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## EDITORIAL

#### **Dear Colleagues!**

The first issue for 2018 has been released. For 7 years since the Journal *Archiv-EuroMedica* has been published, it confirms its actuality and a growing interest to it as well the expansion of geography of the publications and the subject range.

We appreciate the work of our authors and hope that the journal belongs to all of us. My priority as a publisher is to make the journal more efficient and useful. We offer our colleagues to participate at section *Chronicle*, which would record all important events that take place at organizations and countries, where our authors work and live as well as in the medical communities. This will enable our authors and advertisers to learn more about each other and to raise the actuality of the journal.

The subject range of the Journal covers almost all fields of medical specialties. Additionally we conduct semiannual meetings of the editorial team in various cities of Germany. Thus we regularly discuss the development policy of the journal and professional concerns of our colleagues.

Such encounters promote professional and personal contacts, which make our work more effective, give ways to new ideas, joint researches and new joint publications.

We would like to express our special thanks to following colleagues:

Professor Dr. med. **Jörg Schulz**, Paracelsus-Klinik (Berlin) Professor Dr. med. **Dmitry Domenyuk**, Stavropol state medical university (Stavropol) Professor Dr. med. **Alexey Zhidovinov**, Astrakhan State Medical University (Astrakhan) Professor Dr. med. **Vladimir Krestyashin**, Russian National Research Medical University (Moscow) Professor Dr. med. **Galina Reva**, Far Eastern Federal University (Vladivostok) Professor Dr. med. **Gayane Khachatryan**, Yerevan State Medical University (Yerevan)

We are looking forward to your new articles and new ideas. Once again we express our gratitude to our authors and readers for their interest and wish them a lot of success in their professional activities and hope that our Journal influences it positively.

Georg Tyminski Editor-in-Chief



# CHARACTERISTICS OF SUSCEPTOBILITY TO ILLNESS AMONG WORKERS OF SHIPBUILDING AND SHIP-REPAIR INDUSTRIES

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**ABSTRACT** — Analysis of morbidity of shipbuilders and ship repairers exposed to harmful industrial factors allows to assess their health problems, the degree of the industrial impact o on the level of health, to detect groups of people with an increased risk of developing occupational pathology, to work out effective prevention strategies that ensure the preservation of health of the population.

**KEYWORDS** — morbidity, employees of shipbuilding and shiprepair production, unfavorable production factors, length of service.

The actual issues of industrial health include the study of morbidity, the examination of the relationship of diseases with the profession, the search for approaches to conducting preliminary and periodic medical examinations, formation of groups of people with an increased risk of developing occupational pathology, identification and dynamic observation of early forms of occupational diseases [1-7].

#### Aim of the study

To identify specific morbidity of shipbuilding and ship repair workers. The tasks included analysis and assessment of morbidity in shipbuilding and ship repair enterprises, the determinants of morbidity.

In the work nonparametric statistics methods were used.

### Results of the study

The study of the morbidity of workers in shipbuilding and ship repair enterprises was carried out according to the data of preventive medical examinations and the data of the request to the clinic. As a result of preventive medical examinations of shipbuilders and ship repair workers, a two-fold, statistically significant (p < 0.05) increase in the incidence rate from 3680% in 2015 to 6,254.5% in 2017 was revealed. In the structure of pathological involvement of shipbuilding and ship repair workers in 2015–2017, the first place was occupied by diseases of the circulatory system (25.4%), the second — diseases of the digestive



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system and symptoms and signs of deviation from the norm (16.9% respectively), the third — diseases of the musculoskeletal system and connective tissue (11%), the fourth — diseases of the eye and its adnexa and endocrine system diseases (10% respectively), the fifth — diseases of the genitourinary system (9.8%). The total hospitalized morbidity of workers in shipbuilding and ship repair enterprises of the city of Astrakhan had a negative trend with a significant increase from 75.3% in 2015 to 134.1% in 2017. In the structure of the incidence of men, the first place was occupied by the IX Class of the ICD-10 Diseases of the circulatory system (I00-I99), accounting for 36%, the second place — XI Class Diseases of the digestive system (K00-K93) — 23.1%, the third place — XIII Bone diseases (M00-M99) - 22.5%, fourth place - VI Class Diseases of the nervous system (G00-G99) - 6.9%, fifth place V Class Mental and behavioral disorders (F00-F99) — 5.8%, sixth place — XVIII Class Symptoms, signs

and abnormalities detected in clinical and laboratory studies are not classic (R00-R99) — 1.2%, seventh place - III Class Diseases of the blood, blood-forming organs and certain disorders involving the immune mechanism (D50-D89) and X Class Diseases of the respiratory system (J00-J99) — according to 0.6%. The increase in the incidence of shipbuilders and ship repairers occurred both in the time interval from 2015 to 2017, and in the age intervals of workers, taking into account the length of professional activity.

