Malieiev D.V. PSYCHOTHERAPEUTICAL FEATURES OF PERSONS WITH MULTIPLE SCLEROSIS AND HEPATOCEREBRAL DEGENERATION.....	146-151
Sevak Sanasar Shahbazyan. COMPARATIVE ANALYSIS OF EFFECTS INDUCED BY STANDARD AND MODIFIED LAPAROSCOPIC SLEEVE GASTRECTOMY PERFORMANCE ON SHORT TERM AND DISTAL COMPLICATIONS IN PATIENTS WITH 3RD DEGREE OF MORBID OBESITY.....	152-157
Qutaiba A. Qasim. ANTIOXIDANTS, LIPID PROFILES, AND GLUCOSE LEVELS, AS WELL AS PERSISTENT INFLAMMATION, ARE CENTRAL TO THE LINK BETWEEN DIABETES MELLITUS TYPE II AND OXIDATIVE STRESS.....	157-161
Stepanyan L.S, Khitaryan D.S. RESEARCH ON PSYCHOLOGICAL WELL-BEING AND EMOTIONAL PROFILE OF ADOLESCENTS IN THE CONTEXT OF SCHOOL BULLYING.....	162-166
Yi Jin, Zhi Luo, Hua-Qin Su, Cui-Ping Li, Cai-Li Wang, Li-Fen Zhang, Feng-Lian Peng, Lian-Ping He, Xiang-Hu Wang. SERUM CALCIUM WAS NEGATIVELY ASSOCIATED WITH SERUM IRON AMONG GENERAL POPULATION: FINDINGS FROM A CROSS-SECTION STUDY.....	167-169
Stela Dzotsenidze, Lali Pkhaladze, Jenaro Kristesashvili, Nina Davidovi, Samer Hammoude, Marika Zurmukhtashvili. FUNCTIONAL STATE OF THE REPRODUCTIVE SYSTEM AFTER UNILATERAL OOPHORECTOMY.....	170-174

## THE INFLUENCE OF CHANGES IN CARBOHYDRATE METABOLISM INDICATORS IN PATIENTS WITH POLYTRAUMA COMPLICATED BY ALCOHOLIC DELIRIUM ON THE CHOICE OF THE SEDATION METHOD

Dubivska S.S, Hryhorov Y.B, Lazyrskyi V.O, Dotsenko D.G, Lebid P.B.

*Kharkov National Medical University, Kharkov, Ukraine.*

### Abstract.

**Topicality:** Providing assistance to patients with polytrauma, in a state of alcohol intoxication, complicated by alcoholic delirium, is a serious problem when providing anesthesia care and, in particular, choosing drugs for sedation. Considering the severity of mechanical damage, complications associated with alcohol intoxication and serious biochemical disorders of the body, namely carbohydrate, lipid metabolism, electrolyte changes, on which the activity of all systems depends, it is necessary to study the influence on the course of these processes, depending on the choice of their medicinal corrections.

**Purpose:** The purpose of the work is to choose a sedation method to improve the results of treatment of patients with polytrauma and alcohol withdrawal, based on the study of changes in carbohydrate metabolism indicator.

**Materials and methods:** The paper analyzes the results of a study of 80 patients with polytrauma and chronic alcohol intoxication with a state of alcohol withdrawal, complicated by alcoholic delirium, who received intensive therapy in the 12-bed department of anesthesiology and intensive therapy for patients with combined trauma of the KNP «Kharkiv City Clinical Hospital of Emergency Medical Care» named after Prof. O. I. Meschaninov» KhMR. All patients were diagnosed with polytrauma (thoracic and/or abdominal trauma: rib fractures, hemo-, pneumothorax, hematomas of the liver or spleen, fracture of the bones of the waist, and/or upper and/or lower limbs, fracture of the pelvis). In the course of the research, to achieve the goal, the main indicators of carbohydrate metabolism were determined, which were evaluated by the content of key metabolites: glucose, pyruvic acid, lactate. The study was conducted on the 1st, 3rd and 7th day of hospitalization of the patients.

**Results and Discussion:** In all traumatized patients with alcohol withdrawal syndrome and alcoholic delirium with the use of dexmedetomidine for sedation (group 1) and in patients who were used as sedatives, diazepam and haloperidol (group 2), changes in these parameters were observed in the blood, compared to healthy people of the control group. As for the glucose content in the blood of the patients of the 1st group, on the first day, persistent hyperglycemia was observed in them 1.7 times higher than this indicator in healthy people. Next, patients' blood glucose levels were determined on the 3rd and 7th day after hospitalization. Glucose content on the 3rd day decreased by 9.4% compared to the level determined on the first day. On the 7th day, the content of glucose in the blood decreased to normal values, which is 26.5% lower compared to the content of glucose in the blood on the first day. In the 2nd group of patients, where diazepam and haloperidol were used on the first day, hyperglycemia was also observed – 1.9 times higher than

this indicator in the control group of healthy individuals. On the third day, the level of glucose in the blood decreased by 6%. And on the 7th day, it decreased by 20.5%. Thus, hyperglycemia was observed in the blood of victims with alcohol withdrawal syndrome, complicated by delirium during hospitalization, on the 3rd day of hospitalization (first and second groups) and on the 7th day in patients of the second group, which indicates violation of carbohydrate metabolism and the development of hypoxia, with impaired liver and pancreas function.

