

# **GEORGIAN MEDICAL NEWS**

---

ISSN 1512-0112

NO 5 (374) Май 2026

---

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 ბაზებშიდან.

### 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 შედეგების 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.

E. Didebulidze, L. Nadareishvili, S. Sturua, G. Berishvili, S. Tsertsvadze, N. Janelidze, N. Geliashvili, M. Kutateladze, P.M. Lydyard, M. Tediashvili. EARLY HUMORAL IMMUNE RESPONSES TO BACTERIOPHAGES AND SHORT-COURSE PHAGE THERAPY OUTCOMES IN PATIENTS WITH URINARY TRACT INFECTIONS.....	6-17
Iryna Yevchenko, Andrii Masliuk, Serhii Myronets, Inna Lapchenko, Nataliia Ortikova. CORRELATION OF EMOTIONAL EMPATHY WITH MENTAL HEALTH INDICATORS IN ADULTS TO DETECT PSYCHOLOGICAL WELL-BEING MARKERS.....	18-26
Maksat Seiitkhan, Altyn Saparbek, Aibergen Tleubergenov, Kurmanay Soltanbayeva, Sayazhan Stanova. ENDOSCOPIC ENDONASAL TREATMENT OF PRIMARY INVERTED PAPILLOMA OF THE SPHENOID SINUS: A CLINICAL CASE.....	27-34
Dae-Hwan Lee, Bong-Sik Woo, Jung-Ho Lee. RETROSPECTIVE EVALUATION OF A COMMUNITY-BASED ELASTIC BAND EXERCISE PROGRAM USING A BALANCE PAD IN RURAL OLDER WOMEN.....	35-42
Mohamed Abdelhadi, Muna HM Alhendi, Khalil AlShowaiker, Ahmad Almaimooni, Khaled Aljenae, Sulaiman Hajji, Ramadan Eldamarawy, Neveen Shalaby. A RARE PRESENTATION OF DIFFUSE LARGE B-CELL LYMPHOMA AS SEVERE ACUTE HEPATITIS AND SECONDARY HEMOPHAGOCYTIC LYMPHOHISTIOCYTOSIS IN A YOUNG ADULT: A CASE REPORT.....	43-46
Lian-Ping He, Ling-Ling Zhou, Jing-Jin Yang, Ying-Rui Huang, Guang Chen. ARTIFICIAL INTELLIGENCE-ASSISTED TEACHING MODEL AS A STRATEGY TO ENHANCE CORE COMPETENCIES OF CLINICAL MEDICINE UNDERGRADUATES: A SCIENTIFIC HYPOTHESIS.....	47-51
Diana Sargsyan, Arevhat Badalyan, Sona Harutyunyan, Siranush Hovhannisyan. THE STUDY OF CORRELATIONS OF PSYCHOLOGICAL FACTORS ENSURING THE FAMILY MENTAL HEALTH.....	52-60
Gani Uakkazy, Chingiz Shashkin, Natalya Slivkina, Viktor Tkachev, Mirbanu Aikhozhayeva, Gulbana Khussainova, Raushan Baigenzheyeva, Zilola Mavlyanova, Raikhan Burumbayeva, Mereke Alaidarova, Joseph Almazan, Amangali Akanov. CONTEXTUAL ANALYSIS OF ADAPTED BOXING AND KICK-/KNEE-STRIKE EXERCISE MODULES IN MULTIDISCIPLINARY NEUROREHABILITATION AND NURSING CARE: SECONDARY ANALYSIS OF TWO PROSPECTIVE STUDIES.....	61-70