With the help of the correlation analysis, it was possible to identify a direct statistically significant relationship between the frequency of registration of pathology and the length of service at the shipbuilding and shiprepairing enterprise (r = 0.68 with a significance level of difference from zero of more than 95%, p<0.05). The incidence among employees with experience in the profession more than 20 years in 2016 and 2017 was 120% 0 and 130% 0, respectively, and was significantly higher (p < 0.05) than among workers of lesser experience: 15-20 years — 60% 0 in 2015 and 40% 0 in 2016 and 2017, 10–14 years — 29% 0 in 2015 and 45.5% 0 in 2016 and 2017, 5–9 years — 13.9% 0 in 2015, 15, 2% 0 in 2016 and 17.0% 0 in 2017, less than 5 years — 7.3% 0 in 2015, 11.5% 0 in 2016 and 14.5% 0 in 2017. The indicator of the number of days of temporary labor deprivation combined with the incidence also reflected the dynamics of the increase in the incidence in the studied interval, increasing 3.5 to 2 times according to the dynamics of morbidity. The number of cases of temporary disability per 100 employees in 2015 ranged from 7.5 to 8.4 and was 2 times less than in 2017 and 3 times less than in 2016. The incidence of disability in 2015 was 0.2, rising to 0.9 by 2016 and decreasing to 0.6 in 2017.

The length of stay in the hospital did not depend on the length of service, but was determined by the standards and was due to the diagnosis of the disease, the severity of the patient's condition and the effectiveness of treatment. Workers applied for medical assistance more often in the spring and summer, at the height of the increased production activity and, accordingly, the more intensive impact of aggressive production factors. In fact, the seasonality indexes also reflected the seasonality of the work. Reducing the length of stay of patients in the hospital in 2015–2017 caused a significant reduction in the proportion of people discharged to work: from 64.8% in 2015 to 1.6% in 2017 and the corresponding increase in the proportion of outpatients prescribed for outpatient care: from 35.2% in 2015 to 98.4% in 2017. Similar trends persisted in the trainee groups in each year: an increase in the proportion of outpatients prescribed for outpatient care and a decrease in the proportion

of those who were prescribed for labor from each previous group to each subsequent trainee group. The events that occurred are due to the statistically significant impact of production factors on the health of shipbuilding and ship repair workers. That is why shipbuilders and ship repairers with a long work history needed longer treatment.

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## DYNAMICS OF MEDICO-DEMOGRAPHIC PROCESSES IN THE INDUSTRIAL REGION OF RUSSIA

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## INTRODUCTION

Demographic processes are seen as a reaction of the population to the conditions in which it exists, as well as a conscious desire to adapt to these conditions in accordance with the needs. At the same time, external conditions, as well as social comprehensively and simultaneously influence people's behavior. [1].

The events of the nineties in Russia markedly worsened the demographic situation and caused concern about the future demographic development of the state. Throughout the eighties the population growth was moderate and was characterized by an excess of the share of births over the share of the deceased. By the beginning of the nineties, social and economic difficulties in the transition period have contributed to a sharp decline in the birth rate, and some increase in mortality, and since 1992 the number of eath exceeded the number of birth. (depopulation) [6, 7, 8].

Since 2006, Russia a favorable dynamics has seen in the main demographic indicators, characterized by a trend of increasing natural population growth. In 2013, for the first time in recent decades, positive natural population growth was noted, and in 2014 this trend continued with a slight decrease in 2017. (-0.08%) [2, 3, 4, 5].

### **PURPOSE OF THE STUDY**

The purpose of this study is to investigate the demographic situation in one of the regions of the Russian Federation (Astrakhan region) over a period of 27 years.

### MATERIAL AND METHODS OF INVESTIGATION

The object of the study was the population of the Astrakhan region (the general population) for the period from 1990 to 2016. In the analysis of the dynamic series of indicators, a regression analysis (simple regression) of an equation of the type y = a + bx was applied.