In accordance with the aim and objectives of the study, the blood content of the main metabolites of glucose metabolism – pyruvate and lactate – was also studied upon admission to the hospital and one week after treatment, which made it possible to comprehensively assess possible carbohydrate metabolism disorders and characterize the features of the body's energy supply in the combination of polytrauma and withdrawal alcohol, complicated by alcoholic delirium. According to the results of the research, there is an increase in the content of lactate and pyruvate in patients with polytrauma against the background of chronic alcoholism compared to healthy people. When analyzing the content of lactate in the blood of patients with polytrauma and alcohol withdrawal syndrome, complicated by alcoholic delirium upon admission to the intensive care unit, a significant increase of this indicator was observed by 97.1% and 113.0%, respectively, in patients of the first and second groups. One week after the intensive therapy, the patients of the 1st group had a significant decrease in the lactate content in the blood – by 13% ( $P < 0.0001$ ) compared to the content of this indicator at the time of admission to the hospital. In the blood of the patients of the 2nd group, on the 7th day, the lactate content remained unchanged, and by 106.3% it exceeded this biochemical indicator in the blood of the control group. Hyperpyruvatemias was also observed – when entering the hospital in patients of the 2nd group, the content was 55.4% higher compared to healthy people, remained elevated after a week of treatment – by 30.1%, and did not return to normal values. In the patients of the first group, upon admission to the hospital, the pyruvate content in the blood was 53.0% higher compared to the control group, and on the 7th day it significantly decreased by 18.9%, but did not reach the values of the control group (remained at 24, 1% higher compared to the control). The cause of hyperpyruvatemias and hyperlactatemia in patients may also be a violation of their enzymatic transformation into decay products. Lactate is the final product of anaerobic oxidation of glucose, it is formed due to the transformation of pyruvate, under the conditions of action of the lactate dehydrogenase enzyme in conditions of hypoxia. An important indicator of the state of carbohydrate metabolism, namely the balance of anaerobic and aerobic processes in the body, is the lactate / pyruvate ratio, which in the control group



was 14.33 [13.82; 14.49]. In the patients of the first group, an increase in this ratio was observed – and it was 18.46 [18.3; 20.59] and 19.81 [18.96; 21,17] upon admission to the intensive care unit and one week after treatment, respectively. Practically the same value of this ratio was observed in patients of the second group – 19.65 [18.97; 22.3] and 22.73 [21.32 23.91], respectively, according to the time of intensive therapy. The latest figures indicate the restructuring of the energy supply of body tissues during the stay of patients in the intensive care unit.

**Conclusions:** Thus, in patients with polytrauma and alcohol withdrawal syndrome, complicated by alcoholic delirium, there is an intensification of the processes of anaerobic glycolysis, which is evidenced by an increase in the content of pyruvate, lactate, the lactate / pyruvate ratio, and is accompanied by a hypoxic state. When comparing the terms of stay in the intensive care unit, it was determined that the use of dexmedetomidine for the treatment of alcoholic delirium compared to benzodiazepines allows reducing the time of intensive care by 34 hours. Thus, in group 2, the duration of intensive therapy for alcoholic delirium was 89 [82-96.2] hours, while in group 1 it was reduced to 55 [52.2-59.8] ( $p=0.020427$ ). In addition, it was found that the consumption of drugs by patients was different. During the first day, it was 20 [20-30] mg in group 1, and 40 [40-50] mg in group 2. The groups also differed significantly in terms of the total dose of the drug during intensive therapy, so in patients of group 1, the total consumption was 30 [30-40] mg, in group 2 – 80 [80-90] mg ( $p=0.033011$ ).

**Key words.** Polytrauma, alcohol withdrawal syndrome, alcoholic delirium, carbohydrate metabolism, sedation, dexmedetomidine.

## Introduction.

According to the WHO, injuries are becoming a serious problem all over the world [1,2]. Polytrauma took the third place as a cause of death after oncological and cardiovascular diseases, and according to WHO forecasts, it may take the second place by 2025. According to literature data, combined injuries and polytrauma are observed in 12 to 36% of the injured, and the mortality varies from 23.8 to 85.0%. At the same time, the loss of working capacity and the level of disability exceed these indicators in the case of an isolated injury by 10 times. It is unfortunate that trauma is the leading cause of death for people under the age of 40 [3]. In the countries of the European Union, injuries are the cause of 9% of all deaths. The main cause of injury is traffic accidents, and 70% of cases are combined injuries. According to research data, 25 - 85% of injured patients are found to be in a state of alcohol intoxication, and 15% - 35% suffer from chronic alcohol dependence [4-8]. Alcohol withdrawal occurs 6-48 hours after the last alcohol consumption. At the same time, 20 to 35% of patients require hospitalization in the intensive care unit [9], and in 5-20% the withdrawal state progresses to alcoholic delirium [10].

Polytrauma, in the context of a traumatic disease, with severe combined injuries, determines the main features of its pathogenesis and the principles of therapeutic tactics. At the heart of these processes, there are violations of homeostasis, general and local inflammatory processes, and clinical manifestations depend on the nature, number and localization

of injuries [11]. Traumatic disease is characterized by the formation of a pronounced systemic inflammatory response and the development of an imbalance of the antioxidant-prooxidant system, with the development of hypoxia and pronounced oxidative stress [12]. The world's optimal medical tactics in the intensive therapy of traumatic disease is based on the concept of "golden hour" and "damage control" [13]. This concept is the basis of the organization of emergency care for severely injured persons [14-16]. It is based on the pathophysiological mechanisms that develop during polytrauma: the development of acidosis, hypothermia, and coagulopathy. In this strategy, two directions are distinguished: "damage control resuscitation" and "damage control surgery" [14,16-21]. The latter involves the restoration of physiological functions with subsequent surgical treatment [18,21,22]. The concept of "Damage control resuscitation" involves the observance of a well-known algorithm, with infusion therapy [1,3,14-18,23-31]. In patients with a state of alcohol withdrawal complicated by alcoholic delirium, to control excitement and reduce seizures, the basis of basic therapy is sedation [32-34].