Turkiyah Mohsin Elias, Anmar B. AL-Dewachi. DETERMINANTS OF DIABETIC FOOT AMONG PATIENTS WITH TYPE 2 DIABETES: A CASE-CONTROL STUDY.....	71-77
Khatuna Kudava. CLINICAL CHARACTERISTICS OF INFECTION-ASSOCIATED PALMOPLANTAR DERMATOSIS IN PREPUBERTAL CHILDREN: AN OBSERVATIONAL STUDY.....	78-81
Renta Sanxhaku, Ditila Doracaj, Delina Xhafaj, Stela Sanxhaku, Andi Gjini, Alban Xhafaj, Edi Grabocka. HOMOCYSTEINE TESTING IN PREVENTIVE HEALTHCARE: COMPARATIVE INSIGHTS AND POLICY IMPLICATIONS FOR ALBANIA.....	82-87
Sara Ali, Marwan Ismail, Praveen kumar, Salma Elnour Mohamed, Weam Alyoubi, Hiba Mohamed, Raghad Alamri, Fatima Mohamed Osman Yasin, Safa Mohamed Abdelrahman, Huda F. Alshaibi, Einas Awad Osman, Akhtamova Shahzoda Fozilovna, Matlyuba Badritdnova, Rihab Akasha, Mohamed Alfaki. PAN-CANCER ANALYSIS OF CHEMOKINE (C-C MOTIF) LIGAND 26 (Ccl26) AS A PROMISING PROGNOSTIC BIOMARKER AND IMMUNOMODULATORY MEDIATOR.....	88-115
Altin Sallahu, Ferat Sallahu. PROGNOSTIC AND PREDICTIVE VALUE OF TUMOR BUDDING, LYMPHOVASCULAR INVASION, AND PERINEURAL INVASION IN COLORECTAL CARCINOMA.....	116-119
Ghukasyan Norayr, Gharibyan Edita, Geokchyan Haykuhi, Vardanyan Ara, Gekchyan Gor, Sahakyan Lusine. SUCCESSFUL PREGNANCY AND TERM DELIVERY AFTER RADICAL SURGERY FOR COLON CANCER: A CASE REPORT.....	120-124
G.N.K. Ganesh, Clara Shertaeva, Galiya Umurzakhova, Malik Sapakbay, Sabina Seidaliyeva. DIGITALISATION OF THE PHARMACEUTICAL INDUSTRY IN KAZAKHSTAN: HOW IS THE SECTOR ADAPTING TO NEW REALITIES? .....	125-130
Klara Kaldygozova, Aigul Sergazina, Gulmira Datkayeva, Sulugaisha Kalen, Maya Maksut. METABOLIC DISORDERS IN CHILDREN SUFFERING FROM ACUTE RESPIRATORY VIRAL INFECTIONS (ARVI): COMPLICATIONS AND PREVENTIVE MEASURES.....	131-140
Anas Alhur, Sarah Ibrahim Al-Atif, Afrah Alhur, Fahad Saud Alshammari, Hozan Muslat Nasser Al-Taweel, Reeuof Abdullah Zarbah, Remas Abdullah Mohammed Al-Shahrani, Shaimaa Ahmed Yahya Al-Abdullah, Jana Jameel Salamah Allah, Dhay Hammad Al-Amer, Alhanouf Sulaiman Alharbi, Ali Ahmed Alzahrani, Sultan Saad Ali Alowaydi, Reema Al Shahrani, Abdulrahman A. Alsaqabi. GENERATIVE AI-ASSISTED DRUG-DRUG INTERACTION CASE SUPPORT AND PHARMACY STUDENTS' COMPETENCE: A MIXED-METHODS STUDY.....	141-151