## **RESULTS OF THE STUDY**

The Astrakhan region since 1990 to 1997 increased by 20,951 people. Further by 2006, it was



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decreased by 18,323 people, but by 2017 a new wave of growth had increased the population by 16,349 people, having practically reached the level of 1997. Thus, as of January 1, 2017, the total population was 1,018,866 people. However, growth of population in some years took place in separate years due to the positive balance of migration, but not of progressive regime of reproduction. So, in the first half of the 1990s, the influx of migrants into the region, compensated for the beginning of population decline. But since 1996, the positive balance of migration was no longer able to compensate for the natural decline in population. For the period from 2006 to 2011 the migration flow began to increase again and by 2011 the increase was 3945 people. Nevertheless, the last years from 2012 to 2017 the balance of migration became negative and was (-4958), and in 2017 (-967 people). In general, from 2006 to 2017, strong and reliable trend of decrease of migration growth (the correlation coefficient (r) is 0,71, the determination coefficient  $(\mathbb{R}^2)$  is 51,2%, the significance factor (p) is 0,01.

For 1990–2017 years type of age structure of the population can be estimated as regressive, characterized by the prevalence of persons over 50 years old over children (0–14 years). Due to the decrease in the share of migrants (and these are usually persons of working age), the proportion of people of working age in the Astrakhan region (men 16–59 years and women 16–54 years) has started to decrease significantly since 2008 and by 2016 amounted to 593,336 people, which is 38084 people lower compared to 2008. At the same

time, the share of pensioners annually increased(the growth rate during the observation period was 128,9%).

The turning point in the dynamics of structural demographic indicators was 2009. So, from 1990 to 2008 the share of children (0–14 years) among the entire population of the Astrakhan region decreased from 24,46% to 15,89%, respectively. The proportion of people of working age increased during this period - from 55,97% to 62,70%. At the same time, the proportion of people over working age over the entire period of observation from 1990 to 2016 steadily increased from 17,25% to 21,98%.

As a result of the processes described above, the demographic burden of children per 1000 able-bodied population first decreased from 437,1 in 1990 to 253,5 in 2008, and then increased to 308,9 in 2016. Demographic burden by persons older than working age, on the contrary increased throughout the observation period from 308,24 in 1990 to 376,14 in 2016. As a result, the overall demographic burden on the able-bodied population decreased from 745,3 to 685,1 dependents per 1000 able-bodied population.

One of the significant factors for the formation of a normal mode of reproduction of the population is the number of women of reproductive (fertile) age (15-49 years). From 1990 to 2016 years. the number of this category of persons decreased from 306230 people (30,42%) to 241989 people (23,72%). At the same time, the decline occurred annually (with some exceptions) with a rate of decline of 77,9%.

In the Astrakhan region, the birth rate in 2016 was 14,0 ‰, which according to WHO criteria is characterized as "low". In comparison with 1990 (15,0 ‰) the birth rate decreased by 7.0%.

The dynamics of the birth rate in 9 of the 11 districts of the Astrakhan region for the period from 1990 to 2016. characterized by a growth trend: in two regions — Volodarski and Kharabalinski — a pronounced and statistically significant growth trend (r from +0,79 to +0,84, R2 from 63,0% to 71,4%). Seven regions were characterized by poorly expressed growth tendency. In other areas, the birth rate was stabilized in dynamics.

The mortality rate in the Astrakhan region in 2016 was 12,0 ‰, which according to WHO criteria is characterized as "medium". In comparison with 1990 (10,4%) the death rate increased by 13,4%.

The dynamics of mortality rate in 8 of 11 districts of the region during the period from 1990 to 2016 was characterized by a growth trend: in two — Krasnoyarski and Limanski — a pronounced and statistically significant growth trend (r from +0,71 to +0,83, R2 from 50,4% to 69,7%). Six regions were characterized by poorly expressed growth tendency. In other areas, mortality was stabilized in the dynamic.

Thus, the demographic situation in the Astrakhan region should be considered unsatisfactory. There was a decrease in migration growth, number of women of fertile age. The type of age structure of the population can be estimated as regressive, characterized by the prevalence of persons over 50 years old over children (0-14 years). Demographic load of ablebodied population persons increased is more senior than working-age. Level of birth rate is characterized as "low", and a mortality rate as "medium". If not to undertake cardinal measures, then the demographic situation in the area will worsen.

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# ANALYSIS OF MEDICO-ECONOMIC EFFICIENCY OF DENTAL CARE PROVIDED BY HEALTH INSUARANCE PROGRAM

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#### The aim

of this work is to study the feasibility of measures to reduce economic losses in pediatric dentistry and to evaluate the effectiveness of various options for prevention of dental diseases.

In this study we used the method of clinicaleconomic analysis.

Analyzing the problem of a high level of dental morbidity in children, we can single out the following factors:

- a low level of primary prevention and low availability of secondary prevention of dental diseases;
- ageing of dental equipment in healthcare facilities,
- a low level of personal responsibility for oral cavity hygiene among children and parents.

