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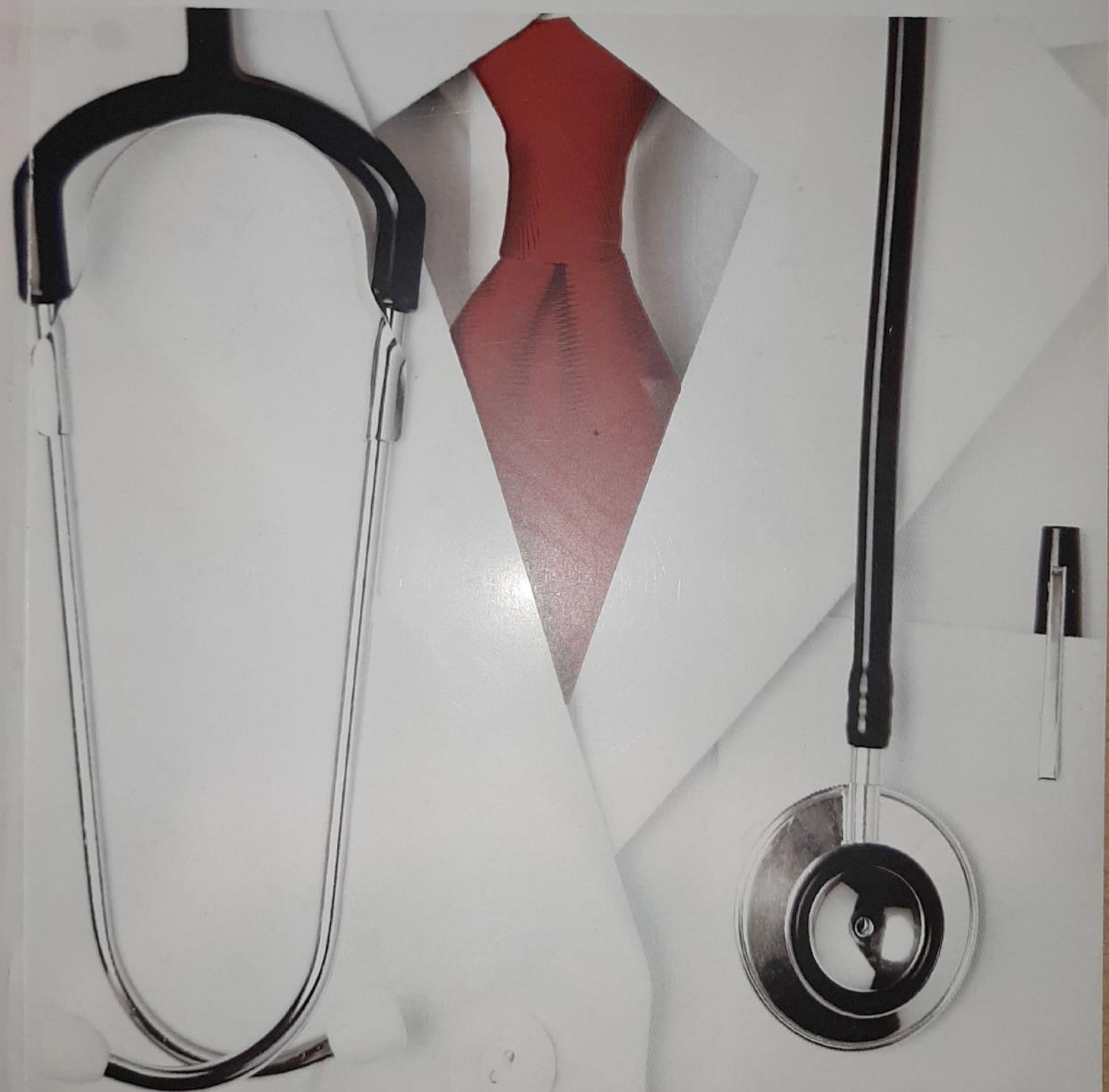
# Wiadomości Lekarskie



