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## Koordynator projektu

Agnieszka Rosa  
tel. 694 778 068  
amarosa@wp.pl

## Redakcja zagraniczna

dr n. med. Lesia Rudenko  
l.rudenko@wydawnictwo-aluna.pl

## Wydawca

Wydawnictwo Aluna  
ul. Przesmyckiego 29  
05-510 Konstancin-Jeziorna  
www.aluna.waw.pl

## Prenumerata

prenumerata@wydawnictwo-aluna.pl  
www.wiadomoscilekarskie.pl/prenumerata

## Opracowanie graficzne

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## SPIS TREŚCI

### PRACE ORYGINALNE / ORIGINAL ARTICLES

- Elzbieta Kulikowska-Karpińska, Magdalena Zdanowicz, Małgorzata Gałazyn-Sidorczuk  
OCENA STĘŻENIE MIEDZI W MOCZU OSÓB PALĄCYCH PAPIEROSY  
ESTIMATION OF MERCURY IN THE URINE OF CIGARETTE SMOKERS 697
- Marlena Olszak-Waškiewicz, Elzbieta Kramarz  
WARTOŚĆ ROKOWNICZA MUTACJI GENU KCNQ1 U CHORYCH PO ZAWALE SERCA  
THE PROGNOSTIC VALUE OF KCNQ1 GENE MUTATIONS IN PATIENTS AFTER MYOCARDIAL INFARCTION 703
- Natalia I. Chekalina, Svitlana V. Shut', Tetiana A. Trybrat, Yurii H. Burmak, Ye. Petrov, Yulia I. Manusha, Yurii M. Kazakov  
EFFECT OF QUERCETIN ON PARAMETERS OF CENTRAL HEMODYNAMICS AND MYOCARDIAL ISCHEMIA IN PATIENTS WITH STABLE CORONARY HEART DISEASE  
WPŁYW KWERCETYNY NA PARAMETRY CENTRALNEJ HEMODYNAMIKI ORAZ NIEDOKRWIENIE MIOKARDIUM U PACJENTÓW ZE STABILNĄ CHOROBAJĄ NIEDOKRWIENNĄ SERCA 707
- Oksana V. Byelan, Tetiana V. Mamontova, Liudmyla E. Vesnina, Oksana A. Borzykh, Igor P. Kaidashev  
ANTI-INFLAMMATORY AND ENDOTHELIUM PROTECTIVE EFFECT OF LONG-TERM PIOGLITAZONE INTAKE IN PATIENTS SUFFERING FROM BRONCHIAL ASTHMA CONCURRENT WITH ISCHEMIC HEART DISEASE  
EFEKT PRZECIWPALNY I OCHRONNY WPŁYW NA ŚRÓDBŁONEK DŁUGOTERMINOWEGO STOSOWANIA PIOGLITAZONU U PACJENTÓW Z ASTMĄ OSKRZELOWĄ WSPÓŁWYSTĘPUJĄCĄ Z CHOROBAJĄ NIEDOKRWIENNĄ SERCA 712
- Halyna O. Movchan, Viktoriya M. Khomenko, Inna I. Andrushko, Olena I. Ostapchuk, Lidia M. Kyrychenko  
ZASTOSOWANIE I OCENA PORÓWNAWCZA EFEKTU PRZECIWNADCIŚNIENIOWEGO ACE-INHIBITORA SPIRAPRYLU I ANTAGONISTY WAPNIA AMLODYPINY PODCZAS ZLECANIA ICH METODĄ TRADYCYJNĄ I METODĄ CHRONOTERAPII  
EXPERIENCE AND COMPARISON OF ANTIHYPERTENSIVE EFFECT OF ACE INHIBITOR SPIRAPRIL AND CALCIUM ANTAGONIST AMLODIPINE IN STANDARD AND CHRONOTHERAPEUTIC PRESCRIPTION MODE 721