The practical implementation of the primary prevention of dental diseases of the population is possible as the development of population, group and individual prevention and implies individual responsibility for hygienic condition of the oral cavity, systemic and local use of sodium fluoride, limiting the intake of sucrose, systematic oral hygiene from an early age.

The main role of the dentist is to train medical and non-medical personnel in methods of prevention, monitoring the effectiveness of interventions.

Professional primary prevention of dental diseases involves such procedures as the removal of dental deposits, sealing fissures on the tooth surface with a material of light rejection, covering the teeth with varnish containing fluoride, monitoring the quality of individual hygiene and diagnosing the early stages of dental and periodontal diseases.

Secondary prevention of dental diseases, especially in children, is carried out by dentists as part of systematic planned treatment of dental caries and periodontal diseases at all stages of the disease.

Summarizing the results of the proposed work on prevention in general, based on the results of the



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Daria Shapovalova, Student



Levan Gobejishvili, Post-graduate student

study, a set of measures to reduce economic losses of a regional pediatric clinical dental center was scientifically analysed.

We also worked out a course of professional prevention of dental diseases enabling to increase the profitability of the pediatric dental center and comprises the following aspects:

- diagnosis of the disease;
- professional hygiene of the oral cavity;
- sealing the fissures of the chewing group of teeth;
- coating 20 teeth with varnish containing fluoride.

Such courses of professional prevention with mild caries should be carried out at least twice a year, and with pronounced dental caries — at least five times a year.

- The planned results of this approach can be:
- prevention and treatment of dental diseases in accordance with modern technologies

- reduction of the intensity of tooth lesions in children covered by the program activities;
- raising awareness of prevention and treatment of dental diseases in parents, children and health professionals;
- motivation in children to prevent dental diseases

To increase the profitability of pediatric dentistry, we propose to carry out a preventive program for the promotion of healthy nutrition (the use of fluorinated milk) and information on the use of various toothpastes, including fluoride-containing.

The studies included an assessment of the caries intensity based on the CPR index determined before and after the use of fluorinated milk in two age groups of children: 6 years (380 children in total) and 12 years (403 children in total).

Dental examinations of children were performed with the involvement of specialists from the Astrakhan regional pediatric dental center. The examinations were organized according to a uniform methodology based on WHO recommendations. Dynamic observations of the preventive and control group of children aged 6 years found that the increase in the index of CPR in the preventive group for temporary teeth was 0.17, constant 0.03, while in the control — 0.64 and 0.05, respectively.

Thus, the effectiveness of the use of fluorinated milk in the nutrition of preschool children is evident, especially in terms of CPR for primary teeth. As for the fact that the increase in the intensity of caries on permanent teeth is not very different in children of preventive and control groups, this is due to the fact that the physiological process of changing primary teeth to permanent teeth at this age is only completed, and caries on them have not yet had time to appear. The results of the determination of the index CPR before and after the experiment in the age group of 12 years are shown in Table. 1.

Analysis of the data shows that both in preventive and control groups caries-intensity rates in permanent teeth have increased. CPR index in the preventive group changed from  $3.85\pm0.39$  to  $4.08\pm0.22$ ; in the control group, without intake of fluorinated milk, from  $3.97\pm0.42$  to  $5.42\pm0.30$ . Our attention was drawn to the most evident differences in the indicators of preventive and control groups in the number of teeth sealed ( $1.05\pm0.05$  and  $2.16\pm0.25$ , respectively).

At the same time, the increase in caries in the preventive group, characterized by the index of CPR, is much lower (0.23 against 1.45 in the control), which can confirm the effectiveness of our preventive program performed in the pediatric dental center.

Table 1. The intensity of permanent dental caries in children of preventive	2
and control groups	

Indicator	Preventive group	Control group				
The initial examination of children under the age of 12						
C (carious tooth)	2.7±0.28	2.68±0.31				
P (pulped tooth)	1.00±0.25	1.25±0.15				
R (removed tooth)	0.08±0.01	0.04±0.01				
CPR	3.85±0.39	3.97±0.42				
Re-inspection after the	e preventive measures					
C (carious tooth)	2.94±0.17	3.08±0.18				
P (pulped tooth)	1.05±0.12	2.16±0.25				
R (removed tooth)	0.09±0.02	0.18±0.01				
CPR	4.08±0.22	5.42±0.30				
Growth						
C (carious tooth)	0.17	0.40				
P (pulped tooth)	0.05	0.91				
R (removed tooth)	0.01	0.14				
CPR	0.23	1.45				