Sara Abdelmahmoud Omer, Alaa Hanafi Makki Elkhalfifa, Abdelkarim Abobakr Abdrabo, Einas A Osman. ASSOCIATION BETWEEN THYROID HORMONE LEVELS AND ADVANCED LIVER FIBROSIS IN PATIENTS WITH TYPE 2 DIABETES MELLITUS AND NON-ALCOHOLIC FATTY LIVER DISEASE.....	152-157
Lingzhi Bao, Jie Ma. NAVIGATING AI IN MEDICAL EDUCATION: A NARRATIVE REVIEW OF APPLICATIONS, CHALLENGES, AND FUTURE STRATEGIES.....	158-166
Mukasheva Gulbarshyn, Seitmaganbetova Indira, Kurmangali Zhanar K. SOCIODEMOGRAPHIC DETERMINANTS OF PRENATAL CARE ACCESS AMONG PREGNANT WOMEN IN THE MANGYSTAU REGION: A CROSS-SECTIONAL STUDY.....	167-173
Sultan M. Siham, Ali L. Jasim, Amar K. Almajidy. INVESTIGATING THE PERSPECTIVES OF RESPIRATORY PHYSICIANS ON HOW SOCIAL DETERMINANTS OF HEALTH AND HEALTH LITERACY INFLUENCE ASTHMA OUTCOMES: A QUALITATIVE STUDY.....	174-178
Datumyan G.S, Sargsyan M.V, Shaboyan K.R, Hovhannisyan M.E, Sahakyan K.M, Muradyan A.A, Hakobyan A.I, Hovhannisyan H.V. SEVERE UPPER EXTREMITY CRUSH SYNDROME IN A NON-DISASTER SETTING: A CASE REPORT OF SUCCESSFUL MULTIMODAL MANAGEMENT WITH COMPLETE RENAL RECOVERY.....	179-184
Tea Chitadze. TEMPORAL DYNAMICS OF GLOBAL LONGITUDINAL STRAIN AND NT-PROBNP IN THE EARLY DETECTION OF ANTHRACYCLINE-INDUCED CARDIOTOXICITY: A 24-MONTH PROSPECTIVE STUDY IN POSTMENOPAUSAL WOMEN WITH BREASTCANCER.....	185-197
Bodnar-Petrovska O.B, Verenkiotova O.V, Petrovskiy A.V, Krykun V.V, Batryn O.V, Ivakhnenko O.A. COMPARATIVE ANALYSIS OF MATERNAL AND CHILD HEALTH CARE IN THE MEMBER STATES OF THE EUROPEAN UNI ON.....	198-208
Gulbarshyn Mukasheva, Tolkyun Bulegenov, Indira Seitmaganbetova, Aigul Tugelbayeva, Meruyert Malik. QUALITY OF LIFE AMONG YOUNG ADULT PATIENTS WITH CARDIOVASCULAR DISEASE.....	209-215
Marina Zhorobekova, Salima Nayzabekova, Dinara Alieva, Saikal Melisova. MEDICAL AND SOCIAL REHABILITATION OF ELDERLY PATIENTS WITH POST-COVID SYNDROME AND COPD: THE EXPERIENCE OF KYRGYZSTAN.....	216-224
Davit Chakvetadze, Otar Darjanian. PREVALENCE, RISK FACTORS, AND STRUCTURAL CHARACTERISTICS OF DENTOALVEOLAR ANOMALIES IN THE SCHOOL- AGED POPULATION OF KUTAISI.....	225-232
Kurmangaliyeva Klara, Shlymova Raikhan, Askarova Karashash, Darybayeva Aisha, Kazangapova Assem, Sagyndykova Gulnur, Yeshmagambetova Zhanna, Akhmedyarova Elmira. EFFECTIVENESS OF PLASMA EXCHANGE IN THE THERAPY OF DRUG-INDUCED HEPATITIS IN PATIENTS WITH PULMONARY TUBERCULOSIS AND CHRONIC VIRAL HEPATITIS B AND C.....	233-242
Matitaishvili T, Domianidze T, Burjanadze G, Shengelia M, Menteshashvili N. EFFECTS OF LONG-TERM SOCIAL ISOLATION ON MEMORY AND DEPRESSIVE-LIKE BEHAVIOR IN RATS OF DIFFERENT SOCIAL STATUS.....	243-248
Svetlana Trofimova, Aruzhan Mendybayeva, Irina Izbassarova, Aida Bokayeva, Aliya Aituganova. DIFFERENTIAL DIAGNOSIS CHALLENGES OF PULMONARY SARCOIDOSIS IN PRIMARY CARE PRACTICE: THE ROLE OF MULTIDISCIPLINARY AND PERSONALIZED APPROACHES.....	249-254
Farman K. Rafeeq, Zeina A. Al-Thanoon. THE POTENTIAL HEPATOPROTECTIVE EFFECT OF PALMITOLEIC ACID AGAINST KETAMINE-INDUCED LIVER INJURY IN RATS: OXIDATIVE, INFLAMMATORY, AND HISTOPATHOLOGICAL EVALUATION.....	255-261
Zakharov Oleg B, Vasileva Anastasiya A, Idiatullin Ravil M, Maslov Vladimir G, Malashikhina Alyona V, Solomonov Sergei A, Falicheva Anastasiia O, Ruchkina Kseniia A, Popov Vasilii V, Litiuk Daria V, Oshchipok Damir D, Tarusina Viktoriia M, Kulbyakova Maria L, Saryeva Albina R, Torba Danil G, Korotkova Sofia E, Sakharova Viktoriya S, Mamutova Zeyneb M, Yaksun Vasilisa S, Suvorova Sofia M. BEYOND CONTRACTILITY: PHENOTYPIC SWITCHING OF VASCULAR SMOOTH MUSCLE CELLS IN ATHEROSCLEROSIS.....	262-269
A.V. Podobed, V.P. Kurchyn, I. Kobidze. VIDEO-ASSISTED THORACOSCOPIC RESECTION OF THE LEFT BRACHIOCEPHALIC AND SUPERIOR VENA CAVA FOR PRIMARY AND RECURRENT THYMIC TUMORS.....	270-275
Fadia Thamir Ahmed. ASSESSMENT OF MELATONIN USE PATTERNS, SAFETY, AND ATTITUDES TOWARD ITS USE IN ADULT POPULATION.....	276-281
Daniel Godoy-Monzon, Patricio Telesca, Jose Manuel Pascual Espinosa. MID-TERM CLINICAL AND RADIOLOGICAL OUTCOMES OF SHORT-STEM VERSUS CONVENTIONAL-STEM TOTAL HIP ARTHROPLASTY IN PATIENTS WITH OSTEONECROSIS OF THE FEMORAL HEAD: A PROSPECTIVE CASE-CONTROL STU DY.....	282-287