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# Wiadomości Lekarskie

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## SPIS TREŚCI

## PRACE ORYGINALNE / ORIGINAL ARTICLES

- Snizhana V. Feisa, Ivan V. Chopei  
SUBCLINICAL HYPOTHYROIDISM IN PATIENTS WITH NON-ALCOHOLIC FATTY LIVER DISEASE AT THE BACKGROUND OF CARBOHYDRATE METABOLISM DISORDERS  
SUBKLINICZNA NIEDOCZYNNOŚĆ TARCZYCY U PACJENTÓW Z NIEALKOHOLOWĄ STŁUSZCZENIOWĄ CHOROBAJĄ WĄTROBY NA PODŁOŻU ZABURZEŃ  
METABOLIZMU WĘGLOWODANÓW 261
- Olena O. Oshyvalova  
FEATURES OF VASCULAR DERMATOSCOPIC COMPONENT IN VARIOUS MORPHOLOGICAL TYPES OF EPIDERMAL DYSPLASIA  
DERMATOSKOPOWE CECHY KOMPONENTY NACZYNIOWEJ W RÓŻNYCH TYPAH MORFOLOGICZNYCH DYSPLAZII NASKÓRKA 265
- Mykhailo M. Oros, Volodymyr I. Smolanka, Nina V. Sofilkanych, Olesya I. Borovik, Vitaliy V. Luts, Pavlo G. Andruk  
EPILEPSY AFTER ISCHEMIC STROKE: IS IT WORTH ADMINISTERING ANTICONVULSANTS AFTER THE FIRST ATTACK?  
PADACZKA PO UDARZE NIEDOKRWIENNYM. CZY WARTO STOSOWAĆ LEKI PRZECIWPADACZKOWE JUŻ PO PIERWSZYM NAPADZIE? 269
- Liliya S. Babinets, Iryna M. Halabitska, Yuliia Ya. Kotsaba, Iryna O. Borovyk, Bogdan O. Migenko, Svitlana S. Ryabokon, Lydmila S. Tsybul'ska  
THE EFFECT OF THE PROTEOLYSIS SYSTEM ACTIVITY FOR THE TROPHOLOGICAL STATUS OF PATIENTS WITH OSTEOARTHRITIS AND EXCRETORY INSUFFICIENCY OF PANCREAS  
WPŁYW AKTYWNOŚCI PROCESÓW PROTEOLITYCZNYCH NA STAN ODŻYWIENIA PACJENTÓW Z CHOROBAJĄ ZWYRODNIENIOWĄ STAWÓW  
I NIEWYDOLNOŚCIĄ ZEWNĄTRZWDZIELNICZĄ TRZUSTKI 273
- Степан С. Філін, Андрій М. Братасюк, Рудольф М. Сливка  
ЕНДОСКОПІЧНА БІПОЛЯРНА ЕЛЕКТРОЕКЦИЗІЯ ТА ЛАЗЕРНА ФОТОКОАГУЛЯЦІЯ ПОЛІПІВ ТОВСТОЇ КИШКИ  
BIPOLAR ELECTROEXCISION AND ENDOSCOPIC LASER PHOTOCOAGULATION COLON POLYPS 277
- Lyubov V. Olenych, Lesya I. Pylypiv, Nataliya S. Bek, Olena M. Radchenko  
CORRELATIONS BETWEEN LIPID METABOLISM INDICES IN PATIENTS WITH HYPERTENSION AND HYPOTHYROIDISM  
KORELACJE POMIĘDZY WSKAŹNIKAMI METABOLIZMU LIPIDÓW U PACJENTÓW Z NADCIŚNIENIEM TĘNICZYM I NIEDOCZYNNOŚCIĄ TARCZYCY 281
- Serhii Yu. Tsiiporenko, Larysa F. Matyucha  
THE RESEARCH OF MEDICAL AND SOCIAL FACTORS OF THE RISK OF REPRODUCTIVE HEALTH OF MEN BY FAMILY DOCTOR  
ANALIZA KLINICZNYCH I SPOŁECZNYCH CZYNNIKÓW RYZYKA ZDROWIA REPRODUKCYJNEGO MĘCZYZN W WARUNKACH PRAKTYKI LEKARZA RODZINNEGO 285
- Оксана П. Кентеш, Мар'яна І. Немеш, Ольга С. Паламарчук, Володимир П. Фекета, Юліанна М. Савка  
ФУНКЦІОНАЛЬНИЙ СТАН АВТОНОМНОЇ РЕГУЛЯЦІЇ У ДІВЧАТ РЕПРОДУКТИВНОГО ВІКУ ЗАЛЕЖНО ВІД КОМПОНЕНТНОГО СКЛАДУ ТІЛА  
FUNCTIONAL STATE OF AUTONOMOUS REGULATION IN GIRLS OF REPRODUCTIVE AGE DEPENDING ON THE COMPONENT BODY COMPOSITION 291
- Marianna O. Dashko, Orysa O. Syzon, Ulyana V. Fedorova  
VALUES OF THE SYSTEMIC IMMUNITY IN PATIENTS SUFFERING FROM ACNE WITH DIFFERENT CLINICAL COURSE  
ANALIZA POZIOMU ODPORNOŚCI U PACJENTÓW Z TRĄDZIKIEM O RÓŻNYM PRZEBIEGU KLINICZNYM 297
- Тетяна В. Духович, Іван В. Чопей, Ксенія І. Чубірко  
ДИНАМІКА АНТИБІОТИКОРЕЗИСТЕНТНОСТІ *STAPHYLOCOCCUS AUREUS* ДО ЛІКАРСЬКИХ ЗАСОБІВ ФТОРХІНОЛОНОВОЇ ГРУПИ *IN VITRO* В ПАЦІЄНТІВ З НАДМІРНОЮ ВАГОЮ  
DYNAMICS OF *STAPHYLOCOCCUS AUREUS* ANTIBIOTIC RESISTANCE TO FLUOROQUINOLONES *IN VITRO* IN PATIENTS WITH OVERWEIGHT 301
- Yaroslav O. Mykhalko  
ANTIMICROBIAL SUSCEPTIBILITY PATTERNS OF *ESCHERICHIA COLI* IN CHILDREN AND ADULTS WITH URINARY TRACT INFECTIONS  
WZORCE LEKOWRAŻLIWOŚCI *ESCHERICHIA COLI* U DZIECI I DOROSŁYCH Z ZAKAŻENIEM UKŁADU MOCZOWEGO 306
- Elizaveta S. Sirchak, Silviya V. Patskun  
INTERRELATION BETWEEN GHRELIN AND GASTRIN IN PATIENTS WITH COMBINATION OF CHRONIC GASTRITIS AND TYPE 2 DIABETES MELLITUS  
ZWIĄZEK POMIĘDZY GRELINĄ A GASTRYNĄ U PACJENTÓW Z PRZEWLEKŁYM ZAPALENIEM ŻOŁĄDKA I WSPÓŁWYSTĘPUJĄCĄ CUKRZYCĄ TYPU 2 311
- Elizaveta S. Sirchak, Svetlana M. Opalenyk, Natalia Yu. Kurchak  
KALLISTATIN LEVEL IN PATIENTS WITH COMBINATION OF CHRONIC PANCREATITIS AND ATHEROSCLEROSIS  
POZIOM KALLISTATYNY U PACJENTÓW Z PRZEWLEKŁYM ZAPALENIEM TRZUSTKI I WSPÓŁWYSTĘPUJĄCĄ MIAŻDŻYCĄ 315
- Victoria S. Sukhan  
CLUSTER ANALYSIS OF THE PHENOTYPE OF ASTHMA AND OBESITY  
ANALIZA SKUPIEŃ (KLASTERYZACJA) FENOTYPU ASTMY I OTYŁOŚCI 319
- Orysa O. Syzon, Marianna O. Dashko, Ulyana V. Fedorova  
MODERN SPECIFIC FEATURES AND THERAPY OF PSORIASIS AND ARTHROPATHIC PSORIASIS COURSES  
NOWE SWOISTE CECHY PRZEBIEGU KLINICZNEGO ŁUSZCZYCY I ŁUSZCZYCOWEGO ZAPALENIA STAWÓW ORAZ NOWE OPCJE TERAPEUTYCZNE 322
- Oleksander R. Pulyk, Myroslava V. Hyryavets  
TREATMENT FOR PATIENTS WITH NEGLEKT AFTER ISCHEMIC STROKE  
LECZENIE CHORYCH Z ZESPOŁEM ZANIEDBYWANIA POŁOWICZEGO WTRÓNYM DO UDARU NIEDOKRWIENNEGO MÓZGU 326