The performed researches enable to develop and introduce methods to influence the causes of dental diseases. This will lead to reduction of workload on orthodontists and improvement in profitability of the pediatric dentistry alongside with increasing the rate of cured teeth. The developed approach offers a balanced diet for calcium and fluoride, the use of fluoride-containing toothpastes, combined with regular information and educational work among children and parents. Besides, we have offered improvement in organizing and carrying out preventive dental checks with a planned preventive sanation of the oral cavity. Thus, the feasibility and accessibility of the proposed methods of practical dental care, predominantly by means of healthy nutrition and rational oral hygiene are shown.

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## ASPECTS OF ADAPTATION BACKGROUND FOR STUDENTS OF A MEDICAL UNIVERSITY ENROLLED AFTER UNIFIED STATE EXAM

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**ABSTRACT** — The review article examines main aspects of students' adaptation to the medical university environment. The problem of students' adaptation is closely related to their health, prevention of diseases caused by the conditions of education in the university and the development of methods for correcting the state of the organism. Studies are considered that are devoted to the formation of an adaptation background for students of medical institutions of higher education, received in the USE format.

**KEYWORDS** — medical high school, social adaptation, disadaptation, student, student group.

Under adaptation (from the latin *adapto* — adaptation, adaptado adaptability, adaptable) in a broad sense is meant adaptation to environmental conditions. The concept of *adaptation* is leading in the scientific research of the organism, because it is the adaptation mechanism, developed as a result of evolution, that can provide an opportunity for adaptation of the organism to the environment [1]. If we turn to the psychological dictionary, then we consider three aspects of adaptation: biological, psychological and social. The psychological aspect of adaptation is understood as the adaptation of a person as a person to existence in society in accordance with the requirements of the given society and with their needs, motives and values. Adaptation is realized through the assimilation of norms and values of a particular society. Psychological adaptation occurs in each individual in the course of his individual development and professional development.

Admission to the university for most students is, more often than not, a new and highest step in life. It is on the first year of study at the university that an understanding of oneself, of one's personality begins, an attitude to learning, to its future professional activity is formed. Adaptation of students to the conditions of the university is at present one of the most urgent and significant problems [1]. If the first stages of adaptation are destabilization of the physiological functions of the organism, then the further process of adaptation to the new learning and functioning conditions is also characterized by the tension of the regulatory mechanism. This, in turn, has an impact not only on adaptation to environmental conditions and studies, but also on the state of health of students.

The problem of adaptation of medical students is directly related to their health, as well as the prevention of diseases caused by the conditions of education in the university and the development of tools and methods for correcting the functional state.

In the study, Malkova T.G. [2] it was found that for students enrolled in the university is characterized by a low level of student health. Among freshmen, 52% have 3-4groups of health. At present, there is a tendency to increase the chronic diseases of first-year students. From the course to the course, the number of students who have a 1-2group of health decreases. Decreased quality of health occurs due to increased prevalence and degree of myopia, hypertension, chronic cholecystitis, chronic gastritis.

Study by S.G. Shestopalova dealt with the process of social adaptation of foreign students to study at the medical faculties of the Russian university, associated with weak pre-university training, lack of appropriate language skills, insufficient knowledge of the host country, and the lack of necessary domestic skills for living at a hostel [3].

Thus, the genesis of the adaptive background of the students of the medical university received in the USE format is characterized by the inclusion of optimizing the functioning of the organism, as well as maintaining a balance in the *organism-environment* system. The genesis of the adaptive background among the students of the medical higher educational establishment entered in the unified state examination format coincides with the process of socialization to new conditions, as well as the formation and interests, therefore, from the socio-psychological climate that forms in the student group, and the comfort of students in it depends not only successful adaptation, but also the effectiveness of further education at the medical university.

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#### MORPHOLOGY, PHYSIOLOGY, PATHOLOGY

# ODONTOMETRIC INDICES FLUCTUATION IN PEOPLE WITH PHYSIOLOGICAL OCCLUSION

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**ABSTRACT** — Biometric examinations of jaw stone models and tomography images of 310 people (both genders) in their first adulthood stage with permanent teeth physiological occlusion were used to study the morphometric parameters of dental types and dental arches gnathic types in each patient. Odontometric procedure included evaluation of the crowns mesial-distal width involving the calculation of the arithmetic mean, the maximum and the minimum values, in order to estimate the deviations from the mean value (fluctuation). The outcomes suggest that there was no statistically significant difference between the odontometric parameters obtained from men and women. The significant variability in the frontal teeth size in women, compared with men, indicates that the size is only slightly dependent on gender, while is determined by the dental system type. In measurements done without taking into account the dental type, it can be hard to determine sexual dimorphism due to the fluctuating nature of the odontometric indices.

