

Clinical and diagnostic features of Crohn's disease in young children

Olga M. Gorbatyuk¹, Dmitry S. Soleiko²

¹ NATIONAL HEALTHCARE UNIVERSITY OF UKRAINE, KYIV, UKRAINE

² NATIONAL PIROGOV MEMORIAL MEDICAL UNIVERSITY, VINNYTSIA, UKRAINE

ABSTRACT

Aim: To highlight the distinctive features of CD in young children, based on personal clinical experience in observation and treatment, with the objective of improving the accuracy of diagnosis and the effectiveness of treatment.

Materials and Methods: The study involves the results of treatment 11 young children with CD. The diagnosis was based on the combination of the following data: clinical manifestations of the disease and its course, as well as the results of laboratory, instrumental, and step biopsy with morphological studies.

Results: In young patients with CD, combined lesions of the small and large intestines predominate, manifesting as gastrointestinal disorders against the background of a severe general condition, intoxication, and extraintestinal complications. Young children with CD often show signs of asthenic syndrome, developmental delay, and high inflammatory activity. All the children in the study showed low serum iron levels, dysproteinemia, and high calprotectin levels.

Conclusions: 1. CD in young children has such clinical features as combined lesions of the small and large intestines (45.45% of cases), high activity of the disease, frequent extraintestinal manifestations of the disease, and developmental delay. All young children with CD upon admission to the hospital were in severe condition, exhibiting signs of intoxication, diarrhea, and blood in their stools. 2. Laboratory findings are characterized by serum iron deficiency, dysproteinemia, and high levels of calprotectin. 3. Knowledge of the clinical and diagnostic features of CD is essential for specialists to provide appropriate medical care.

KEY WORDS: Crohn's disease (CD), children, early age, clinical picture, diagnosis

Wiad Lek. 2024;77(9):2015-2019. doi: 10.36740/WLek/195170 DOI

INTRODUCTION

Crohn's disease (CD) in young children poses a substantial problem for these vulnerable patients. It is a gastrointestinal disease of unclear etiology, characterized by transmural (affecting all layers of the intestinal wall) segmental granulomatous inflammation, leading to intestinal (local) complications and extraintestinal (systemic) manifestations [1, 2]. Currently, the approaches to diagnosing and treating CD remain a topic of ongoing discussion among experts globally. CD is among the conditions that present significant challenges for practicing physicians. The increasing mortality rate among children with CD, including infants, is concerning and has attracted significant attention from both international and domestic researchers [3]. In recent years, there has been a noted increase in the incidence of CD in European countries. The early-onset incidence (new cases per year) in children is 4.37 per 100,000, and the prevalence is 14 per 100,000 [4]. According to a population-based Scottish study, over the past four decades, the incidence of early-onset CD and ulcerative colitis has tripled – in children under 5, the frequency

increased from 0.7 (1981–1985) to 2.0 per 100,000 per year (2008–2013) [5]. Experts estimate that the approximate number of patients with CD in Ukraine is 30.33 per 100,000 of the population, with 48% experiencing moderate to severe inflammatory activity, though the exact number of patients is unknown due to the absence of a registry [6]. In the last decade, there has been a trend toward an increase in early-onset cases, with the incidence of CD in childhood having tripled [7, 8]. However, to this day, CD in young children remains one of the least studied pathologies. Global research offers only incomplete and controversial data on the clinical presentation, diagnostic potential, and treatment strategies for CD in young children.

AIM

Aim was to highlight the distinctive features of CD in young children, based on personal clinical experience in observation and treatment, with the objective of improving the accuracy of diagnosis and the effectiveness of treatment.