- Galyna V. Yeryomenko  
THE DEPENDENCE OF THE ENDOTHELIAL FUNCTION ON COMORBID STATES IN PATIENTS WITH ASTHMA  
WPŁYW FUNKCJI ŚRÓDBŁONKA NA CHOROBY WSPÓŁWYSTĘPUJĄCE U PACJENTÓW Z ASTMĄ 329
- Yelyzaveta S. Sirchak, Mykhailo P. Stan, Valeria V. Brych  
CHANGES IN CHOLECYSTOKININ LEVEL IN PATIENTS WITH GASTROESOPHAGEAL REFLUX DISEASE ON THE BACKGROUND OF TYPE II DIABETES  
ZMIANY STĘŻENIA CHOLECYSTOKININY U PACJENTÓW Z CHOROBA REFLUKSOWĄ PRZELYKU W PRZEBIEGU CUKRZYCY TYPU 2 333
- Liliya S. Babynets, Nataliia A. Melnyk, Nataliia O. Shevchenko, Galina M. Sasyk, Olexandr S. Zemlyak, Olexandra Ye. Kopach, Olga Ye. Fedoriv  
OPTIMIZATION OF THE COMPLEX THERAPY OF CHRONIC PANCREATITIS WITH METABOLIC SYNDROME  
OPTIMALIZACJA ZŁOŻONEJ TERAPII PACJENTÓW Z PRZEWLEKŁYM ZAPALENIEM TRZUSTKI I ZESPOŁEM METABOLICZNYM 337
- Olesya M. Besh, Dmytro I. Besh, Olena O. Sorokopud, Marta O. Kondratiuk, Oksana R. Slaba  
ASIT THERAPY: ADVANTAGES AND ADVERSE EFFECTS. OWN RESULTS AND LITERATURE DATA  
ALERGENOWO SWOISTA IMMUNOTERAPIA (ASIT): KORZYŚCI I DZIAŁANIA NIEPOŻĄDANE. DOŚWIADCZENIA WŁASNE I PRZEGLĄD LITERATURY 341
- Антоніна В. Варваринець, Іван В. Чопей, Ксенія І. Чубірко  
КЛІНІКО-ЕНДОСКОПІЧНА ЕФЕКТИВНІСТЬ ЗАСТОСУВАННЯ ВЕДОЛІЗУМАБУ У ПАЦІЄНТІВ З НЕСПЕЦИФІЧНИМ ВИРАЗКОВИМ КОЛИТОМ  
CLINICAL AND ENDOSCOPIC EFFICACY OF VEDOLIZUMAB IN PATIENTS WITH ULCERATIVE COLITIS 346
- Gennadiy O. Slabkiy, Svetlana V. Delehan-Kokaiko  
SPECIAL FEATURES OF POPULATION MORBIDITY OF TRANSCARPATIAN REGION AS THE MOUNTAINOUS TERRITORY OF UKRAINE AND THE PREVALENCE OF DISEASES IN THE REGION  
SVOISTE CECHY CHOROBOWOŚCI POPULACYJNEJ OBWODU ZAKARPACKIEGO JAKO PRZYKŁADU GÓRZYSTEGO TERYTORIUM UKRAINY. ANALIZA WYSTĘPOWANIA CHORÓB W REGIONIE 350
- Yevheniya H. Zaremba, Nataliya O. Rak, Olha V. Zaremba, Olena V. Zaremba-Fedchyshyn, Marianna M. Vima, Liliya O. Odnorih  
INDICATORS OF BLOOD LIPID PROFILE, ACUTE PHASE REACTIONS AND URIC ACID IN PATIENTS WITH ARTERIAL HYPERTENSION COMBINED WITH CONNECTIVE TISSUE DYSPLASIA  
PROFIL LIPIDOWY, MARKERY REAKCJI OSTREJ FAZY ORAZ KWAS MOCZOWY U PACJENTÓW Z NADCIŚNIENIEM TĘTNICZYM I WSPÓŁWYSTĘPUJĄCĄ DYSPLAZJĄ TKANKI ŁĄCZNEJ 356
- Михайло М. Івачевський, Віталіна В. Івачевська  
ОБГРУНТУВАННЯ КОМПЛЕКСНОЇ ІНТЕНСИВНОЇ ТЕРАПІЇ ПЕЧІНКОВОЇ НЕДОСТАТНОСТІ, УСКЛАДНЕНОЇ ЕНЦЕФАЛОПАТІЄЮ  
SUBSTANTIATION OF COMPLEX INTENSIVE TREATMENT OF HEPATIC FAILURE, COMPLICATED BY ENCEPHALOPATHY 361
- Маріанна І. Немеш, Оксана П. Кентеш, Ольга С. Паламарчук, Ольга Є. Костенчак, Володимир П. Фекета  
ВЗАЄМОЗВ'ЯЗОК ПОКАЗНИКІВ КОМПОНЕНТНОГО СКЛАДУ ТІЛА З ФУНКЦІОНАЛЬНИМ СТАНОМ СЕРЦЕВО-СУДИННОЇ СИСТЕМИ У ЧОЛОВІКІВ МОЛОДОГО ВІКУ ЗАЛЕЖНО ВІД ТИПУ ГЕМОДИНАМІКИ  