KEYWORDS — craniometry, sexual dimorphism, dental type, odontometry, normodontia.

The advances in Dental Anthropology (Anthropological Odontology), a science that studies variations in the human teeth anatomy, allows not only identifying certain regularities in the shape and size of teeth, depending on the gender, ethnicity and race, yet also developing some theoretical basics promoting further this branch of anthropology, as well as defining concepts and formulations that are of applied value in dentistry [1, 21, 22, 28, 31, 35].

At present, the fluctuation of the gender-related features of the dentoalveolar system has a biological meaning, which is the reflection of the gene pool. Some odontological features are known to have stable gender differences in view of the racial specifics [3, 32, 39].

The indicator of sexual dimorphism is the ratio of the difference in the male and female features to the feature that occurs in males [2, 5, 7, 11, 25, 37].

The tooth size sexual dimorphism, according to K. Hanihara (1967), is subject to fluctuations, the causes of which have not been studied well enough yet.

According to A.J. Perzigian (1984), the size of the teeth correlates with growth, and taller people have been observed to have teeth of larger size than shorter ones. In this connection, manifestations of sexual dimorphism may take place [38].

Nevertheless, most experts agree that sexual dimorphism is of fluctuating nature if viewed based on a feature like the size of the teeth. In this regard, it is recommended that sampling be done observing proportional correlation by the age, as well as sexual and racial features [36].

It is worth noting the opinion of some experts pointing at the dependence of the teeth size on the gnathic and dental types of dental arches [14, 17, 19, 23]. Besides, there was an indication of correlational dependence that the dental arch dimensions have on the craniofacial parameters and, in particular, on the dimensions of the gnathic part of the face [9, 27, 29].

The taxonomic value of odontological features is due to the rigid genetic determination, their functional independence from each other as well as from other feature systems, the absence of age-related variability and directional inter-gender differences, phylogenetic age, stability, and clear geographic proximity. Taxonomic disparity of odontological features suggests more detailed distribution of the groups taking into account the current status of the entire issue in question. Recently, for instance, classifications of dental arches have been proposed in view of the gnathic and dental parameters [6, 8, 12, 15, 33]. Nine basic types of dental arches are distinguished with physiological occlusion, which take into account the gnathology (meso-, brachy- and dolichognathy) and odontometry (macro-, micro- and normodontia) [4, 10, 13, 16, 18, 20, 24, 26, 30, 34, 40].

Despite the numerous odontometric studies on sexual dimorphism, we have not encountered works offering a comparative study of males-female teeth size in view of the dental arches type, namely, in cases of normodontia.

#### Aim

To determine the odontometric fluctuations in people with physiological occlusion in terms of sexual dimorphism with normodontia of permanent teeth.

### MATERIALS AND METHODS

A biometric study was carried out involving 310 people (both females and males; age — 21–35, the first stage of adulthood) with physiological occlusion of permanent teeth. The odontometric and the linear parameters were measured on stone models of jaws, as well as through analyzing the data obtained with cone-beam computed tomography (Fig. 1).

Through the study, the participants were distributed based on their gender, taking into account their dental system type, which was identified based on the length of the. In cases of normodontia, the sum total of the mesial-distal crowns width for the 14 teeth constituting the upper jaw dentition varied from 110 mm to 118 mm. The gnathic type of the dental arch was identified through a computer tomogram, as the dental arch depth ratio to the width between the second molars. In cases with mesognathia the ratio was  $0.74 \pm 0.03$ .

The average module of molars was determined based on the half-sum of the first and second molars modules. To be noted that the value of the module was taken as the half-sum of the mesial-distal and vestibularlingual molar crown size.

In the anterior teeth and premolars odontometry, only the mesial-distal width of the crowns was taken into account. Calculation was performed for the arithmetic mean, maximum and minimum values of the odontometric index. The feature fluctuation was estimated focusing on the deviation from the mean value (feature fluctuation).

The statistical processing was performed directly from the common data matrix of ECXEL 7.0 (Microsoft, USA) also involving certain features offered by the STATGRAPH 5.1 (Microsoft, USA) software, ARCA-DA (Dialog-MGU, Russia), and implied detecting the median values, its mean root square deviation, and the non-sampling error. Further on, following the patterns commonly employed for medical and biological studies (sample numbers; type of distribution; non-parametric criteria; reliability of the difference of 95%, etc.) the significance of the sampling difference was evaluated subject to the Student's criterion (t) and the respective significance index (p).