MATERIALS AND METHODS

The study included the results of examination, treatment, and observation of 11 children with CD aged from 11 months to 3 years. Patient data were collected from medical history, review of outpatient case records, hospital discharge reports, and other relevant sources. The diagnosis was based on a combination of the following data: assessment of clinical manifestations of the disease and its course, and the results of laboratory, instrumental, and morphological studies. The instrumental methods of examination in children included: endoscopic examination with biopsy (fibrogastroduodenoscopy, fibrocolonoscopy, sigmoidoscopy), barium X-ray examinations of the gastrointestinal tract, double-contrast CT scan of the abdomen, MRI of the abdomen and pelvis, and morphological examination of clinical biopsy material. Biopsies should be multiple (or stepped), which involves taking samples from 5 areas along the large intestine, including the rectum and ileum. The gold standard for examining children with perianal lesions is rectal examination under anesthesia. When symptoms of CD appear at an early age, it is necessary to exclude the presence of primary immunodeficiency [9]. Thus, an immunological marker for suspected CD is antibodies to *Saccharomyces cerevisiae*. CD is verified by the morphological examination of clinical biopsy material [10, 11].

The activity of CD was assessed using the PCDAI (Pediatric Crohn's Disease Activity Index), as presented in Table 1 [12].

The study applied commonly accepted methods for statistical data processing in medical and biological research. Non-parametric methods were used due to the non-representative sample and the preference for analyzing qualitative rather than quantitative characteristics. Numerical indicators are presented in absolute values and in percentage ratios.

Compliance with bioethical principles was ensured.

RESULTS

While CD primarily affects the terminal ileum (a synonym for the disease is terminal ileitis), in young children, combined involvement of the small and large intestines predominates. Among the studied patients, 5 children exhibited combined involvement of the small and large intestines, which accounted for 45.45% of cases. In 2 (18.18%) young children, there was involvement of the ileum, in 3 (27.27%) patients only the large intestine was affected, and in 1 (9.09%) patient, there was involvement of the jejunum, which corresponded to the data presented by Aloj M et al. [13]. Perianal complications, known as 'perianal Crohn's disease', were

observed in 3 children in the study group: in 2 children with involvement of the large intestine and in 1 child with involvement of the ileum, accounting for 27.27%.

Upon admission to the hospital, the main manifestations of CD in young children were abdominal pain, vomiting, abdominal distension, the presence of purulent-hemorrhagic and mucous discharge from the rectum, fistulas in the buttock and perineal areas, rectal erosion, perianal dermatitis, loose stools, fever, and more. All young children with CD admitted to the hospital were in serious condition with signs of intoxication. Common symptoms in young children with CD included anemia, weakness, fever of unknown origin, fatigue, weight loss, loss of muscle mass, developmental delay, stunted growth, and more. More than half of the patients, namely 6 children (54.54%), had extraintestinal manifestations of CD: lesions of the oral mucosa in the form of canker sore, eye involvement such as iridocyclitis, and erythema nodosum. The analysis of the disease history data revealed that patients had previous complaints and changes in their general condition ranging from 1 month to 2 years.

Based on the nature of bowel movements, weight, height, the presence of perianal and extraintestinal manifestations, as well as laboratory changes (levels of Ht, ESR, and albumin), CD in the majority of young children in the study group was active. The high activity of CD in these young children, as assessed by the PCDAI (Pediatric Crohn's Disease Activity Index) scores, corresponded to moderate and severe forms of the disease.

All patients had inflammatory changes in their blood tests, including elevated ESR, leukocytosis, and high levels of C-reactive protein. It is noteworthy that all young children with CD in the study group had iron deficiency (low serum iron levels) and dysproteinemia. The level of fecal calprotectin, an inflammatory protein that indicates the degree of intestinal inflammation, was also elevated. The method of measuring fecal calprotectin has been implemented in practical healthcare as a screening tool to differentiate between inflammatory and non-inflammatory bowel diseases. In patients with CD, the level of calprotectin increased by 3-4 times or more (the normal range is 50 mcg/g) [14].

Upon admission to the hospital, the studied group of patients had elevated average values of the leukocyte intoxication index (LII) and the hematological index of intoxication (HII).

Antibodies to *Saccharomyces cerevisiae*, which serve as an immunological marker when CD is suspected, were detected in 6 young children, accounting for 54.54%.