THE CORRELATION BETWEEN BODY COMPOSITION AND THE FUNCTIONAL STATE OF CARDIOVASCULAR SYSTEM IN YOUNG MEN IN DEPENDENCE ON THE HEMODYNAMICS TYPES 366
- Людмила В. Ігнатко, Андріяна О. Янковська, Габрієла Г. Кавуля, Олена В. Дебрецені, Крістіан О. Дебрецені, Наталія М. Гема-Багіна, Агнета В. Ленченко  
ПОРІВНЯЛЬНА ХАРАКТЕРИСТИКА ФУНКЦІОНАЛЬНИХ ГАСТРОЦЕРЕБРАЛЬНИХ РОЗЛАДІВ У ДОНОШЕНИХ ТА НЕДОНОШЕНИХ ДІТЕЙ  
COMPARATIVE CHARACTERISTIC OF FUNCTIONAL GASTRO CEREBRAL DISORDERS IN DONORS AND PREMATURE INFANTS 372
- Oksana S. Khukhlina, Alona A. Antoniv, Olha Ye. Mandryk, Olha Ye. Hryniuk, Svitlana V. Kovalenko, Victoria Yu. Drozd, Zoriana Ia. Kotsiubilchuk  
CLINICAL AND PATHOGENETIC FEATURES OF NONALCOHOLIC STEATONEPHRITIS FOR COMORBIDITY WITH BRONCHIAL ASTHMA ON THE BACKGROUND OF OBESITY  
КЛІНІЧНІ ТА ПАТОГЕНЕТИЧНІ ОСОБЛИВОСТІ НЕАЛКОГОЛОВОГО СТІУСЗЧЕНІВОВОГО ЗАПАЛЕННЯ ВАТРОБИ І ВСПÓŁWYSTĘPUJĄCEJ АСТМУ ОСKRZЕЛОВОЈ НА ПОДЛОЖУ ОТУЇОŚCI 376
- OPISY PRZYPADKÓW / CASE REPORTS
- Іван П. Катеренчук, Лідія А. Ткаченко, Тетяна І. Ярмола, Олександр І. Катеренчук  
ПЕРВИННИЙ АМІЛОІДОЗ НИРОК: ОСОБЛИВОСТІ ПЕРЕБІГУ ТА МОЖЛИВОСТІ СВОЄЧАСНОЇ ДІАГНОСТИКИ (ВИПАДОК З ПРАКТИКИ)  
PRIMARY RENAL AMYLOIDOSIS: FEATURES OF DISEASE COURSE AND THE POSSIBILITIES OF IN-TIME DIAGNOSIS (CLINICAL CASE REPORT) 380
- STRESZCZENIA / ABSTRACT
- Vasyl M. Mykhalchuk, Averian G. Vasyliov  
A DESCRIPTIVE, CROSS-SECTIONAL, POPULATION-BASED STUDY OF MEDICAL AND DEMOGRAPHICAL CHARACTERISTICS OF COPD AMONG KYIV (UKRAINE) POPULATION AS AN INDICATOR OF GENERALIZED TENDENCIES  
OPISOWE, PRZEKROJOWE, POPULACYJNE BADANIE KLINICZNYCH I DEMOGRAFICZNYCH CECZ POCHP U MIESZKAŃCÓW KIJOWA (UKRAINA) JAKO WSKAŹNIK OGÓLNYCH TENDENCJI 385
- Andriy M. Bratasyuk, Stepan S. Filip, Vasyl Y. Ploskina  
COLON POLYPS' DETECTION FREQUENCY IN ELDERLY AND SENILE PATIENTS ON THE BACKGROUND OF NSAIDS THERAPY  
CZĘSTOŚĆ WYKRYWANIA POLIPÓW JELITA GRUBEJGO U OSÓB W STARSZYM WIEKU STOSUJĄCYCH NLPZ 386
- Eugene V. Sid', Oleksandr S. Kulbachuk  
DIAGNOSTIC VALUE OF MATRIX METALLOPROTEINASE-9 AMONG PATIENTS WITH ACUTE CORONARY SYNDROME WITH ELEVATION AND WITHOUT ELEVATION OF ST SEGMENT  
WARTOŚĆ DIAGNOSTYCZNA METALOPROTEINAZY MACIERZY ZEWNĄTRZKOMÓRKOWEJ MMP-9 U PACJENTÓW Z OSTRYM ZESPOŁEM WIENĆCOWYM Z PRZETRWAŁYM, JAK I BEZ PRZETRWAŁEGO UNIESIENIA ODCINKA ST 387
- Яна Ю. Гнепа, Іван В. Чопей, Ксенія І. Чубірко, Юрій В. Плоскіна  
ОЦІНКА ЯКОСТІ ЖИТТЯ У ХВОРИХ З МЕТАБОЛІЧНИМ СИНДРОМОМ  
ASSESSMENT OF QUALITY OF LIFE IN PATIENTS WITH METABOLIC SYNDROM 388