- Татьяна Б. Олешко, Ольга А. Обухова, Татьяна М. Олешко, Ольга И. Матлай, Дмитрий Д. Сотников, Виктория Ю. Гарбузова  
РОЛЬ ОДНОНУКЛЕОТИДНОГО ПОЛИМОРФИЗМА C+70G ГЕНА РЕЦЕПТОРА ЭНДОТЕЛИНА-A В РАЗВИТИИ ИШЕМИЧЕСКОГО АТЕРОТРОМБОТИЧЕСКОГО ИНСУЛЬТА  
ROLE OF C+70G SINGLE NUCLEOTIDE POLYMORPHISM OF ENDOTHELIN RECEPTOR A GENE IN THE DEVELOPMENT OF ISCHEMIC ATHEROTHROMBOTIC STROKE 725
- Liudmyla A. Vygivska, Iryna O. Tuchkina, Violetta B. Kalnytska  
THE IMPACT OF EMERGENT INFECTIONS ON THE FETAL STATE  
WPŁYW POWAŻNYCH INFEKCI NA DOBROSTAN PŁODU 731
- Oksana Kopchak, Oleksander Pulyk  
ASSOCIATION BETWEEN DEPRESSIVE SYMPTOMS AND COGNITIVE IMPAIRMENT IN PATIENTS WITH METABOLIC SYNDROME  
ZWIĄZEK POMIĘDZY OBJAWAMI DEPRESYJNYMI A ZABURZENIAMI POZNAWCZYMI U PACJENTÓW Z ZESPOŁEM METABOLICZNYM 737
- Hryn V.H., Svintsytska N.L., Piliuhin A.V., Ustenko R.L., Katsenko A.L.  
THE USE OF INJECTION-CORROSIVE METHOD IN THE STUDY OF EXTRAORGANIC BLOODSTREAM OF HUMAN INTACT STOMACH  
WYKORZYSTANIE METODY INIEKCYJNO-KOROZYJNEJ W BADANIACH PRZEPŁYWU KRWI W LUDZKICH ŻOŁĄDKACH EX VIVO 742
- Ruslan V. Lutsenko, Antonina H. Sydorenko, Viktor M. Bobryriov  
ANHEDONIA AT EXPERIMENTAL MODELS OF CHRONIC STRESS AND ITS CORRECTION  
ANHEDONIA W MODELACH EKSPERYMENTALNYCH PRZEWLEKŁEGO STRESU I PRÓBY JEJ POPRAWY 745
- Andriy R. Stasyshyn  
GASTROESOPHAGEAL REFLUX DISEASE: THE RESULTS OF VIDEO LAPAROSCOPIC FUNDOPLICATION AT FIVE YEARS AFTER SURGERY  
CHOROBA REFLUKSOWA PRZEŁYKU: WYNIKI Z 5-LETNIEJ OBSERWACJI PO ZABIEGU FUNDOPLIKACJI WIDEOLAPAROSKOPOWEJ 751
- Tetiana A. Petrushanko, Viktoriia V. Chereda, Galina A. Loban'  
THE RELATIONSHIP BETWEEN COLONIZATION RESISTANCE OF THE ORAL CAVITY AND INDIVIDUAL-TIPOLOGICAL CHARACTERISTICS OF PERSONALITY: DENTAL ASPECTS  
ZWIĄZEK POMIĘDZY OPORNOŚCIĄ KOLONIZACYJNĄ MIKROORGANIZMÓW JAMY USTNEJ A INDYWIDUALNĄ TYPOLOGICZNĄ CHARAKTERYSTYKĄ OSOBOWOŚCI – ASPEKTY DENTYSTYCZNE 754
- Dmytro Shkurupii  
EARLY ENTERAL NUTRITION AS A PART OF INTENSIVE CARE OF ABDOMINAL SURGICAL PATHOLOGY  
WCZESNE ŻYWIENIE JELITOWE W KOMPLEKSIE INTENSYWNEJ TERAPII PATOLOGII CHIRURGICZNEJ JAMY BRZUSZNEJ 758
- Vera D. Kuroyedova, Alexandra N. Makarova, Tatyana A. Chicor  
FUNCTIONAL CONDITION OF MASSETERS MUSCLES OF PATIENTS WITH CLASS II SUBDIVISION  
STAN CZYNNOŚCIOWY MIĘŚNI ŻWACZY U PACJENTÓW Z JEDNOSTRONNĄ KLASĄ II 762