Symptoms such as abdominal pain, weight loss, diarrhea, and asthenic syndrome were predominant

Table 1. Pediatric Crohn's Disease Activity Index (PCDAI)

Criteria	Presence	Scores
Abdominal Pain	None	0
	Mild intensity	5
	Severe	10
Bowel Movements, Frequency, Consistency	0-1 time/day, liquid, no blood present	0
	2-5 times/day, with minor blood presence	5
	≥ 6 times/day	10
Weight	No weight loss	0
	Weight loss of 1-9%	5
	Weight loss ≥ 10%	10
Height	Below 1st percentile	0
	From 1st to 2nd percentiles	5
	Below 2nd percentile	10
Abdominal Tenderness	No tenderness	0
	Tenderness or palpable mass	5
	Severe tenderness	10
Perirectal Manifestations	None	0
	Fistula, inflammation	5
	Abscess	10
Extraintestinal Manifestations	None	0
	One manifestation	5
	More than 2 manifestations	10
Hematocrit (children under 10 years)	≥33%	0
	28-32%	2.5
	≤28%	5
Hematocrit (girls 11-18 years)	≥34%	0
	29-34%	2.5
	≤29%	5
Hematocrit (boys 11-14 years)	≥35%	0
	30-34%	2.5
	≤30%	5
Hematocrit (boys 15-18 years)	≥37%	0
	32-36%	2.5
	≤32%	5
ESR (mm/hr)≤	≤ 20	0
	20-50	2.5
	≥50	5
Albumin (g/dl)	≥3.5	0
	3.1-34	5
	≤3	10
PCDAI Interpretation	No activity (remission)	≤ 10 scores
	Mild to moderate	11-30 scores
	Severe	30-100 scores

in young children. Among patients under one year of age, low body weight was present in 100% of cases, and growth delay occurred in 50% or more of the children. In children aged 1-3 years, disturbances in weight and height indicators were observed in 82.82% of cases (9 patients), and diarrhea in 63.64% (7 children). Blood in the stool was noted in 72.73% of the young children.

Key diagnostic methods for CD in children include endoscopic examinations. Children with CD exhibit aphthous lesions on a normal or inflamed intestinal mucosa. In one child, the jejunum was affected. During

rectosigmoidoscopy and fibrocolonoscopy, there were signs of focal infiltration, swelling, hyperemia with the formation of a cobblestone appearance of mucosa in the affected segments of the colon, enhanced or absent vascular pattern, multiple ulcers with debris, and the presence of liquid hemorrhagic content and/or blood clots in the intestinal lumen [15].

Today, methods of MRI and CT with bowel filling using water, such as hydro-MRI and hydro-CT, have become widely used. They enable highly accurate assessment of bowel wall thickness, the presence of intestinal ab-

scesses, stenoses, and effusions. These methods have expanded the diagnostic capabilities for CD in young children and in the early stages of the disease [16].

In 2014, the Porto Criteria for diagnosing CD were published (by the European Society for Paediatric Gastroenterology, Hepatology and Nutrition). They emphasize that even among the methods of additional diagnosis for CD, there is none that can guarantee the detection of CD in a child with 100% certainty. Therefore, clinicians must be aware that the diagnosis of CD should be verified by morphological methods of investigation [17].

According to the results of the morphological examination of biopsies taken during diagnostic procedures, the characteristic changes in the small intestine were as follows: uneven lymphoplasmacytic infiltration, infiltration by segmented neutrophils, eosinophils, and focal lymphoproliferative changes in the lamina propria of the small intestine; lymphocytic infiltration, areas of fibrinoid necrosis of the vessel wall, ulcerative defects with proliferative inflammatory changes, and fibrosis of the muscle layer; lymphoproliferative changes in the serous membrane, and the presence of ulcers with smooth edges extending into the subserosal layer. The morphological changes in the biopsy material of the colon were as follows: infiltration and lymphoplasmacytic infiltration of the lamina propria of the mucous membrane, areas of mucosal fibrosis, follicle formation in the mucous membrane, focal angiomatosis, areas of hyperplasia of intramural ganglia, ulcerative and proliferative inflammatory defects of the mucosal and serosal layers; muscle layer fibrosis; thickening of the intestinal wall due to pronounced fibrotic changes, presence of ulcers with smooth edges extending to the subserosal layer.