The main sources of energy in the body are glucose and glycogen, which is a glucose reservoir in the liver. Hypoxia develops in patients with polytrauma against the background of chronic alcohol intoxication. This leads to a violation of the oxidative phosphorylation process in the mitochondria, the synthesis of macroergic compounds (ATP), which are universal carriers and a source of energy. It is known that long-term alcohol consumption has a diabetogenic effect, has a toxic effect on pancreatic cells, inhibits insulin secretion, causes an insulin-resistant state, which causes a violation of carbohydrate metabolism. Due to the hypoxic state, adaptive changes in carbohydrate metabolism with intensification of anaerobic glycolysis are formed [35]. Hypoxia leads to a disruption of the energy supply of cells due to a decrease in the efficiency of oxidative phosphorylation, the remote consequences of which are the activation of pro-apoptotic changes and cell death [36].

At the same time, compensatory changes against the background of hypoxia include modulation of carbohydrate metabolism. Therefore, in patients with polytrauma, especially in the state of alcohol withdrawal, the accumulation of lactate is noted as a result of progressive tissue hypoxia. Sedation is the mainstay of treatment in patients with alcohol withdrawal complicated by the choice of the sedation method to improve the treatment of patients with polytrauma and alcohol withdrawal, based on the study of changes in carbohydrate metabolism indicators. Support measures include stabilization, detoxification therapy, as well as full nutritional support, combating hypoxia [32,33].

**Purpose.** The choice of the sedation method to improve the treatment of patients with polytrauma and alcohol withdrawal, based on the study of changes in carbohydrate metabolism indicators.

## Materials and Methods.

The paper analyzes the results of a study of 80 patients with polytrauma and chronic alcohol intoxication with a state of alcohol withdrawal, complicated by alcoholic delirium, who received intensive therapy in the 12-bed department of anesthesiology and intensive therapy for patients with combined trauma of the

KNP "Kharkiv City Clinical Hospital of Emergency Medical Care" named after Prof. O. I. Meschaninov" KhMR.

All patients were diagnosed with polytrauma (thoracic and/or abdominal trauma: rib fractures, hemo-, pneumothorax, hematomas of the liver or spleen, fracture of the bones of the waist, and/or upper and/or lower limbs, fracture of the pelvis). Patient inclusion criteria: age from 19-60 years, presence of damage in two or more anatomical and functional areas, degree of severity of traumatic damage according to the ISS scale 9-15 points (average severity), severity of the condition of the victims according to the APACHE II scale 7-14 points, the state of chronic alcohol intoxication (AI), revealed by the number of points  $\geq 7$  in the modified "LeGo Grid" test, 3 or more positive answers in the "CAGE" questionnaire, established alcoholic delirium (arousal on the RASS scale  $\geq +2$ ; hallucinations; convulsions and the presence delirium according to the CAM-ICU scale and psychiatrist consultations). For the reliability of the study, a group of 20 practically healthy people were examined, who made up the control group.

To ensure the fulfillment of research tasks, patients (n=80) were divided into 2 groups based on sedation methods. Fixed simple randomization using random numbers was used to allocate patients. Group 1 (n=40), which included patients with polytrauma and severe alcohol withdrawal, complicated by alcohol delirium, who were sedated with dexmedetomidine. The drug was administered in a dose of 0.2-1.0 mcg/kg/hour with subsequent gradual correction of the dose in the range of 0.2-1.4 mcg/kg/hour depending on the achievement of sedation at the RASS level from 0 to -2. Group 2 (n=40) included a similar list of injuries and the condition of patients who were sedated with diazepam according to a symptom-trigger protocol. Administration of benzodiazepines, respectively, according to a symptom-dependent protocol in combination with CIWA-Ar is in line with current views on the treatment of CVA and has advantages compared to fixed hourly administration [37-39].

All 80 patients in the hospital were examined in accordance with the medico-economic standards of providing medical care. The victims underwent a comprehensive assessment of the injuries received and the degree of impairment of vital functions, as well as provided emergency aid and urgent surgical interventions. The state of carbohydrate metabolism was assessed by the content of key metabolites: glucose, pyruvic acid, lactate. The concentration of glucose in the blood was determined by the glucose oxidase method [40], the concentration of lactic acid in the blood serum was determined by the enzymatic colorimetric method [41]. The content of pyruvic acid (pyruvate) in the blood was determined according to Friedemann and Haugen [41] by the enzymatic method.