# INTERRELATION BETWEEN GHRELIN AND GASTRIN IN PATIENTS WITH COMBINATION OF CHRONIC GASTRITIS AND TYPE 2 DIABETES MELLITUS

## ZWIĄZEK POMIĘDZY GRELINĄ A GASTRYNĄ U PACJENTÓW Z PRZEWLEKŁYM ZAPALENIEM ŻOŁĄDKA I WSPÓŁWYSTĘPUJĄCĄ CUKRZYCĄ TYPU 2

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### ABSTRACT

**Introduction:** Ghrelin is 28-amino-acid peptide that is produced by X/A-like cells present in the stomach. Gastrin is a hormone that stimulates gastric acid secretion and mucosal cell growth.

**The aim:** to study the interrelation between ghrelin and gastrin levels in patients with combination of chronic gastritis and type 2 diabetes mellitus.

**Materials and methods:** 60 *Helicobacter pylori* positive patients with a combination of chronic gastritis and type 2 diabetes mellitus were examined. The diagnosis of type 2 diabetes mellitus is based on the recommendations of the International Diabetes Federation (IDF, 2005). Gastric acid secretion function was studied by intra-stomach express-pH-metry (method of prof. V.N. Chernobrov). Serum gastrin was determined using ELISA using Gastrin-EIA test kit Cat. No. CS 001 030. Serum ghrelin was determined by immunoassay analysis using the Human Ghrelin ELISA Kit from RayBiotech No. 1.03930005306

**Results:** The obtained data testify to the existence of a feedback between the level of ghrelin and gastrin in the blood of patients with chronic gastritis and type 2 diabetes mellitus. That is, with increasing levels of gastrin in the blood, the level of ghrelin in the blood decreases and vice versa with a decrease in the level of gastrin in the blood, the level of ghrelin – increases.