The results of morphological examination of biopsy samples from the esophagus, stomach, and duodenum, taken during esophagogastroduodenoscopy (EGD), in some small children revealed chronic atrophic duodenitis and erosions of the gastric mucosa, changes characteristic of chronic gastroduodenitis, and the presence of gastropathy.

Diagnostic search for CD must include mandatory testing for yersiniosis, which should be excluded in patients with CD.

In the treatment of CD in young children, it is crucial to use a combined approach, integrating conservative and surgical treatments. Surgical and medical treatments for CD should complement each other. The key to effective treatment is timely diagnosis of the pathology and determining appropriate medical care for the child, which should be based on multidisciplinary approaches in both diagnostic and therapeutic strategies.

DISCUSSION

Clinical monitoring and diagnosis of CD in young children must be comprehensive and multidisciplinary, involving pediatricians, gastroenterologists, immunologists, pediatric surgeons, morphologists, and others in the diagnostic process.

Our own experience of observing children with CD aged 11 months to 3 years reveals differences in the clinical presentation and laboratory findings in this pathology. In young patients, combined lesions of the small and large intestines predominate, manifested by gastrointestinal disorders against the background of a generally severe condition, intoxication, and extraintestinal complications. Asthenic syndrome and developmental delay are typical for young children with CD. High activity of the inflammatory process is also common in young children [4].

Regarding laboratory features, all the children from the study had low serum iron levels, decreased albumin levels, elevated gamma globulin levels, and fecal calprotectin levels increased by 3-4 times or more. Antibodies to *Saccharomyces cerevisiae*, which serve as an immunological marker when CD is suspected, were detected in half of the patients (54.54% of cases). Yersiniosis was excluded in all children with CD, which we consider a mandatory step in the diagnostic search.

The primary diagnostic methods for this group of patients are endoscopic examinations with biopsy sampling and morphological verification of the diagnosis.

Given the high number of cases of late diagnosis and unsatisfactory treatment outcomes of CD in young children, the issue requires the development of a unified strategy and treatment approach.

CONCLUSIONS

1. CD in young children has such clinical features as combined lesions of the small and large intestines (45.45% of cases), high activity of the disease process according to the PCDAI index, frequent extraintestinal manifestations of the disease (54.54% of cases), and developmental delay (100% of cases). All young children with CD upon admission to the hospital were in severe condition, exhibiting signs of intoxication, diarrhea, and blood in their stools.
2. Laboratory findings in young children with CD are characterized by serum iron deficiency, dysproteinemia, and high levels of calprotectin.
3. Knowledge of the clinical and diagnostic features of CD in young children is essential for specialists involved in the treatment of such patients to provide appropriate medical care.