Methods of mathematical and statistical analysis of the obtained results. The studied clinical material was entered into a database created in Microsoft Excel 2010 (Microsoft, USA). On the basis of the created database, a statistical analysis was carried out using a package of application programs for statistical data processing STATISTICA 7.0 for WINDOWS, (Stat Soft Inc., USA) and MICROSOFT EXCEL 2010, intended for solving medical and biological problems. Mathematical processing of the obtained results was carried out in accordance with the generally accepted methodology of statistical analysis. Taking into account the

nature of the distribution of the analyzed values, parametric (average value, standard deviation) and non-parametric methods were used. The critical value of the level of significance (p) was taken to be  $\leq 5\%$  ( $p \leq 0.05$ ). In order to compare two samples with binary characteristics, the Pearson test or Fisher's exact test was used with the construction of correlation tables. The  $\chi$ -square and odds ratio (OR) were used to assess the causal role of various factors in the development of lesions. To determine the presence and strength of the relationship between the features, correlation analysis was carried out: according to Spearman (for non-parametric features).

## Results and Discussion.

When characterizing the biochemical indicator of carbohydrate metabolism - glucose, the content of which was determined in the blood serum, it should be noted that in all traumatized patients with alcohol withdrawal syndrome, with the phenomena of alcoholic delirium with the use of dexmedetomidine for sedation (group 1) and in patients who were used as sedative drugs diazepam, haloperidol (group 2), changes in this integral indicator were observed in the blood, compared to healthy people of the control group.

As for the glucose content in the blood of patients of the 1st group, they had persistent hyperglycemia on the first day: the glucose level was 7.45 [6.52; 8.97] mmol/l, ( $P < 0.0001$  compared to the control) which is 1.7 times higher than this indicator in healthy people. Next, patients' blood glucose levels were determined on the 3rd and 7th day after hospitalization. In the course of intensive therapy with the use of dexmedetomidine (1 group of patients), the glucose content on the 3rd day decreased by 9.4% compared to the level determined on the first day, and was 6.75 [6.13; 8.0] mmol/l ( $P < 0.0001$  compared to the first day), but did not reach the level of glucose in the group of healthy people and remained higher by 55.1% compared to the control. On the 7th day, the glucose content in the blood decreased to normal values and amounted to 5.55 [4.9; 5.9] mmol/l ( $P < 0.0001$  compared to the third day), which is 26.5% lower compared to the blood glucose content on the first day.

In the second group of patients, where diazepam and haloperidol were used on the first day, hyperglycemia was also observed - the blood glucose level was 8.3 [7.2; 9.87] mmol/l ( $P < 0.05$  compared to the control), which is 1.9 times higher than this indicator in the control group of healthy individuals. On the third day, the level of glucose in the blood decreased by 6% to 7.8 [6.95; 9.2] mmol/l ( $P < 0.05$  compared to the first day), and a week after admission to the hospital, it decreased by 20.5% compared to the first glucose measurement, but did not reach normal values of this indicator, as in healthy individuals of the control group and was 6.6 [4.9; 7.9] mmol/l, which was 51.7% higher than in the control group.

Thus, hyperglycemia was observed in the blood of victims with alcohol withdrawal syndrome, complicated by delirium during hospitalization, on the 3rd day of hospitalization (first and second groups) and on the 7th day in patients of the second group, which indicates violation of carbohydrate metabolism and the development of hypoxia, with impaired liver and pancreas function. Important indicators of the state of carbohydrate metabolism are the determination of the main metabolites of

glycolysis - pyruvate and lactate - in the blood. Therefore, the next stage of research was the determination of these substances in the blood. In accordance with the aim and objectives of the study, the blood content of the main metabolites of glucose metabolism - pyruvate and lactate - was also investigated upon admission to the hospital and one week after treatment.

Thus, the conducted research made it possible to comprehensively evaluate possible violations of carbohydrate metabolism and to characterize the features of the body's energy supply in combination with polytrauma and alcohol withdrawal complicated by alcoholic delirium. Those factors that contribute to an increase in the content of lactate also lead to an increase in the concentration of pyruvate in the blood, so lactate and pyruvate must be examined simultaneously.

The content of metabolites of carbohydrate metabolism, namely lactate and pyruvate, in the blood serum on the first day upon admission to the hospital and on the 7th day in the intensive care unit in the victims of both groups and patients in the control group is presented in table 1 and table 2.

Regarding the content of this indicator in the blood of patients who were prescribed benzodiazepines and haloperidol as needed (group 2), after a week the content of lactate remained unchanged ( $P>0.31$ ) and exceeded this biochemical indicator in the blood of the control group by 106.3%.

According to the results of the research, there is an increase in the content of pyruvate in patients with polytrauma against the background of chronic alcoholism compared to healthy people. So, in the patients of the first group, upon admission to the hospital, the pyruvate content in the blood was 53.0% higher compared to the control group, after a week of treatment with the use of dexmedetomidine, it significantly decreased by 18.9%, but did not reach the values of the control group (it remained at 24.1% higher compared to the control). In the second group of patients, hyperpyruvatemias was also observed - when entering the hospital, the content was 55.4% higher

compared to healthy people and remained elevated even after a week of treatment - by 30.1% and did not return to normal values. When analysing the content of lactate in the blood of patients with polytrauma and alcohol withdrawal syndrome, complicated by alcoholic delirium upon admission to the intensive care unit, a significant increase of this indicator was observed by 97.1% and 113.0%, respectively, in patients of the first and second groups. One week after intensive therapy, patients of group 1 had a significant decrease in blood lactate content - by 13% ( $P<0.0001$ ) compared to the content of this indicator at the time of admission to the hospital. The cause of hyperpyruvatemias and hyperlactatemias in patients may also be a violation of their enzymatic transformation into decay products. Lactate is the final product of anaerobic oxidation of glucose, it is formed due to the transformation of pyruvate, under the conditions of action of the lactate dehydrogenase enzyme in conditions of hypoxia. One of the important sensitive indicators of the state of carbohydrate metabolism, namely the balance of anaerobic and aerobic processes in the body, is the lactate / pyruvate ratio, which in the control group was 14.33 [13.82; 14.49]. In patients of the first group, a significant increase in this ratio was observed - it was 18.46 [18.3; 20.59] and 19.81 [18.96; 21,17] upon admission to the intensive care unit and one week after treatment, respectively. Practically the same value of this ratio was observed in patients of the second group - 19.65 [18.97; 22.3] and 22.73 [21.32 23.91], respectively, according to the time of intensive therapy. The latest figures testify to the restructuring of the energy supply of body tissues during the stay of patients in the intensive care unit.