## A RARE PRESENTATION OF DIFFUSE LARGE B-CELL LYMPHOMA AS SEVERE ACUTE HEPATITIS AND SECONDARY HEMOPHAGOCYtic LYMPHOHISTIOCYTOSIS IN A YOUNG ADULT: A CASE REPORT

Mohamed Abdelhadi<sup>1\*</sup>, Muna HM Alhendi<sup>1</sup>, Khalil AlShowaiker<sup>1</sup>, Ahmad Almaimooni<sup>1</sup>, Khaled Aljenae<sup>2</sup>, Sulaiman Hajji<sup>2</sup>, Ramadan Eldamarawy<sup>3</sup>, Neveen Shalaby<sup>4</sup>.

<sup>1</sup>Internal Medicine Department, Al-Adan Hospital, Kuwait.

<sup>2</sup>Endocrinology Department, Al-Adan Hospital, Kuwait.

<sup>3</sup>Gastroentology Department, Al-Adan Hospital, Kuwait.

<sup>4</sup>Hematology Department, Al-Adan Hospital, Kuwait.

### Abstract.

Hemophagocytic lymphohistiocytosis (HLH) is a rare but life-threatening hyperinflammatory syndrome characterized by dysregulated immune activation and cytokine storm, frequently triggered by infections, autoimmune disorders, and malignancies. Among adults, lymphoma-associated HLH represents one of the most aggressive subtypes and carries significant mortality if not recognized early. We report the case of a 24-year-old male who initially presented with constitutional symptoms, progressive jaundice, and biochemical features suggestive of acute hepatitis. Initial evaluation focused on hepatic and autoimmune etiologies; however, progressive pancytopenia, marked hyperferritinemia (>15,000 ng/mL), hypofibrinogenemia, hypertriglyceridemia, and hepatosplenomegaly raised suspicion for HLH. Further imaging revealed diffuse lymphadenopathy and infiltrative hepatic lesions. Histopathological examination of a supraclavicular lymph node confirmed diffuse large B-cell lymphoma (DLBCL). The patient fulfilled HLH diagnostic criteria with an HScore of 200, indicating high probability of disease. Despite prompt initiation of dexamethasone and immunomodulatory therapy, the patient deteriorated rapidly, necessitating transfer to a tertiary oncology center. This case highlights the diagnostic challenge posed by hepatic-predominant HLH and emphasizes the importance of considering HLH in patients presenting with unexplained hepatitis, cytopenias, and hyperferritinemia.