REFERENCES

1. Abraham BP, Mehta S, El-Serag HB. Natural history of pediatric-onset inflammatory bowel disease: a systematic review. *J. Clin. Gastroenterology*. 2012;46(7):581 – 589. doi: 10.1097/MCG.0b013e318247c32f
2. Alpaslan K, Muhammed K. Crohn's disease from past to present: research trends and global outcomes with scientometric analysis during 1980 to 2022. *Medicine* 2023;102(35):e34817. doi: 10.1097/MD. 00000000000034817.
3. Olen O, Askling J, Sachs MC et al. Increased mortality of patients with childhood-onset inflammatory bowel disease, compared with the general population. *Gastroenterology*. 2019;156(3):614–622. doi: 10.1053/j.gastro.2018.10.028.
4. Benchimol EL, Fortinsky KJ, Gozdyra P. Epidemiology of pediatric inflammatory bowel disease: a systematic review of international trends. *Inflam. Bowel dis*. 2011;17(1): 423–39. doi: 10.1002/ibd.21349.
5. Van Assche G, Dignass A, Reinisch W et al. The second European evidence-based consensus on the diagnosis and management of Crohn's Disease: special situations. *J. Crohn's Colitis*. 2010;4(1):63–101. doi: 10.1016/j.crohns.2009.09.009.
6. Unifikovanyy klinichnyy protokol pervynnoyi, vtorynnoyi (spetsializovanoi) khvoroby kyshechnyky (khvoroba Krona, vyrazkovyy kolit) [Order of the Ministry of Health of Ukraine №90 11.02.2016. Unified clinical protocol for primary, secondary (specialized) bowel disease (Crohn's disease, ulcerative colitis)]. (Ukrainian)
7. Ushing K, Haggling P. Management of Crohn Disease. *JAMA* 2021;325(1):69–80. doi: 10.1001/jama.2020.18936.
8. Ledder O, Catto-Smith AG, Oliver MR et al. Clinical patterns and outcome of early-onset inflammatory bowel disease. *J. Ped. Gastroenterol. Nutr.* 2014;59(5):562–566. doi: 10.1097/MPG.0000000000000465.
9. Seirenji T, Collins KL, Evans DV. An update of inflammatory bowel disease. *Primary care*. 2017;44(4):673–692. doi: 10.1016/j.pop.2017.07.010.
10. Stoikevych MV, Haidar YuA, Mylostyva DF et al. Association between morphological manifestations of inflammatory bowel disease and biochemical markers of inflammation. *Zaporozhye Medical Journal*. 2022;24(6):665–673. doi: 10.14739/2310-1210.2022.6.260285.
11. Gant A, Lerer T, Griffiths AM et al. Assessing disease activity using the Pediatric Crohn's Disease Activity Index: can we use subjective or objective parameters alone? *World J. Gastroenterol*. 2021;27(30):5100–5111. doi: 10.3748/wjg.v27.i30.5100.
12. Aloï M, Lionetti P, Barabino A. Phenotype and disease course of early-onset pediatric inflammatory bowel disease. *Inflam. Bowel Dis*. 2014; 20(4):597–605. doi: 10.1097/01.MIB.0000442921.77945.09.
13. Francisco G, Rodrigo M, Pedro F et al. Faecal calprotectin is the biomarker that best distinguishes remission from different degrees of endoscopic activity in Crohn's disease. *BMC Gastroenterol*. 2020;20:35. doi: 10.1186/s2876-020-1183-x.
14. Tontini GE, Vecchi M, Neurath MF, Neumann H. Advanced endoscopic imaging techniques in Crohn's disease . *J. Crohn's Colitis*. 2014;8(4):261–269. doi: 10.1016/crohns.2013.09.004.
16. Towbin A. CT and MP Enterography in children and adolescents with inflammatory bowel disease. *Radiographics*. 2013;33(7):1843–1860. doi: 10.1148/rg.337105140.
17. Levine A, Koletzko S, Turner D et al. ESPGHAV revised Porto Criteria for the diagnosis of inflammatory bowel disease in children and adolescents. *J. Ped. Gastroenterol Nutr*. 2014;58(6):795–806. doi: 10.1097/MPG.0000000000000239.

CONFLICT OF INTEREST

The Authors declare no conflict of interest

CORRESPONDING AUTHOR

Olga M. Gorbatyuk

Shupyk National Healthcare University of Ukraine

9 Dorogozitska St., 04112 Kyiv, Ukraine

e-mail: ol.gorbatyuk@gmail.com

ORCID AND CONTRIBUTIONSHIP

Olga M. Gorbatyuk: 0000-0003-3970-8797 **A** **B** **D** **E**

Dmitry S. Soleiko: 0000-0002-8663-990X **B** **C** **F**

A – Work concept and design, **B** – Data collection and analysis, **C** – Responsibility for statistical analysis, **D** – Writing the article, **E** – Critical review, **F** – Final approval of the article

RECEIVED: 27.05.2024

ACCEPTED: 18.09.2024



CONTENTS

ORIGINAL ARTICLES

Vitaliy Myhovych, Andriiy Smolanka

Prognostic value of ultrasound and ENMG in predicting the results of treatment of tunnel compressive and post-traumatic neuropathies 1833

Oleksii I. Dronov, Inna O. Kovalska, Tetiana U. Ivanets, Liudmyla V. Levchenko, Larysa O. Roshchyna

Markers for predicting the severity of acute pancreatitis 1842

Yaroslav O. Mykhalko, Yaroslav F. Filak, Yuliia V. Dutkevych-Ivanska, Mariana V. Sabadosh, Yelyzaveta I. Rubtsova