**Conclusions:** A significantly higher level of ghrelin was found in patients with type 2 diabetes mellitus and chronic gastritis compared with control group. The reverse association between gastrin and ghrelin levels in patients with combination of chronic gastritis and type 2 diabetes mellitus has been obtained.

**KEY WORDS:** chronic gastritis, type 2 diabetes mellitus, gastrin, ghrelin

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### INTRODUCTION

Gastrin is a hormone that stimulates gastric acid secretion and mucosal cell growth. It is released from G cells and it acts through the cholecystokinin-2 receptor. It is believed that gastrin stimulates the enterochromaffinlike cells to release histamine, which, in turn, binds to H<sub>2</sub> receptors on parietal cells and stimulate acid secretion. Both chemical and mechanical stimuli increase gastrin secretion. These stimuli act directly on the G cell and/or indirectly through the adjacent neuroendocrine cells and neurons. [1] The pituitary gland adenylate cyclase-activating protein, bombesin, sucralose, glucose, caffeine, and bacterial lipopolysaccharide also stimulate gastrin release [2]. Such causes as gastrinoma, predominant *Helicobacter pylori* associated gastritis, gastric outlet obstruction; renal failure, retained antrum, atrophic gastritis, and antisecretory therapy can lead to increase in the serum gastrin concentration [3].

Ghrelin is 28-amino-acid peptide that is produced by X/A-like cells present in the stomach and also throughout

the entire gastrointestinal tract ghrelin expression has been described. Thirty percent of the circulating ghrelin levels are acylated and remaining 70% circulates as unacylated ghrelin. The ghrelin-circulating levels were decreased after gastrectomy, suggesting that the stomach is the main source of ghrelin in the organism. Such tissues as hypothalamus, pituitary, ovary, testis, heart and placenta are responsible for ghrelin release [4].

After feeding, low levels of ghrelin can be seen and in food deprivation conditions plasma ghrelin levels are elevated. The mechanism that directly regulates ghrelin production in the stomach remained unclear, leading to the assumption that any changes in plasma ghrelin reflect changes in gastric ghrelin release. Changes in plasma ghrelin levels that are mediated by food provided due to variations in ghrelin release by the stomach. The ghrelin secretion directly from the stomach is regulated not only by the direct mechanical contact with the gastric wall, digestion or absorption of nutrients. It can be stimulated



and modify without real food intake, in the same way as true feeding. This fact indicates that a relevant factors involved in this process are the central nervous system, including ghrelin as a neural-mediated integrative factor that constitutes as a link between the sensory qualities of food, neural activation and nutrient metabolism. [5]

Ghrelin has orexigenic and lipogenic effects and also plays significant role in glucose regulation. While acylated ghrelin can lead to insulin resistance, the unacylated ghrelin counters hyperglycemia and enhances insulin sensitivity [6].

## THE AIM

Aim: to study the interrelation between ghrelin and gastrin levels in patients with combination of chronic gastritis (CG) and type 2 diabetes mellitus (DM).

## MATERIALS AND METHODS

60 *Helicobacter pylori* positive patients with a combination of CG and type 2 DM, who were treated in the endocrinology department in Transcarpathia Regional Clinical hospital named after A. Novak in Uzhhorod. The average age of patients was  $57.6 \pm 2.3$  years. Among patients there are 35 (58.3%) women and 25 (41.7%) men. Patients underwent general clinical examinations according to local protocols. The diagnosis of type 2 DM is based on the recommendations of the International Diabetes Federation (IDF, 2005), that is, determining the level of glucose in serum on the empty stomach and 2 hours after glucose administration using the oxidant method. The severity of diabetes was assessed by the level of glycosylated hemoglobin (HbA1c, %), which was determined using a chromogenic assay on Sysmex 560 (Japan) using Siemens reagents.

Gastric secretion's function was studied by intra-stomach express-pH-metry, using a computer system by the method of prof. V.N. Chernobrov. In the computer analysis of the results, the functional interval of pH (FI pH) from 0 to 5 (in the direction of greater acidity of the stomach) was taken into account:

- pH 7.0 - 7.5 (FI-pH0 - anacidity);
- pH 3.6-6.9 (FI pH1 - hypoacidity expressed);
- pH 2,3 - 3,5 (FI pH2 - moderate hypoacidity);
- pH 1.6 - 2.2 (FI pH3 - normoacidity);
- pH 1.3 - 1.5 (FI pH4 - moderate hyperacidity);
- pH 0.9 - 1.2 (FI pH5 - hyperacidity expressed).

HP was confirmed by detection of its fecal antigens (CITO TEST H.Pylori Ag, Pharmasco, Ukraine).