## THE RELATIONSHIP BETWEEN COLONIZATION RESISTANCE OF THE ORAL CAVITY AND INDIVIDUAL-TYOLOGICAL CHARACTERISTICS OF PERSONALITY: DENTAL ASPECTS

### ZWIĄZEK POMIĘDZY OPORNOŚCIĄ KOLONIZACYJNĄ MIKROORGANIZMÓW JAMY USTNEJ A INDYWIDUALNĄ TYPOLOGICZNĄ CHARAKTERYSTYKĄ OSOBOWOŚCI – ASPEKTY DENTYSTYCZNE

**Tetiana A. Petrushanko, Viktoriia V. Chereda, Galina A. Loban'**

HIGHER STATE EDUCATIONAL ESTABLISHMENT OF UKRAINE "UKRAINIAN MEDICAL STOMATOLOGICAL ACADEMY", POLTAVA, UKRAINE

#### ABSTRACT

**Introduction:** The present article deals with the role of the oral mucosa colonization resistance in the implementation of the influence of individual-typological characteristics of the individual susceptibility to caries and inflammatory periodontal diseases.

**The aim:** to study the role of colonization resistance of the oral mucosa in the implementation of the influence of individual-typological characteristics of the individual susceptibility to caries and inflammatory periodontal diseases.

**Materials and methods:** The studies were conducted on 182 medical students 19-29 years old. All the examinees had a screening assessment of the oral mucosa colonization resistance by our own method, which received a patent UA 51373.

**Conclusion:** It is shown that psychophysiological features of healthy individuals and patients with dental caries and gingivitis determine the level of resistance to caries and periodontal inflammatory diseases, deviation of personality profile towards high neuroticism is a risk factor for caries and gingivitis. It is reported that the highest resistance to caries and inflammatory periodontal disease had emotionally stable introverts, inflammatory periodontal disease are more common in emotionally unstable introverts. The authors found that oral colonization resistance is a predictor of the risk of caries and inflammatory periodontal diseases. Reducing of the oral cavity colonization resistance most commonly diagnosed in emotionally unstable introverts, that correlated with their low resistance to inflammatory periodontal diseases.

**KEY WORDS:** colonization resistance, oral mucosa, individual-typological characteristics, caries, periodontal diseases.

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#### INTRODUCTION

Preservation of public health and an increase of its level remains an urgent problem worldwide. Despite considerable specialization in medicine, that contributed to intensive development of its individual areas, a search for new solutions to this complex and multifaceted problem is ongoing now [1,2,3]. Active research on the fundamentals of dentistry involving biomedical sciences is essential in terms of mounting understanding of the importance of fundamental science in medicine [1].

According to WHO, the problems of caries and periodontal diseases remain unresolved by modern medicine, but their topicality is determined by the high demand of the population for effective treatment of these diseases. Accumulated experience in recent decades shows that the leading role in the occurrence of dental caries and periodontal inflammatory diseases belongs to microbial and immune shifts occurring in the mouth, on the background of genetic predisposition [4,5,6].

Oral cavity represents an ecological system, inhabited by various microorganisms that are combined into a biofilm.

Resident microflora as an integral part of this microecosystem, together with the oral mucosa performs barrier-protective function and ensures its colonization resistance. Colonization resistance is one of the mechanisms of local immunity that depends on a combination of factors that prevent the adhesion and growth of bacteria on the mucous membranes. A role in this belongs to the resident microflora, which is an antagonist of bacteria, optional for the same ecological niche, and the epithelial cells of the oral cavity. The antagonistic effect of the normal microflora is carried through a large adhesive and colonizing ability of resident species of microbes, as well as the production of specific substances - bacteriocins and antibiotics that inhibit the growth of pathogenic microorganisms [7,8].