From open-ended to multiple-choice: evaluating diagnostic performance and consistency of ChatGPT, Google Gemini and Claude AI 1852

Voctoriya V. Matiy, Mykola V. Rishko, Tetyana F. Rosola, Viktoria M. Hadzheha, Mykhailo P. Stan, Stanislav A. Tsoka

Biomarker diagnostics of endothelial dysfunction in patients with acute coronary syndrome and non-alcoholic fatty liver disease 1857

Oleksandr Y. Usenko, Yaroslav Y. Voitiv, Olexandr S. Tyvonchuk, Kateryna O. Usenko, Olena P. Dmytrenko, Vladyslav I. Makarov

Anastomotic leak: genetic aspects of prediction and choice of surgical treatment tactics 1863

Olexii I. Dronov, Inna O. Kovalska, Andrii I. Horlach, Larysa O. Roshchyna, Ivanna A. Shchyhel, Vadym O. Kostiukevich

Intra-abdominal hypertension and pancreatic destruction in patients with acute necrotizing pancreatitis 1871

Stepan S. Filip, Rudolf M. Slivka, Anatoly I. Shitev, Pavlo P. Kish

Minimally invasive methods of surgical treatment of patients with varicose disease of the lower extremities 1877

Olesia I. Ihnatko, Liudmyla V. Ihnatko, Svitlana O. Rudakova, Marianna I. Tovt-Korshynska, Nataliya V. Lizanets, Viktor Ya. Ihnatko, Yaroslav Ya. Ihnatko

Analysis of the prevalence of allergic rhinitis among children in Uzhhorod 1883

Nataliya Yu. Bysaha, Oxana O. Korchynska, Shtefanija Andrashchikova, Silvija Zhultakova, Alena Shlosserova

Endometrial hyperplasia as a consequence of mixed urogenital infections 1888

Oksana V. Klitynska, Gennadii F. Tkach, Liudmyla F. Horzov, Stepan S. Bozhyk, Orest V. Bun, Stepan S. Sheveria, Nataliya V. Layoch

Influence of elemental composition on the stability of restorative structures in permanent teeth in children from different geographical areas of residence 1982

Aidyn G. Salmanov, Volodymyr V. Artyomenko, Yuliia V. Strakhovetska, Olha D. Leshchova, Victor O. Rud, Andriy I. Chubatyy, Anastasia S. Padchenko, Svitlana M. Korniyenko, Oleksandr A. Voloshyn, Tetiana A. Stryk

Epidemiology of complications associated with gynecological laparoscopy procedures in Ukraine: results a multicenter study 1902