**Key words.** B-cell lymphoma, acute hepatitis, hemophagocytic lymphohistiocytosis, adults.

### Introduction.

Hemophagocytic lymphohistiocytosis (HLH) is a severe hyperinflammatory syndrome caused by uncontrolled activation of macrophages, cytotoxic T lymphocytes, and natural killer cells, leading to excessive cytokine production and multiorgan dysfunction. Prompt recognition is essential because HLH is rapidly progressive and often fatal if treatment is delayed. HLH may occur as a primary genetic disorder or secondary to infection, autoimmune disease, or malignancy. Malignancy-associated HLH is more common in adults, with hematologic malignancies—particularly lymphomas—being the predominant trigger. Diffuse large B-cell lymphoma (DLBCL), although less frequently associated than T-cell lymphomas, remains an important cause of lymphoma-associated HLH.

Clinical diagnosis can be challenging due to the nonspecific and heterogeneous presentation of HLH. Hepatic involvement is common and may mimic viral, autoimmune, or infiltrative liver disease, thereby delaying diagnosis. We present a case of DLBCL-associated HLH in a young adult whose initial presentation closely resembled acute hepatitis, illustrating the diagnostic challenges and emphasizing the importance of early suspicion in atypical presentations [1-17].

### Case Presentation.

A previously healthy 24-year-old male presented with a five-week history of persistent nausea, intermittent vomiting, abdominal discomfort, and subjective fever. Two weeks prior to admission, he developed progressive jaundice, dark urine, night sweats, and significant unintentional weight loss over three months. He denied alcohol use, illicit drug use, recent travel, sick contacts, or exposure to hepatotoxic agents. Past medical history was notable for a recent admission one month earlier for presumed hepatitis, from which he had been discharged following partial biochemical improvement.

On examination, the patient appeared jaundiced and mildly ill-looking. Vital signs demonstrated hypotension (92/61 mmHg) and tachycardia (117 bpm), with normal temperature. There were scleral icterus and generalized jaundice. Cardiovascular and respiratory examinations were unremarkable. Abdominal examination showed a soft, non-tender abdomen without palpable organomegaly. No peripheral lymphadenopathy was appreciated initially.

Initial laboratory evaluation revealed pancytopenia with hemoglobin 9.9 g/dL, white blood cell count  $1.1 \times 10^9/L$ , neutrophils  $0.82 \times 10^9/L$ , and platelet count  $75 \times 10^9/L$ . Liver function testing showed cholestatic hepatitis with AST 276 U/L, ALT 190 U/L, ALP 328 U/L, GGT 339 U/L, and total bilirubin 160  $\mu\text{mol/L}$ . Coagulation studies revealed prolonged INR of 1.68 and fibrinogen 0.89 g/L. Ferritin was markedly elevated above 15,000 ng/mL, triglycerides were elevated at 3.6 mmol/L, and LDH was 661 U/L.

Viral hepatitis and infectious serologies were negative for acute infection. Autoimmune liver workup was largely unremarkable aside from weakly positive ANA (1:80). Abdominal ultrasound demonstrated mild hepatosplenomegaly. MRCP excluded biliary obstruction but revealed hepatosplenomegaly, diffuse parenchymal liver abnormalities, and an 8 cm hepatic lesion concerning for infiltrative disease. Subsequent CT imaging identified supraclavicular, axillary, abdominal lymphadenopathy, and hepatic/splenic infiltrative lesions.