### Conclusion.

Thus, in patients with polytrauma and alcohol withdrawal syndrome, complicated by alcoholic delirium, there is an intensification of the processes of anaerobic glycolysis, which is evidenced by an increase in the content of pyruvate, lactate, the lactate / pyruvate ratio, and is accompanied by a hypoxic state.

**Table 1.** The content of indicators of carbohydrate metabolism in the blood serum of healthy people and patients with polytrauma with an alcohol history in polytrauma at admission to the hospital (Me [QI-QIII]).

Groups Researched	Pyruvate mmol/l	lactate, mmol/l	Lactate/pyruvate
Control group (n=20)	0,083 [0,075; 0,089]	1,190 [0,96; 1,29]	14,33 [13,8; 14,49]
Group 1 (n=40)	0,127* [0,115; 0,130]	2,345* [2,11; 2,66]	18,46 [18,3; 20,59]
Group 2 (n=40)	0,129* [0,104;0,147]	2,535* [2,33; 2,81]	19,65 [18,97; 22,3]

Note: \* -  $p<0.001$  relative to the control

**Table 2.** The content of indicators of carbohydrate metabolism in the blood serum of healthy people and patients with polytrauma, with alcohol withdrawal syndrome, complicated by alcoholic delirium on the 7th day (Me[QI-QIII]).

Groups researched	Pyruvate mmol/l	lactate, mmol/l	Lactate/pyruvate
Control group (n=20)	0,083 [0,075; 0,089]	1,190 [0,96; 1,29]	14,33 [13,82; 14,49]
Group 1 (n=40)	0,103* [0,098;0,111]	2,040* [1,86; 2,19]	19,81 [18,96; 21,17]
Group 2 (n=40)	0,108* [0,093; 0,129]	2,455* [2,26; 2,748]	22,73 [21,32; 23,91]

Note: \* -  $p<0.05$  relative to the control

When comparing the terms of stay in the intensive care unit, it was determined that the use of dexmedetomidine for the treatment of alcoholic delirium compared to benzodiazepines allows reducing the time of intensive care by 34 hours. Thus, in group 2, the duration of intensive therapy for alcoholic delirium was 89 [82-96.2] hours, while in group 1 it was reduced to 55 [52.2-59.8] (p=0.020427). In addition, it was found that the consumption of drugs by patients was different. During the first day, it was 20 [20-30] mg in group 1, and 40 [40-50] mg in group 2. The groups also differed significantly in terms of the total dose of the drug during intensive therapy, so in patients of group 1, the total consumption was 30 [30-40] mg, in group 2 - 80 [80-90] mg (p=0.033011).

### Prospects for further research.

Studying the processes of homeostasis disruption in patients with polytrauma, alcohol withdrawal, and complicated alcoholic delirium is promising, especially the study of carbohydrate metabolism and its indicators affecting the state of hypoxia and tissue damage. The duration of treatment, its cost, the occurrence of complications and the subsequent quality of life of injured patients depend on this.

### Conflict of interest.

The authors of the manuscript knowingly acknowledge the absence of actual or potential conflict of interest regarding the results of this work with pharmaceutical companies, manufacturers of biomedical devices, other organizations whose products, services, financial support may be related to the subject matter or sponsored.

### Funding information.

Financing by expenditures of the State Budget of Ukraine.

### Connection with scientific programs, plans and topics.

The article is a fragment of research work of the Department of Emergency Medicine, Anesthesiology and Intensive Care of Kharkov National Medical University of the Ministry of Health of Ukraine "Choice of intensive care and anesthesia patients with systemic inflammatory response syndrome "(№ state registration 0116U005232, 2016-2018)," Anesthesia and intensive care in patients with damage to the oxygen transport system "(№ state registration 0120U102018, 2020-2022).

1. Kao TW, Lee YC, Chang HT. Prothrombin Complex Concentrate for Trauma Induced Coagulopathy: A Systematic Review and Meta-Analysis. *J Acute Med.* 2021;11:81-89.
2. Guidelines for essential trauma care / World Health Organization, International Society of Surgery/Société Internationale de Chirurgie and the International Association for the Surgery of Trauma and Surgical Intensive Care (IATSIC): <https://apps.who.int/iris/handle/10665/42565>
3. Lamb CM, MacGoey P, Navarro AP, et al. Damage control surgery in the era of damage control resuscitation. *Br J Anaesth.* 2014;113:242-249.
4. Molina PE, Katz PS, Souza-Smith F, et al. Alcohol's Burden on Immunity Following Burn, Hemorrhagic Shock, or Traumatic Brain Injury. *Alcohol Res.* 2015;37:263-78.