- Oleksandr M. Slobodian, Zoriana Z. Masna, Yaroslav I. Penishkevych, Khrystyna I. Rudnytska, Ilona V. Chelpanova, Olena V. Smolkova, Kostyantyn I. Voytsenko
The second week corneal changes in rodents model of streptozotocin-induced diabetes 1910
- Oksana V. Bakun, Natalya Ya. Muzyka, Svitlana B. Semenenko, Tetiana P. Savchuk, Alla I. Peryzhniak
Molecular-genetic characteristics of hmgb1 mrna expression in blood of women with endometriosis associated with infertility 1916
- Oksana V. Klitynska, Nataliya V. Layoch, Roksolana Yu. Kruchak, Viacheslav R. Gurando, Volodymyr V. Shetelya, Stepan S. Sheveria, Iurii O. Mochalov
Local anesthesia in adolescents with high anxiety levels 1922
- Olesya M. Horlenko, Iryna Yu. Pikina, Lyubomyra B. Prylypko, Gabriella B. Kossey, Olga A. Pushkarenko, Iryna M. Boisak, Ivan I. Pushkash
Dynamic indicators of the antioxidant system in children with acute respiratory pathology depending on the therapy scheme 1928
- Olesya M. Horlenko, Oksana M. Berezovska, Lyubomyra B. Prylypko, Oksana O. Korchynska, Lybov Yu. Pushkash, Olga V. Zolina
Violation of vitamin and mineral homeostasis in children with recurrent respiratory diseases 1938
- Olesya M. Horlenko, Jurij Ju.Chukhran, Gabriella B. Kossey, Viktoriia V. Ivano, Nataliia V. Sochka, Volodymyr D. Symulyk
The burdened medical history of the mothers-in-partum – risks for the newborn 1947
- Mykhaylo M. Oros, Liliia V. Soroka
Serotonin levels in children with cognitive impairment in delayed speech development in non-alcoholic fatty liver disease with obesity and Covid-19 1956
- Zoriana Tylishchak, Oleksandra Pryshliak, Oleksandr Boichuk, Sergiy Fedorov2, Andrii Protsyk, Taras Kobryn, Ruslan Miziuk
Effectiveness of the quercetin use in patients with COVID-19 with concomitant type 2 diabetes mellitus 1962
- Rawan Saad AlKadhaly, Muna Saleem Khalaf, Ghada Abdulmunim Mohammed
Oral health status in relation to nutritional status amongst 6-12 years aged orphans in Baghdad city, Iraq 1969
- Anatoliy Potapchuk, Vasyl Almashi, Yevhen Onipko, Viktoria Hegedush, Nazar Basarab, Serhii Tsuperiak
Analysis of the intensity of carious infection of teeth in children permanently living in conditions of a polluted ecosystem 1979
- Antonina V. Varvaynets
Specifics of barrier function impairment of the large intestine in patients with ulcerative colitis and joint damage 1989
- Tetyana M. Ternushchak, Marianna I. Tovt-Korshynska, Snizhana V. Feysa
Iron deficiency and heart failure with preserved ejection fraction 1996
- Yelyzaveta S. Sirchak, Volodymyr V. Kornash, Oleksandr O. Dutko, Mykhailo M. Lopit, Olena V. Ustych, Vasilij I. Griga
Differentiated approach to management of patients with irritable bowel syndrome and ulcerative colitis in non-alcoholic fatty liver disease 2002
- Olga S. Palamarchuk, Denys Ya. Shyp, Vasyl V. Kaliy, Olesya M. Horlenko, Stepan N. Vadzyuk, Oleksandr A. Rishko
Peculiarities of neurovegetative regulation in children and adolescents with sarcopenia according to heart rate variability indicators 2008

Olga M. Gorbatyuk, Dmitry S. Soleiko

Clinical and diagnostic features of Crohn's disease in young children 2015

Sukayna Jabbar Mushattat, Jabbar Abadi ALAridi, Salim Kadhim

Effect of some immunological markers on the level of anti- mullerian hormone (AMH) in women infected with *Toxoplasma gondii* 2020

Ammar Abdul Aziz Alibeg, Tuqa Salim Hussein

In silico study of new isatin- sulfonamide derivatives as carbonic anhydrase inhibitors 2027

Mushtaq Ibraheem, Saif Abdulrazaq

Molecular study of FAM20A gene and biochemical analysis for amelogenesis imperfecta patients 2033

Iyudmyla Rusyn, Oleksandr Pulyk, Myroslava Hryvavets

Correction of dysmenorrhea in teenage girls with autonomic dysfunction syndrome 2043

REVIEW ARTICLES

Kyryl G. Krymovskyy, Zinaida E. Zhehulovych, Kateryna V. Storozhenko, Yurii I. Babaskin

Nowadays and the future of the 3d digital technologies in modern orthodontics 2047

Aleksandra Kucharska-Lusina

Individual and molecular risk factors for the development of rheumatoid arthritis 2057

Myroslava V. Bielova, Viktoriia I. Fridmanska, Viktoriia Yu. Svyscho, Lesia V. Leshanych

Legal regulation of biomedical research: key principles and their implementation 2070

Roman M. Fridmanskyy, Andrianna Yu. Badyda, Oleksandr O. Pifko, Ihor Yu. Dir

Human rights in the context of transhumanist medicine: ethical and legal aspects 2077

Jerzy Głuszek

Novel pharmacologic approaches in resistant hypertension 2083

Tetiana Danylova, Svitlana Storozhuk, Nataliia Kryvda, Iryna Matviienko

For whom the bell tolls: The fear of death and the ways to become less afraid of it 2090