#### **RESULTS AND DISCUSSION**

The results show that the overall pattern of the odontometric parameters variations is of a fluctuating nature. The fluctuation from the mean value has revealed a fairly significant range (Table 1).

The difference between the maximum and minimum values of the mesial-distal width of the upper medial incisor crown in case of physiological occlusion is about 2 mm.

The difference in the length of the dental arch



Fig. 1. Specific features of measuring linear and angular parameters on a computer tomogram, horizontal (a), sagittal (b) and vertical (c) planes

Size						
Odontometric	Upper jaw			Lowe jaw		
parameters	average	max	min	average	max	min
Medial incisor	9,10±0,18	10,09±0,27	8,11±0,09	5,45±0,12	6,01±0,19	4,69±0,05
Lateral incisor	6,52±0,14	7,71±0,22	5,32±0,07	5,97±0,14	6,68±0,17	5,27±0,12
Canine	7,94±0,23	8,69±0,29	7,19±0,18	6,79±0,23	7,73±0,26	5,86±0,21
Sum of the six anterior teeth	46,76±1,26	51,78±1,48	41,74±1,03	35,94±1,12	40,22±1,36	31,66±0,87
Sum of the 14 teeth	109,62±2,66	112,82±3,24	106,42±2,08	109,03±2,87	118,18±3,61	99,88±2,14
Molar average module	10,95±0,37	11,85±0,41	10,04±0,34	10,78±0,35	11,62±0,43	9,93±0,28

<b>Table 1.</b> Ma	aior odontometric indices in	people with phy	rsioloaical occlusion of	the upper and lower i	permanent teeth, $(mm)$ , $(M\pm m)$ , $(p \le 0.05)$
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anterior section, which is defined as the width sum for the six anterior teeth crowns, can reach a maximum of 10 mm between the maximum and minimum values.

The lower jaw presents the same picture, yet the digital indices range is smaller.

The obtained results are consistent with the opinion expressed by most experts dealing with odontometric issues.

At the same time, we carried out a study taking into account the dental system type. 178 participants were identified as having the normodontia type of the dental system, which was  $57.42 \pm 2.81\%$  of the entire number of the participants with physiological occlusion. Besides, 82 of them were males ( $26.45 \pm 2.5\%$ ) and 96 females ( $30.97 \pm 2.62\%$ ). Almost twice as many people were found to have signs of macrodontia ( $79 - 25.48 \pm 2.47\%$ ). The number of men and women was nearly same –  $42 (13.55 \pm 1.94\%)$  and 38 persons ( $11.93 \pm 1.84\%$ ) respectively. The lowest was the number of participants with microdontia dental systems (53 in the group; 17.1  $\pm$  2.14%). Microdontia was significantly more typical of women (38 persons, i.e. 12.26  $\pm$  1.86%). As for men, only 15 of them (4.84  $\pm$  1.22%) had signs of microdontia (Fig. 2).

Of the total number of the participants, we examined a group of persons distributed based on their gender, who had normodontia of permanent teeth.

Those with normodontia dental systems, the rate of the difference in the numerical values obtained from men and women to that obtained from males, varied from 1.5% to 3%, which is less determinant regarding sexual dimorphism features. The major dimensions of the teeth depend on the gnathic and dental type.

Table 2 below offers a view on the results of the upper jaw teeth parameters in people of different gender.

The difference between the maximum and minimum values of the mesial-distal width of the upper medial incisor crown in case of physiological occlusion in people with normodontia does not exceed 1 mm, which is significantly lower than a similar value obtained



Fig. 2. Specific craniofacial features (CT imaging) with permanent teeth microdontia (a) and macrodontia (b).

*Table 2.* The major indicators of the upper jaw permanent teeth in people (males and females) with physiological occlusion and normodontia, (mm),  $(M\pm m)$ ,  $(p\leq 0,05)$ 

	Teeth size						
Odontometric	Males			Females			
purumeters	average	max	min	average	max	min	
Medial incisor	8,78±0,27	9,28±0,36	8,29±0,19	8,45±0,22	8,79±0,29	8,11±0,16	
Lateral incisor	6,87±0,14	7,36±0,21	6,39±0,08	6,45±0,16	7,27±0,23	5,63±0,09	
Canine	7,91±0,19	8,33±0,24	7,49±0,15	7,76±0,19	8,21±0,28	7,32±0,11	
Sum of the six anterior teeth	47,20±1,36	48,38±1,49	46,02±1,24	45,69±1,31	48,54±1,54	42,84±1,08	
Sum of the 14 teeth	114,15±3,35	115,86±3,47	112,44±3,23	113,33±3,21	115,98±3,32	110,68±3,09	
Molar average module	10,58±0,33	10,75±0,37	10,41±0,28	10,96±0,34	11,81±0,41	10,11±0,26	

from a study of patients without taking into account the dental arches type.