5. Zeckey C, Dannecker S, Hildebrand F, et al. Alcohol and multiple trauma—is there an influence on the outcome? *Alcohol.* 2011;45:245-251.
6. Mainerova B, Prasko J, Latalova K, et al. Alcohol withdrawal delirium - diagnosis, course and treatment. *Biomedical Papers.* 2015;159:044-52.
7. Awissi DK, Lebrun G, Coursin DB, et al. Alcohol withdrawal and delirium tremens in the critically ill: a systematic review and commentary. *Intensive Care Medicine.* 2012;39:16-30.
8. Parry CD, Patra J, Rehm J. Alcohol consumption and non-communicable diseases: epidemiology and policy implications. *Addiction.* 2011;106:1718-1724.
9. Rayner SG, Weinert CR, Peng H, et al. Dexmedetomidine as adjunct treatment for severe alcohol withdrawal in the ICU. *Annals of Intensive Care.* 2012;2:12.
10. Gortney JS, Raub JN, Patel P, et al. Alcohol withdrawal syndrome in medical patients. *Cleveland Clinic Journal of Medicine.* 2016;83:67-79.
11. Boyko IV, Zaft VB, Lazarenko GO. Orhanyzatsiia ekstremnoi medytsynskoi pomoshchy postradavshym s polytravmoi na etapakh medytsynskoi evakuatsyy. *Emergency Medicine.* 2013;2:77-84.
12. Bershadsky F.F, Grebenchikov O.A, Yershov A.V, et al. Influence of Sedation with Dexmedetomidine on Oxidative Distress During Delirium Developed Following Severe Polytrauma. *General Reanimatology.* 2019;15:11-20.
13. Barry AE, Chaney BH, Stellefson ML, et al. Validating the ability of a single-item assessing drunkenness to detect hazardous drinking. *The American Journal of Drug and Alcohol Abuse.* 2013;39:320-325.
14. Newgard CD, Schmicker RH, Hedges JR, et al. Emergency medical services intervals and survival in trauma: assessment of the "golden hour" in a north american prospective cohort. *Annals of Emergency Medicine.* 2010;55:235-46.
15. Amdahl CA. Golden hour. *HCA Healthcare Journal of Medicine.* 2022;3.
16. Rogers FB, Rittenhouse KJ, Gross BW. The golden hour in trauma: dogma or medical folklore? *Injury.* 2015;46:525-7.
17. Samokhvalov Y. M. y dr. Anesteziyolohycheskaia y reanimatolohycheskaia pomoshch postradavshym s polytravmoi: sovremennyye problemy y puty ykh resheniya. SPb.: YnformMed. 2013:144.
18. Moore EE, Knudson MM, Jurkovich GJ, et al. Emergency traumatologist or trauma and acute care surgeon: decision time. *Journal of the American College of Surgeons.* 2009;209:394-5.
19. Yovenko Y.A, Kobeliatskyi Yu. Yu, Tsarev A.V, et al. Yntensyvnaia terapiya krovopotery, koahulopatyy y hypovolemycheskoho shoka pry polytravme. *Medytsyna neotlozhnykh sostoianyi.* 2016;4:64-71.
20. Lamb CM, MacGoey P, Navarro AP, et al. Damage control surgery in the era of damage control resuscitation. *British Journal of Anaesthesia.* 2014;113:242-9.
21. Cannon JW, Khan MA, Raja AS, et al. Damage control resuscitation in patients with severe traumatic hemorrhage: A practice management guideline from the Eastern Association for the Surgery of Trauma. *J Trauma Acute Care Surg.* 2017;82:605-617.