Anatolii Hrynzovskyi, Serhii V. Bielai, Vladimir S. Vasishev, Vladimir I. Pasichnik, Aleksandr M. Kernickyi, Mykola I. Tovma

Psychosocial aspects of rehabilitation of the National guard of Ukraine soldiers injured in combat 2098

CASE STUDIES

Agil N. Huseynov, Vladislav A. Malanchuk, Vyacheslav P. Maistrenko, Mykhailo S. Myroshnychenko, Olena V. Markovska, Andrii A. Boiko, Oleksii I. Hryniuk

Mine-explosive trauma of the maxillofacial region: current state of the problem and description of a case from practice 2104

Wiadomości Lekarskie

Medical Advances

Official journal of the Polish Medical Association
Wiadomości Lekarskie has been published since 1928



Volume LXXVII, Issue 10, OCTOBER 2024

ISSN 0043-5147

E-ISSN 2719-342X



Memory of
dr Władysław
Biegański

Wiadomości Lekarskie Medical Advances is abstracted and indexed in:
PUBMED/MEDLINE, SCOPUS, EMBASE, INDEX COPERNICUS,
MINISTRY OF SCIENCE AND HIGHER EDUCATION, POLISH MEDICAL BIBLIOGRAPHY

Copyright: © ALUNA Publishing

Articles published on-line and available in open access are published under Creative Commons Attribution-Non Commercial-No Derivatives 4.0 International (CC BY-NC-ND 4.0) allowing to download articles and share them with others as long as they credit the authors and the publisher, but without permission to change them in any way or use them commercially.

Distribution and Subscriptions:

Bartosz Guterman prenumerata@wydawnictwo-aluna.pl

Graphic design / production:

Grzegorz Sztank

fajne.work

Publisher:

ALUNA Publishing
29 Przesmyckiego st.,
05-510 Konstancin – Jeziorna, Poland
www.wydawnictwo-aluna.pl
www.wiadomoscilekarskie.pl
www.wiadlek.pl

Wiadomości Lekarskie

Medical Advances

Official journal of the Polish Medical Association
Wiadomości Lekarskie has been published since 1928



Editorial Team

Editor in-Chief:

Prof. Paweł Kalinski – Buffalo, USA

Honorary Editor in-Chief:

Prof. Władysław Pierzchała – Katowice, Poland

Deputy Editor in-Chief:

Prof. Waldemar Kostewicz – Warsaw, Poland
President Polish Medical Association

Statistical Editor:

Dr Lesia Rudenko – Konstancin – Jeziorna, Poland

Managing Editor:

Agnieszka Rosa – amarosa@wp.pl

International Editorial Office:

Nina Radchenko (editor) – n.radchenko@wydawnictwo-aluna.pl

International Editorial Board – in-Chief:

Marek Rudnicki Chicago, USA

International Editorial Board – Members:

Stalbek M. Akhunbaev	Bishkek, Kyrgyzstan	Jerzy Robert Ładny	Białystok, Poland
Kris Bankiewicz	San Francisco, USA	Stella Nowicki	Memphis, USA
Christopher Bara	Hannover, Germany	Alfred Patyk	Gottingen, Germany
Krzysztof Bielecki	Warsaw, Poland	Palmira Petrova	Yakutsk, Russia
Zana Bumbuliene	Vilnius, Lithuania	Waldemar Priebe	Houston, USA
Stanislav Czudek	Ostrava, Czech Republic	Maria Siemionow	Chicago, USA
Mowafaq Muhammad Ghareeb	Baghdad, Iraq	Aleksander Sieroń	Katowice, Poland
Nataliya Gutorova	Kharkiv, Ukraine	Vladyslav Smiiianov	Sumy, Ukraine
Marek Hartleb	Katowice, Poland	Tomasz Szczepański	Katowice, Poland
Roman Jaeschke	Hamilton, Canada	Andrzej Witek	Katowice, Poland
Andrzej Jakubowiak	Chicago, USA	Jerzy Woy-Wojciechowski	Warsaw, Poland
Peter Konturek	Saalfeld, Germany	Zbigniew Wszolek	Jacksonville, USA
George Krol	New York, USA	Vyacheslav Zhdan	Poltava, Ukraine