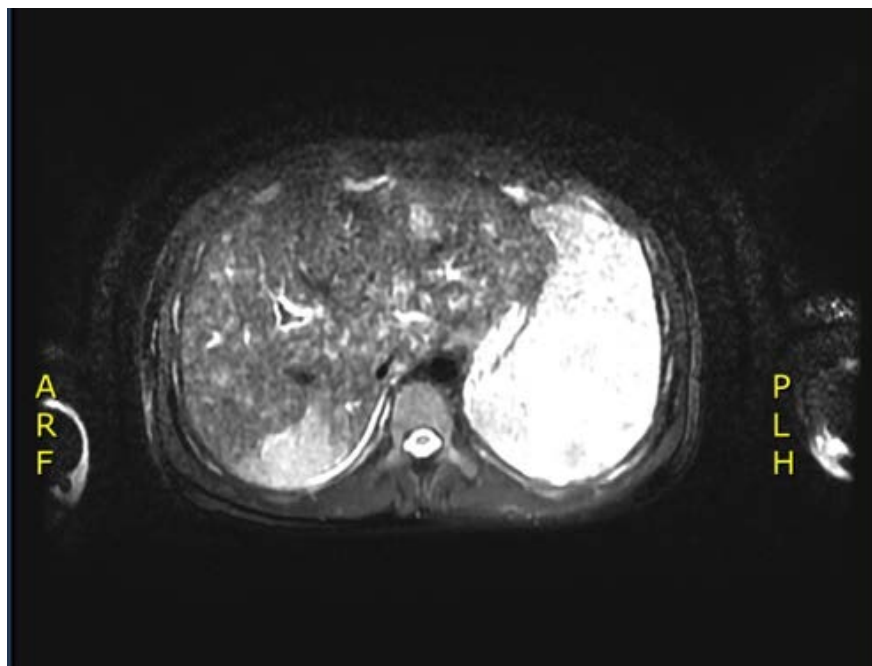
Given the constellation of persistent fever, cytopenias involving  $\geq 2$  hematologic lineages (anemia, leukopenia, and thrombocytopenia), hyperferritinemia, hypertriglyceridemia with hypofibrinogenemia, splenomegaly, hepatomegaly, and liver dysfunction, secondary Hemophagocytic Lymphohistiocytosis was strongly suspected. The patient fulfilled at least five HLH-2004 diagnostic criteria, specifically: (1) fever, (2) cytopenias affecting  $\geq 2$  cell lines, (3) hyperferritinemia, (4) hypertriglyceridemia with hypofibrinogenemia, and (5) splenomegaly. The calculated HScore was 200, corresponding to an estimated 88–93% probability of HLH. Bone marrow biopsy was deemed unnecessary given the clear clinicopathological diagnosis and fulfillment of established HLH diagnostic criteria. Assessment of soluble IL-2 receptor (sCD25) levels and NK-cell activity was not available at our institution and therefore could not be performed.

**Table 1.** Diagnosis requires  $\geq 5$  of the following 8 criteria (in the absence of a molecular diagnosis)[1].

Criterion	Definition / Threshold
Fever	$\geq 38.5^{\circ}\text{C}$
Splenomegaly	Clinically or radiologically detected
Cytopenias ( $\geq 2$ lineages)	Hb $< 9$ g/dL, Platelets $< 100 \times 10^9/\text{L}$ , Neutrophils $< 1.0 \times 10^9/\text{L}$
Hypertriglyceridemia and/or hypofibrinogenemia	Triglycerides $\geq 265$ mg/dL and/or Fibrinogen $\leq 150$ mg/dL
Hemophagocytosis	Bone marrow, spleen, lymph node, or liver
Low/absent NK-cell activity	Functional assay
Ferritin elevation	$\geq 500$ ng/mL (often much higher in practice)
Elevated soluble CD25 (sIL-2 receptor)	$\geq 2400$ U/mL



**Figure 1.** CT image of the upper abdomen demonstrates a diffusely heterogeneous hepatic parenchyma with a mottled attenuation pattern.



**Figure 2.** MRCP demonstrates hepatosplenomegaly, diffuse parenchymal liver abnormalities, and an 8 cm hepatic lesion concerning for infiltrative disease.