Understanding of the causes of pathological processes is closely linked to obligatory consideration of the role of the body in causing the disease. The same factor may be pathogenic to one organism and not cause pathological changes in the other. The causative agent does not just act on the body but there is their peculiar interaction. In the occurrence of the disease the properties of the factor and the whole organism are important. It is believed that

**Table I.** Personality characteristics of individuals with different dental status (% detection)

Personal characteristics	Control	Caries	Gingivitis
Extroverts	40,9	54,4»	47,4
Introverts	59,1	45,6»	52,6
Emotionally stable	72,7	43,7»	29,8»*
Emotionally unstable	27,3	56,3»	70,2»*

» - the probability of detecting the frequency difference in the personal characteristics of groups of persons with caries, gingivitis and control groups by  $\chi$ -square,  $p < 0,05$ , \* - the probability of detecting the frequency difference in the personal characteristics of the groups of people with gingivitis and caries by  $\chi$ -square  $p < 0,05$ .

the cause of the disease is necessarily connected with the peculiarities of the human body, it is internal to it, and any external factor can be pathogenic if it is capable of inducing a pathological reaction in this organism [9].

The intensity of changes in the activities of various organs and systems depends on individual-typological characteristics of the person and his/her temperament. That's why a special attention is paid to personal predisposition of the formation of psychosomatic disorders.

A great number of works are devoted to the study of individual typological characteristics of the patients with dental pathology [1,10,11]. But the role of colonization resistance of oral personal predisposition to the development of caries and inflammatory periodontal disease has not been studied yet.

## THE AIM

To study the role of colonization resistance of the oral mucosa in the implementation of the influence of individual-typological characteristics of the individual susceptibility to caries and inflammatory periodontal diseases.

## MATERIALS AND METHODS

The studies were conducted on 182 medical students aged 19-29 years, of which the control group consisted of 22 people (11 men, 11 women) who had no lesions of hard tissue of teeth and periodontal disease. The groups that were studied were formed on the basis of dental status: 1 - 103 people (53 men, 50 women) with the defeat of hard tissues of teeth with caries and periodontal intact; 2 - 57 patients (29 men, 28 women) who were diagnosed with chronic catarrhal gingivitis.

A conventional dental examination was conducted with determining DMF index, hygiene index of Grenn-Vermilion (OHI-S), PMA in the modification of S.Parma, Muhlemann index, Muhlemann-Saxer index (PBI), interdental HI (HYG), comprehensive periodontal index (CPI) [12].

All the examinees had a screening assessment of colonization resistance of the oral mucosa by our own methods, which received a patent UA 51373 [13]. Colonization resistance index (CRI) 1 point characterizes a high level of colonization resistance of the oral mucosa. CRI 0 point indicates the oppression of the barrier of colonization resistance and lowering antagonistic properties of the normal microflora.

CRI 2 points indicates overvoltage barera colonization, a quantitative increase in microorganisms, which may include not only symbiotic but also pathogenic ones [7,8].

Psychological testing included determination extraversion - introversion and neuroticism level using Eysenck questionnaire [14]. Interpretations of L.A.Ulyanova's interpretation the indicator of extra-introvertiveness within 1-13 points indicates introvertiveness, 14-24 points - ekstravertivness. The level of neuroticism up to 12 points is characterized as low, such individuals are emotionally stable. Emotionally unstable individuals have the level of neuroticism more than 12 points [14].

Statistical analysis of the results was performed using SPSS 17.0 software and Microsoft Excel 2003. The overall sample was analyzed by parametric methods after preliminary check for normal distribution using the Kolmogorov-Smirnov test. The differences between the studied parameters were evaluated by Student test. Identified frequency in individual groups were compared by  $\chi$ -square to determine the reliability of their differences.

## RESULTS AND DISCUSSION

According to the results of clinical examination of patients DMF index in patients with caries was  $5,74 \pm 0,26$ , in people suffering from catarrhal gingivitis -  $5,79 \pm 0,35$ . In patients with chronic catarrhal gingivitis PMA was  $26,5\% \pm 0,92$ , and gingival bleeding indices of Muhlemann that Muhlemann-Saxer (PBI) -  $1,39 \pm 0,05$  and  $0,87 \pm 0,03$  respectively.