Serum gastrin was determined using ELISA using Gastrin-EIA test kit Cat. No. CS001 030.

Serum ghrelin was determined by immunoassay analysis using the Human Ghrelin ELISA Kit from RayBiotech No. 1.03930005306, according to the application method. Reading the results was carried out at a wavelength of 450 nm.

The criteria for inclusion of patients in this study were:

Patients with type 2 DM and CG with HP infection;

Criteria for exclusion of patients from this study:

Patients with type 1 DM;

Patients who have already received anti-helicobacter therapy.

All studies were conducted with the consent of patients, and its method corresponded to the Helsinki Declaration of 1975 and its revision in 1983.

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The analysis and processing of the results of the patient examination was carried out using the computer program STATISTICA 10.0 (firm StatSoftInc, USA).

## RESULTS

According to the results of intra-stomach pH-metry, patients were divided into 2 groups depending on the degree of pH change. In 75% (45) patients, there was a pronounced gastric hyperacidity, and these patients were included in group I. In 25% (15) patients moderate gastric hyperacidity was detected; these patients were included into II group. The control group included 20 practically healthy people. We measured the level of ghrelin and gastrin in these patient groups. The obtained data are listed in Table I below as the arithmetic mean of the values of the examined patients.

The obtained data testify to the existence of a feedback between the level of ghrelin and gastrin in the blood of patients with CG and type 2 DM. That is, with increasing levels of gastrin in the blood, the level of ghrelin in the blood decreases and vice versa with a decrease in the level of gastrin in the blood, the level of ghrelin - increases.

One of the functions of ghrelin is to increase tissue sensitivity to insulin and increase insulin secretion in response to hyperglycemia. Thus, as the main pathogenic component of type 2 diabetes is insulin resistance, the reduction of the ghrelin level in patients with this pathology is natural. The data of our study, partly confirm the effect of insulin resistance to the level of ghrelin, but according to Table II, we can conclude that not only this factor affects the secretion of the hormone, since when comparing two groups with a difference in pH of gastric juice; increase in the ghrelin level in falling pH was seen.

## DISCUSSION

In present study, decrease in the serum's ghrelin level was observed in patients with combination of CG and DM compared with the control group, and the difference was statistically significant ( $p < 0,05$ ). On the contrary, the result of a prospective study carried out by Bennet et al. showed that no association between the baseline ghrelin level and the incidence of type 2 DM was found. [7] The others clinical studies have identify the interrelation between serum ghrelin, glucose and insulin, but the physiological mechanisms of this relationship remain unclear. [8,9] Previous studies were concentrating only on the changes in ghrelin level in patients with type 2 DM, but the main organ of the body that is responsible for the ghrelin se-



Table I. Gastrin level in patients with combination of CG and type 2 DM, depending on the acid-forming function of the stomach.

Gastric acid secretion function of the stomach	Gastrin level (pg/ml)
I group (hyperacidity expressed) n= 40	123,7±4,7*
II group (moderate hyperacidity) n= 15	98,4±2,4
Control group n= 20	72,4±3,4*

\*p<0,05 – data are reliable.

Table II. Ghrelin level in patients with a combination of CG and type 2 DM, depending on the acid-forming function of the stomach.

Gastric acid secretion function of the stomach	Ghrelin level (mmol/l)
I group (hyperacidity expressed) n= 40	91,195±3,8*
II group (moderate hyperacidity) n= 15	234,983±5,7
Control group n= 20	365,657±6,5*

\*p<0,05 – data are reliable.

cretion is stomach. It is known that such disease as CG affects the production of gastric juice and also influence on its chemical composition.

Other findings suggest that hyperinsulinemia associated with insulin resistance decreases serum ghrelin levels in type 2 DM and obese subjects. The present study was in the favor that there is an inverse relationship between fasting glucose and ghrelin level. The study also demonstrated that hyperglycemia due to disturbance in glucose metabolism may result in suppression of ghrelin level in type 2 DM and obesity. [10]

Ghrelin suppresses glucose-induced insulin secretion, without significantly influencing insulin secretion at basal and lower glucose concentrations. This glucose-dependence can be explained by the action of ghrelin to counteract cAMP signaling in  $\beta$ -cells, which is well known to glucose-dependently promote insulin secretion. [11]

In this study interrelation between gastrin and ghrelin levels were observed in patients with combination of CG and type 2 DM. In all previous studies only interrelation between ghrelin serum level, glucose, and insulin were examined in patients with different metabolic diseases. Level and effect of gastrin were examined only in connection with the stomach disorders. The present study combines both hormones evaluation in patients with combination of CG and type 2 DM. Still the mechanism of interrelation between gastrin and ghrelin level in pathological states remain unknown.

### CONCLUSIONS

A significantly higher level of ghrelin was found in patients with type 2 DM and CG compared with control group. The reverse association between gastrin and ghrelin levels in patients with combination of CG and type 2 DM has been obtained.