22. Bugaev N, Como JJ, Golani G, et al. Thromboelastography and rotational thromboelastometry in bleeding patients with coagulopathy: practice management guideline from the eastern association for the surgery of trauma: erratum. *Journal of Trauma and Acute Care Surgery*. 2021;90:766-7.
23. Cotton BA, Reddy N, Hatch QM, et al. Damage control resuscitation is associated with a reduction in resuscitation volumes and improvement in survival in 390 damage control laparotomy patients. *Annals of Surgery*. 2011;254:598-605.
24. Morrison CA, Carrick MM, Norman MA, et al. Hypotensive resuscitation strategy reduces transfusion requirements and severe postoperative coagulopathy in trauma patients with hemorrhagic shock: preliminary results of a randomized controlled trial. *The Journal of Trauma: Injury, Infection, and Critical Care*. 2011;70:652-63.
25. De Biasi AR, Stansbury LG, Dutton RP, et al. Blood product use in trauma resuscitation: plasma deficit versus plasma ratio as predictors of mortality in trauma (CME). *Transfusion*. 2011;51:1925-32.
26. Shaz BH, Dente CJ, Nicholas J, et al. Increased number of coagulation products in relationship to red blood cell products transfused improves mortality in trauma patients. *Transfusion*. 2010;50:493-500.
27. Frith D, Goslings JC, Gaarder C, et al. Definition and drivers of acute traumatic coagulopathy: clinical and experimental investigations. *Journal of Thrombosis and Haemostasis*. 2010;8:1919-25.
28. Dubrov S.A. Basic principles of intensive care for patients with polytrauma at an early stage. Ways to optimize. *Science Rise*. 2015;5:117.
29. Hussmann B, Lefering R, Waydhas C, et al. Does increased prehospital replacement volume lead to a poor clinical course and an increased mortality? A matched-pair analysis of 1896 patients of the Trauma Registry of the German Society for Trauma Surgery who were managed by an emergency doctor at the accident site. *Injury*. 2013;44:611-617.
30. Usenko L.V, Belotserkovets O.V, Mashyn A.M, et al. *Sovremennyye aspekty yntensyvnoi terapiyu polytravmy s prevalyrovanyem torakalnoi travmy na dohospytalnom u hospytalnom etapakh. Medytsyna neotlozhnykh sostoiany*. 2007;5:10-19.
31. Stupnytskyi M.A, Zhukov V.Y, Horbach T.V, et al. *Dynamyka kontsentratsyyi molekul srednei massy u patsyentov s tiazheloi sochetannoi torakalnoi travmoi v ostrom peryode travmatycheskoi bolezny*. *Travma*. 2014;15:46-50.
32. Long D, Long B, Koyfman A. The emergency medicine management of severe alcohol withdrawal. *Am J Emerg Med*. 2017;35:1005-1011.
33. Maldonado JR, Nguyen LH, Schader EM, et al. Benzodiazepine loading versus symptom-triggered treatment of alcohol withdrawal: a prospective, randomized clinical trial. *Gen Hosp Psychiatry*. 2012;34:611-617.
34. Marsden NJ, Tuma F. Polytraumatized Patient. 2021 Jul 5. In: *StatPearls*. Treasure Island (FL): StatPearls Publishing. 2021.
35. Woods AD, Giometti R, Weeks SM. The use of dexmedetomidine as an adjuvant to benzodiazepine-based therapy to decrease the severity of delirium in alcohol withdrawal in adult intensive care unit patients: a systematic review. *JBI Database System Rev Implement Rep*. 2015;13:224-52.
36. Miyamoto K, Nakashima T, Shima N, et al. Effect of Dexmedetomidine on Lactate Clearance in Patients With Septic Shock: A Subanalysis of a Multicenter Randomized Controlled Trial. *Shock*. 2018;50:162-166.
37. Rahman A, Paul M. Delirium Tremens. 2022 Aug 22. In: *StatPearls*. Treasure Island (FL): StatPearls Publishing; 2022.
38. Sullivan JT, Sykora K, Schneiderman J, et al. Assessment of alcohol withdrawal: the revised Clinical Institute Withdrawal Assessment for alcohol scale (CIWA-Ar). *Br J Addict*. 1989;84:1353-1357.
39. Daepfen JB, Gache P, Landry U, et al. Symptom-triggered vs fixed schedule doses of benzodiazepine for alcohol withdrawal: a randomized treatment trial. *Arch Intern Med*. 2002;162:1117-1121.
40. Ivanytska H.I, L.V. Liulenko, M.V. Ivanytska. *Praktykum z klinichnoi biokhimii*. Kyiv, VSV "Medytsyna". 2010:184.
41. Камышныков V.S. *Klynyko-byokhymycheskaia laboratornaia dyahnostyka*. – Mynsk, Ynterpresservys. 2003:463.

#### Резюме

**Актуальність.** Надання допомоги пацієнтам з політравмою, у стані алкогольного сп'яніння, ускладненим алкогольним делірієм, є серйозною проблемою при проведенні анестезіологічної допомоги та зокрема вибору препаратів для седації. Враховуючи тяжкість механічних пошкоджень, ускладнень пов'язаних з алкогольною інтоксикацією та серйозних біохімічних порушень організму, а саме вуглеводного, обміну ліпідів, електролітних змін, від яких залежить діяльність всіх систем, це потребує вивчення впливу на протікання цих процесів, в залежності від вибору їх медикаментозної корекції.

**Мета роботи:** Вибір методу седації для покращення результатів лікування хворих з політравмою та станом відміни алкоголю, на підставі дослідження змін показників вуглеводного обміну.

**Матеріали та методи:** В роботі проаналізовано результати дослідження 80 пацієнтів з політравмою та хронічною алкогольною інтоксикацією зі станом відміни алкоголю, ускладненим алкогольним делірієм, які отримували інтенсивну терапію у відділенні анестезіології та інтенсивної терапії на 12 ліжок для хворих з поєднаною травмою КНП «Харківської міської клінічної лікарні швидкої невідкладної медичної допомоги ім. проф. О. І. Мещанінова» ХМР. Усім хворим було встановлено діагноз: політравма (торако - і/або абдоміносkeletalна травма: переломи ребер, гемо-, пневмоторакс, гематоми печінки або селезінки, перелом кісток поясу, і/або верхніх і/або нижніх кінцівок, перелом кісток тазу). У ході проведення дослідження, для досягнення мети, визначали основні показники вуглеводного обміну, які оцінювали за вмістом ключових метаболітів: глюкози, піровиноградної кислоти, лактата. Дослідження проводили на 1,3 та 7 добу госпіталізації пацієнтів.