Test results using Eysenck's questionnaire made it possible to identify individuals who were referred to extraverts, introverts, emotionally stable and emotionally unstable individuals. Frequency of psychophysiological characteristics of patients with different dental status are shown in table I.

Extra introvertiveness is a fairly stable personality characteristic. According to our data the frequency of the incidence trait in the patients with gingivitis is not significantly different from the control group. In patients suffering from caries the frequency characteristics of extro- introvertiveness differed from the control group and were characterized by slight predominance of extroverts. Although we could not identify significant differences of average indicator of extro- introvertiveness in the groups, they accounted for the control group  $13,6 \pm 0,77$  points, for patients with caries -  $13,8 \pm 0,34$  points, for patients with gingivitis -  $13,9 \pm 0,68$  points.



**Table II.** Distribution by individual typological peculiarities of personality among individuals with different dental status (% detection)

Personal characteristics	Control	Caries	Gingivitis
Emotionally unstable extroverts	9,1	28,1»	31,6»
Emotionally stable extroverts	31,8	26,2»	15,8»
Emotionally stable introverts	40,9	17,5»	14,0»
Emotionally unstable introverts	18,2	28,2»	38,6»

» - the probability of detecting the frequency difference in the personal characteristics of groups of persons with caries, gingivitis and control groups by  $\chi$ -square

**Table III.** Indicators of screening assessment of colonization resistance SACR in young people

Data	Control	Caries	Gingivitis
frequency	0 points	31,8	56,3»
CRI, %	1 point	68,2	78,9»
	2 points	0,0	0,0
		11,7»	21,1»

» - the probability of the frequency difference detection of gradations CRI in groups of individuals with caries, gingivitis and control groups by  $\chi$ -square,  $p < 0,05$ .

H. Eysenck found that introverts have a higher level of activity of the cerebral cortex. Extroverts compensate this lack by activation of additional movements, increased attention to external signals, introducing diversity in any monotonous situation. Introverts and extroverts have different style of intellectual activity [15].

By frequency characteristics of neuroticism study groups differed significantly. If in the control group emotionally stable individuals prevailed by 45,4%. They are characterized by properties such as stability of sthenic emotions and emotional arousal when exposed to various stresses, maintaining an optimistic mood, lack of fear, abashment and depression. In the group of patients with caries emotionally unstable individuals prevailed by 7,8%.

As our research has shown, a high level of neuroticism is a risk factor for the development of inflammatory periodontal diseases. For example, among patients with gingivitis, emotionally labile individuals were by 40,4% more frequent. They were characterized by the predominance of negative emotions, excitement, apathy, exhaustion of the nervous system, resulting from overly severe or prolonged mental stress, not a full restoration of balanced forces. Individuals with severe neuroticism were emotionally unstable and they were characterized by predominantly non-willed but emotional regulation. Individuals with a high level of neuroticism were significantly more likely (than the control group and the group of patients with caries) to develop inflammatory periodontal disease. Average values of the level of neuroticism in the control group amounted to  $9,95 \pm 0,84$  points, in the group of patients with caries –  $12,98 \pm 0,41$  points ( $p < 0,05$ ), in the group of patients suffering from gingivitis –  $13,60 \pm 0,48$  points ( $p < 0,05$ ).

Taking into account extro-introvertiveness and level of neuroticism, we distributed all patients by individual typological features of personality. According to Eysenck, emotionally unstable extrovert corresponds to choleric temperament, stable extrovert to sanguine, unstable introvert to melancholic and stable introvert to phlegmatic [15]. According to our data, the ratio of personality types in each of the treatment groups differed significantly (Table II).

The study of the frequency profile of the control group showed a high resistance to caries and periodontal inflammatory diseases of emotionally stable introverts.

Gingivitis most often develops in emotionally unstable introverts (melancholic). In the group of patients with caries, caries resistency was inherent to emotionally stable introverts (phlegmatic). The individuals of choleric, sanguine and melancholic temperament types were equally susceptible to caries.