Histopathological examination of the supraclavicular lymph node biopsy demonstrated diffuse infiltration by large atypical lymphoid cells. Immunohistochemical analysis revealed positivity for CD20, CD5, CD30, BCL2, and CD25, with focal EMA expression. The neoplastic cells were negative for CD10, CD23, CD21, BCL6, and CD15. Ki-67 immunostaining demonstrated moderately increased proliferative activity. These findings were consistent with diffuse large B-cell lymphoma (DLBCL).

The patient was initiated on dexamethasone and emapalumab along with supportive care including blood product transfusion, broad-spectrum antibiotics, and electrolyte correction. Despite therapy, the patient experienced progressive cytopenias, worsening hyperbilirubinemia, and clinical deterioration, necessitating urgent transfer to a tertiary oncology center for definitive lymphoma-directed chemotherapy.

The patient received 1 cycle of R-CEP chemotherapy (Rituximab, Cyclophosphamide, Etoposide, and Prednisolone) in addition to 4 doses of Gamifant (Emapalumab). During admission, the patient showed significant clinical and laboratory improvement, with improvement of cytopenias and reduction of bilirubin level to 40  $\mu\text{mol/L}$  prior to discharge. The patient was discharged in good general condition. The planned 2nd cycle of chemotherapy was postponed due to CMV reactivation. Further management and timing of subsequent chemotherapy cycles will depend on control of CMV infection and reassessment of the patient's clinical and laboratory status.

## Discussion.

HLH is a hematologic emergency characterized by dysregulated immune activation leading to hypercytokinemia, tissue infiltration, and progressive multiorgan failure. Early recognition and prompt initiation of therapy are critical, as mortality remains exceedingly high when treatment is delayed [1,4,6,15].

In adults, HLH remains particularly challenging to diagnose because its clinical presentation is often nonspecific and may overlap with sepsis, acute liver injury, autoimmune disease, and hematologic malignancy [4,5,8]. The HLH-2004 criteria remain the most widely used diagnostic framework and require fulfillment of five of eight established criteria [1]. The HScore has also emerged as a valuable validated diagnostic tool in adults, with scores  $\geq 169$  demonstrating high sensitivity and specificity for HLH [3].

The present case was especially diagnostically challenging because hepatic dysfunction was the dominant initial manifestation, closely mimicking acute hepatitis. Although liver involvement is common in HLH, presentation as acute cholestatic hepatitis or acute liver failure is relatively uncommon and may delay recognition of the underlying hyperinflammatory syndrome [4,13].

Malignancy-associated HLH, particularly lymphoma-associated HLH, represents the most frequent subtype of secondary HLH in adults and is associated with a particularly poor prognosis [10,11]. Among malignancy triggers, large B-cell lymphomas, including diffuse large B-cell lymphoma (DLBCL), are recognized causes, although less common than T-cell or NK-cell lymphomas [11,12].

Marked hyperferritinemia is one of the most important diagnostic clues in HLH. Ferritin levels exceeding 10,000 ng/mL strongly support the diagnosis in the appropriate clinical context [9]. In this case, ferritin levels exceeded 15,000 ng/mL, significantly strengthening the clinical suspicion for HLH.

The cornerstone of treatment in malignancy-associated HLH involves rapid suppression of the hyperinflammatory state using HLH-directed therapy, most commonly dexamethasone with or without etoposide, followed by definitive treatment of the underlying malignancy [6,8]. Emerging targeted therapies, such as interferon- $\gamma$  blockade with emapalumab, may offer benefit in refractory cases, although data in malignancy-associated HLH remain limited [14].

Although Emapalumab is currently approved primarily for primary HLH, its use in this case was justified by the presence of severe malignancy-associated HLH accompanied by progressive multiorgan dysfunction and an insufficient response to initial supportive and immunosuppressive therapies. In the setting of a fulminant hyperinflammatory syndrome characterized by marked cytokine activation, worsening cytopenias, and progressive hepatic dysfunction, targeted inhibition of interferon- $\gamma$  was employed as a bridging therapeutic strategy to achieve inflammatory control prior to the initiation of definitive lymphoma-directed chemotherapy. Furthermore, emerging evidence supports a central pathogenic role of interferon- $\gamma$  in secondary HLH, including malignancy-associated subtypes, thereby providing a biologically plausible rationale for the off-label use of emapalumab in critically ill adult patients with refractory disease [16,17].