**Результати та їх обговорення.** У всіх травмованих з синдромом відміни алкоголю та явищами алкогольного делірію із застосуванням задля седатції дексмететомідину (група 1) та у пацієнтів, яким застосовували в якості седативних препаратів діазепам, галоперидол (група 2) спостерігалися зміни цих показників у крові, порівняно зі здоровими людьми контрольної групи. Що стосується вмісту глюкози в крові хворих 1-ї групи, то у них на першу добу спостерігалася стійка гіперглікемія в 1,7 рази вище цього показника у здорових людей. Далі, пацієнтам визначали вміст глюкози в крові на 3-тю та 7-му добу після госпіталізації. Вміст глюкози на 3-тю добу зменшувався на 9,4% у порівнянні з рівнем, що визначався на першу добу. На 7-му добу вміст глюкози в крові зменшувався до нормальних значень, що на 26,5% нижче у порівнянні зі вмістом глюкози в крові на першу добу. У 2 групі пацієнтів, де застосовували діазепам та галоперидол на першу добу, також спостерігалася гіперглікемія – в 1,9 рази вище, ніж цей показник у контрольній групі здорових осіб. На третю добу рівень глюкози в крові зменшувався на 6%. А на 7-му добу знижувався на 20,5 %. Таким чином, гіперглікемія спостерігалася в крові постраждалих, з синдромом відміни алкоголю, ускладненим делірієм під час надходження до стаціонару, на 3-тю добу перебування в стаціонарі (перша та друга групи) та на 7-му добу у пацієнтів другої групи, що свідчить про порушення вуглеводного обміну і розвитку гіпоксії, з порушенням функції печінки та підшлункової залози.

Відповідно до мети і завдань дослідження досліджували також вміст в крові основних метаболітів обміну глюкози - пірувату та лактату при надходженні до стаціонару та через тиждень після лікування, що дало змогу інтегрально оцінити можливі порушення обміну вуглеводів та охарактеризувати особливості енергетичного забезпечення організму при поєднанні політравми та стану відміни алкоголю, ускладненого алкогольним делірієм. За результатами проведених досліджень у хворих з політравмою на тлі хронічного алкоголізму спостерігається підвищення вмісту лактату та пірувату порівняно зі здоровими людьми. При аналізі вмісту лактату в крові хворих з політравмою та синдромом відміни алкоголю, ускладненим алкогольним делірієм при надходженні до відділення інтенсивної терапії спостерігалось суттєве підвищення цього показника на 97,1% та 113,0% відповідно у пацієнтів першої та другої груп. Через тиждень після проведення інтенсивної терапії у пацієнтів 1-ї групи спостерігалось достовірне зниження вмісту лактату в крові – на 13% ( $P < 0,0001$ ) у порівнянні з вмістом цього показника під час потрапляння до стаціонару. В крові пацієнтів, 2 -ї групи, на 7 добу вміст лактату залишався незмінним, та на 106,3% перевищував цей біохімічний показник в крові у контрольній групі. Також спостерігалася гіперпіруватемія – при надходженні до

стаціонару у пацієнтів 2 – і групи вміст був на 55,4% вище у порівнянні зі здоровими людьми, залишався підвищеним через тиждень лікування – на 30,1%, та не повертався до нормальних значень. У пацієнтів першої групи при надходженні до стаціонару вміст пірувату в крові був на 53,0% вище у порівнянні з контрольною групою, і на 7 -му добу достовірно знижувався на 18,9%, але не досягав значень контрольної групи (залишався на 24,1% вище у порівнянні з контролем). Причиною гіперпіруватемії та гіперлактатемії у пацієнтів може також бути порушення їхнього ферментативного перетворення на продукти розпаду. Лактат є кінцевим продуктом анаеробного окиснення глюкози, утворюється завдяки перетворенню пірувату, за умов дії ферменту лактатдегідрогенази в умовах гіпоксії. Важливим показником стану метаболізму вуглеводів, а саме балансу анаеробних та аеробних процесів в організмі, є співвідношення лактат / піруват, яке у контрольній групі склало 14,33 [13,82; 14,49]. У пацієнтів першої групи спостерігалось підвищення цього співвідношення – та становило 18,46 [18,3; 20,59] та 19,81 [18,96; 21,17] при надходженні до відділення інтенсивної терапії та через тиждень після лікування відповідно. Практично таке ж значення цього співвідношення спостерігалось у хворих другої групи - 19,65 [18,97; 22,3] та 22,73 [21,32 23,91] відповідно часу застосування інтенсивної терапії. Останні цифри свідчать про перебудовування енергетичного забезпечення тканин організму під час перебування пацієнтів у відділенні інтенсивної терапії

#### **Висновки.**

Таким чином, у пацієнтів з політравмою та синдромом відміни алкоголю, ускладненим алкогольним делірієм, відбувається інтенсифікація процесів анаеробного гліколізу, про що свідчить підвищення вмісту пірувату, лактату, співвідношення лактат / піруват та супроводжується гіпоксичним станом. При порівнянні термінів перебування у відділенні інтенсивної терапії визначено, що використання дексмететомідину для лікування алкогольного делірію в порівнянні з бензодіазепінами дозволяє зменшити час інтенсивної терапії на 34 год. Так, у групі 2 тривалість інтенсивної терапії алкогольного делірію становила 89 [82-96.2] годин, тоді як у групі 1 вона скоротилась до 55 [52.2-59.8] ( $p=0,020427$ ). Крім того, виявлено, що споживання препаратів пацієнтами було різним. На протязі першої доби в групі 1 становило 20 [20-30] мг, а в 2 групі – 40 [40-50] мг. Групи також достовірно відрізнялись за загальною кількістю дози препарату протягом проведення інтенсивної терапії, так у пацієнтів 1 групи загальне споживання складало 30 [30-40] мг, у 2 групі – 80 [80-90] мг ( $p=0,033011$ ).

**Ключові слова:** політравма, синдромом відміни алкоголю, алкогольний делірій, вуглеводний обмін, седатія, дексмететомідин.