The causal link between psychophysiological characteristics of an individual and somatic diseases, including dental are mediated, ambiguous and don't fit into a basic scheme. Caries and inflammatory periodontal diseases are multifactorial diseases, the foundation of which supports the development of complex pathological changes in the microecology of the oral cavity. Research by domestic and foreign scientists showed that the basis microecological disorders is depression of colonization resistance [16]. In the case of reducing the number of colonization resistance, the range of potential pathogens increases and expands largely determines the risk of development and progression the diseases of the hard tissues of teeth, periodontal and oral mucosa [16].

The analysis of microecological disorders of the oral cavity in young people showed that cytological smears surveyed in terms of colonization resistance (CRI) were different. In the control group incidence of CRI 1 point in cytological smears was 68,2%, whereas CRI 0 points were observed only in 31,8% of individuals and CRI 2 points were not recorded. With the development of caries and gingivitis, an increase in individuals with CRI 0 points and 2 points, and respectively, a decrease of persons with CRI 1 point was observed. In particular, individuals with caries incidence of CRI 0 points and 2 points were 68,0% in patients with gingivitis - 100%. Frequency characteristics of CRI 1 point for these groups was respectively 32,0% and 0%. The obtained results show a decrease in the colonization resistance barrier of the oral mucosa with dental caries and gingivitis (Table III).

The results suggest that patients with dental caries, which are dominated by emotionally unstable introverts and extroverts in 68,0% of the people, here was a reduction of colonization resistance of the oral mucosa. In patients with gingivitis, in which the proportion of emotionally unsta-

ble introverts was the largest, inhibition of colonization resistance level was detected in 100% of all the inspected.

The study of colonization resistance of the oral mucosa in the groups of people that differ in individual-typological characteristics of the individual, has revealed that most low resistance to colonization by pathogens was observed in emotionally unstable introverts (melancholic). Thus, 80,0% of the emotionally unstable introverts had reduced colonization resistance of the oral cavity. Among emotionally unstable extroverts the figure was 71.4%, among emotionally stable extroverts – 72,1%, and among emotionally stable introverts – 68,6%.

The desire to research the causal relationship between somatic and psychic factors in somatic clinical diseases, including dental, and to associate them with the personality of the patient, is called a psychosomatic approach in modern medicine.

Systemic clinical manifestations of dental caries and periodontal inflammatory diseases are associated with tension of regulatory mechanisms. The specific differences in the reactions of the whole organism manifestation of the major dental diseases outline the basic morphological, functional and physiological components of each functional type of constitution [1,17,18]. According to M.I.Klenovskoy [19] emotionally labile introverts (melancholic) are characterized by the predominance of sympathetic nervous system and the high susceptibility to stress factor. These regulatory mechanisms are likely to affect the functional properties of the buccal epithelial cells, local immunity and micro ecology of the oral cavity.

Thus, the prognostic and current assessment of the emergence and development of dental caries and periodontal inflammatory diseases, the formation of risk groups should be carried out taking into account the individual typological characteristics of the organism and the level of colonization resistance of the oral cavity.

## CONCLUSIONS

Psychophysiological features of healthy individuals and patients with dental caries and gingivitis determine the level of resistance to caries and periodontal inflammatory diseases. Deviation of personality profile towards high neuroticism is a risk factor for caries and gingivitis. The highest resistance to caries and inflammatory periodontal disease have emotionally stable introverts, inflammatory periodontal disease are more common in emotionally unstable introverts. Oral colonization resistance is a predictor of the risk of caries and inflammatory periodontal diseases. Reducing of colonization resistance of the oral cavity is the most common in emotionally unstable introverts, that correlates with their low resistance to inflammatory periodontal disease.

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## ADDRESS FOR CORRESPONDENCE:

**Mariia Faustova**

Higher State Educational Establishment of Ukraine  
 "Ukrainian medical stomatological academy",  
 Shevchenko st.23, 36011 Poltava, Ukraine  
 tel.: +380666192820  
 e-mail.: mashafaustova@ukr.net

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