### REFERENCES

- Ericsson P, Hakanson R, Rehfeld JF et al. Gastrin release: antrum microdialysis reveals a complex neural control. *Regul Pept.* 2010;161:22–32.
- Kidd M, Hauso O, Drozdov I et al. Delineation of the chemomechanosensory regulation of gastrin secretion using pure rodent G cells. *Gastroenterology.* 2009;137:231–241.
- Murugesan SVM, Varro A, Pritchard DM. Review article: strategies to determine whether hypergastrinaemia is due to Zollinger–Ellison syndrome rather than a more common benign cause. *Aliment Pharmacol Ther.* 2009;29:1055–1068.
- Al Massadi O, Tschop MH, Tong J. Ghrelin acylation and metabolic control. *Peptides.* 2011;32:2301–2308.
- Seoane LM, Al-Massadi O, Caminos JE et al. Sensory stimuli directly acting at the central nervous system regulates gastric ghrelin secretion. An ex vivo organ culture study. *Endocrinology.* 2007;148:3998–4006.
- Collden G., Tschop MH, Muller TD. Therapeutic potential of targeting the ghrelin pathway. *International Journal of Molecular Sciences.* 2017;18(4):798.
- Bennett NR, Boyne MS, Cooper RS et al. Impact of adiponectin and ghrelin on incident glucose intolerance and on weight change. *Clin Endocrinol (Oxf).* 2009;70:408–414.
- Purnell JQ, Weigle DS, Breen P et al. Ghrelin levels correlate with insulin levels, insulin resistance, and high-density lipoprotein cholesterol, but not with gender, menopausal status, or cortisol levels in humans. *J Clin Endocrinol Metab.* 2003;88:5747–5752.
- Vartiainen J, Rajala U, Jokelainen J et al. Serum ghrelin and the prediction of the development of impaired glucose regulation and Type 2 diabetes in middle-aged subjects. *J Endocrinol Invest.* 2010;33:496–500.
- Jawed M, Saeed MS, Shahid A et al. Ghrelin Level in Type 2 Diabetes Mellitus and Obesity. *Annals of King Edward Medical University.* 2017;23(3):312-319.



11. Yada T, Damdindorj B, Rita RS et al. Ghrelin signalling in  $\beta$ -cells regulates insulin secretion and blood glucose. *Diabetes, Obesity and Metabolism*. 2014;16(S1):111-117.

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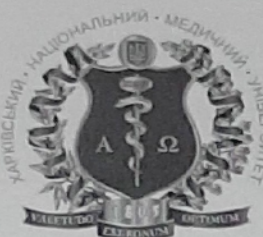
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**SCIENTIFIC AND PRACTICAL CONFERENCE  
WITH INTERNATIONAL PARTICIPATION**

**"MEDICINE OF BORDERLINE CONDITIONS: THEORY AND PRACTICE OF PRENOSOLOGICAL  
DIAGNOSTICS, TREATMENT AND PREVENTION OF OCCUPATIONAL DISEASES"**

**DEAR COLLEAGUES!**

We inform you about the holding, and invite you to take part in the scientific and practical conference with international participation "Medicine of borderline conditions: Theory and Practice of Prenosological Diagnostics, Treatment and Prevention of Occupational Diseases" which will be held on September 25-26, 2018 in Kharkiv, Ukraine with the participation of the scientists and doctors on occupational hygiene, occupational pathologists and other specialists in the field of preventive and clinical medical organizations, organizers and heads of health care institutions, representatives of public organizations, industrial enterprises of Ukraine, Armenia, Poland, Germany and other countries. This conference is included in the "Register of congresses, symposiums and scientific-practical conferences, 2018" which is published by Ministry of Public Health and National Academy of Medical Sciences of Ukraine.

**BASIC THEMATIC DIRECTIONS OF THE CONFERENCE:**

- Creative heritage of the founders of world and native occupational medicine.
- Prospects for the further development of occupational hygiene and occupational pathology.
- Theoretical foundations and practice of medicine of borderline conditions.
- Review the existing health paradigm.
- Reforming the medical sector based on its prophylactic orientation.
- Prenosological diagnostics of occupational diseases.
- Correction of pre-pathological conditions in the prevention of occupational diseases.
- Modern methods of health research and technology for its preservation.
- Medical aspects of vocational education, vocational guidance and vocational guidance.
- Psycho-hygiene of labor, upbringing, education, daily life, extraordinary situations.
- Actual problems of higher medical education in the field of medicine.

**Languages of the conference:** Ukrainian, English, Russian

**Materials of the conference will be published:**

like abstracts in the digest "Medicine of Borderline Conditions: Theory and Practice of Prenosological Diagnostics, Treatment and Prevention of Occupational Diseases";

like articles in the magazines "Experimental and Clinical Medicine", "Wiadomości Lekarskie" (Poland).

**On the questions related to the organization and conducting the Conference call**

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