## Conclusion.

This case highlights an unusual hepatic-predominant presentation of DLBCL-associated HLH in a young adult, initially masquerading as acute hepatitis. HLH should be considered in patients presenting with unexplained hepatitis, cytopenias, hepatosplenomegaly, and marked hyperferritinemia. Early recognition and prompt multidisciplinary intervention are critical, particularly in malignancy-associated HLH, where delayed diagnosis may significantly worsen prognosis.

## Disclosure Statement.

The authors declare no conflicts of interest.

## REFERENCES

1. Henter JI, Horne A, Aricó M, et al. HLH-2004: Diagnostic and therapeutic guidelines for hemophagocytic lymphohistiocytosis. *Pediatr Blood Cancer*. 2007;48:124-131.
2. Emile J-F, Horne A, Requena-Caballero L, et al. Revised classification of histiocytoses and neoplasms of the macrophage-dendritic cell lineages. *Blood*. 2016;127:2672-2681.
3. Fardet F, Galicier L, Lambotte O, et al. Development and validation of the HScore for the diagnosis of reactive hemophagocytic syndrome. *Arthritis Rheumatol*. 2014;66:2613-2620.
4. Ramos-Casals M, Brito-Zerón P, López-Guillermo A, et al. Adult haemophagocytic syndrome. *Lancet*. 2014;383:1503-1516.
5. Schram AM, Berliner N. How I treat hemophagocytic lymphohistiocytosis in the adult patient. *Blood*. 2015;125:2908-2914.
6. Jordan MB, Allen CE, Weitzman S, et al. How I treat hemophagocytic lymphohistiocytosis. *Blood*. 2011;118:4041-4052.
7. Otrock ZK, Eby CS. Clinical characteristics, prognostic factors, and outcomes of adult patients with hemophagocytic lymphohistiocytosis. *Am J Hematol*. 2015;90:220-224.
8. La Rosée P, Horne A, Hines M, et al. Recommendations for the management of hemophagocytic lymphohistiocytosis in adults. *Blood*. 2019;133:2465-2477.
9. Allen CE, Yu X, Kozinetz CA, et al. Highly elevated ferritin levels and the diagnosis of hemophagocytic lymphohistiocytosis. *Pediatr Blood Cancer*. 2008;50:1227-1235.
10. Parikh SA, Kapoor P, Letendre L, et al. Prognostic factors and outcomes of adults with hemophagocytic lymphohistiocytosis. *Mayo Clin Proc*. 2014;89:484-492.
11. Machaczka M, Vaknā J, Klimkowska M, et al. Malignancy-associated hemophagocytic lymphohistiocytosis in adults: a retrospective population-based analysis. *Acta Oncol*. 2011;50:963-969.
12. Song Y, Wang Z, Hao X, et al. Hemophagocytic lymphohistiocytosis associated with B-cell lymphoma: a case series and literature review. *Oncotarget*. 2017;8:53581-53590.

13. Rivière S, Galicier L, Coppo P, et al. Reactive hemophagocytic syndrome in adults: a retrospective analysis of 162 patients. *Am J Med.* 2014;127:1118-1125.
14. De Benedetti F, Brogan P, Bracaglia C, et al. Emapalumab (anti-interferon gamma antibody) in primary HLH. *N Engl J Med.* 2020;382:1811-1822.
15. Janka GE. Familial and acquired hemophagocytic lymphohistiocytosis. *Annu Rev Med.* 2012;63:233-246.
16. Vallurupalli M, Berliner N. Emapalumab for the treatment of relapsed/refractory hemophagocytic lymphohistiocytosis. *Blood.* 2019.
17. Johnson WT, Epstein-Peterson ZD, Ganesan N, et al. Emapalumab as salvage therapy for adults with malignancy-associated HLH. *Haematologica.* 2024;109.