Notable is the significant reduction in the difference between the maximum and minimum values of the anterior part of the dental arch length, which is defined as the sum of the width of the six anterior teeth crowns, which does not exceed 2.5 mm.

There was no significant difference between the indicators obtained from males and females. The variability in the sizes of the six anterior teeth in females was above that in males. These values indicate that the teeth size depends on gender to a smaller extent if compared to the type of the dental system.

Table 3 contains the results of the study concerning the mandibular teeth parameters (males and females). The lower jaw reveals a situation similar to that of the upper dental arch, while the digital indices range is smaller. There was no significant difference observed between the indicators obtained from males and females.

#### CONCLUSIONS

1. When performing odontometric studies, the evaluation and the interpretation of the results should be done in view of the dental system type.

2. The dental system type should be evaluated along the dental arch length, namely, the sum of the mesial-distal width of the crowns of the 14 permanent teeth that make up the dentition.

3. When performing odontometric studies without taking into account the dental system type, the features deviate significantly from the average value, which

<b>0 1 1 1 1</b>	Teeth size					
Odontometric	Males			Females		
pulumeters	average	max	min	average	max	min
Medial incisor	5,61±0,17	5,99±0,21	5,23±0,14	5,37±0,16	5,75±0,23	4,99±0,09
Lateral incisor	6,07±0,16	6,56±0,19	5,57±0,12	6,04±0,19	6,45±0,26	5,63±0,13
Canine	7,17±0,24	7,64±0,28	6,69±0,21	6,66±0,14	7,01±0,22	6,31±0,07
Sum of the six anterior teeth	36,97±1,12	38,62±1,27	35,32±0,96	35,77±1,04	37,58±1,19	33,96±0,88
Sum of the 14 teeth	108,48±2,97	112,08±3,16	104,88±2,78	105,09±2,94	108,96±3,08	101,23±2,81
Molar average module	10,76±0,27	10,95±0,31	10,56±0,24	10,37±0,26	10,78±0,34	9,96±0,19

*Table 3.* The major indicators for the lower jaw in permanent teeth in people with physiological occlusion and normodontia, (mm),  $(M\pm m)$ ,  $(p \le 0,05)$ 

makes it difficult to determine sexual dimorphism and is of fluctuating nature.

4. The outcomes of odontometric parameters examination concerning sexual dimorphism are of applied value in terms of restorative dentistry, where the focus is on restoring and replacing teeth, as well as in forensic practice implying identification of people subject to their dental status.

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## MAJOR TELERENTHENGOGRAM INDICATORS IN PEOPLE WITH VARIOUS GROWTH TYPES OF FACIAL AREA

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Currently, there are three major types of jaw growth known – neutral, horizontal and vertical. The growth type is determined subject to several interdependent parameters, including the total Bjork angle, the ratio of the face front height to the rear height, the lower gonial angle, the Ricketts face angle. Comparing the obtained actual values with the tabulated values allows estimating the type of the jaw growth

[5, 12, 26, 32, 37, 40].

Clinical orthodontics recommends evaluating the jaw growth type while selecting treatment for occlusion disturbances in various directions [1, 3, 7, 9, 14, 18, 21, 23, 27, 31].

The neutral type of jaw growth is considered the most favorable one for treating occlusion anomalies. Treating mesial occlusion and deep occlusion at the vertical growth type is preferable than treating distal occlusion. The horizontal type of jaw growth makes the treatment of deep and mesial occlusion complicated yet is viewed as favorable in case of treating distal occlusion [2, 6, 8, 10, 16, 20, 22, 29, 33, 35, 38, 41].

The available scientific literature offered us no account of the most common types of growth for the jaw bones, nor for the facial part, in people with physiological occlusion. Noteworthy is the opinion of specialists claiming that the varieties of gnathic, dental face, an of the dental arches, which are to be found at physiological occlusion, manifest a wide range of shapes and sizes, as well as in the anterior teeth position, at protrusion or retraction [13, 15, 19, 24, 36, 39, 42].

All the above has laid the grounds for the aim of this study.

**ABSTRACT** — The results of the study and the comparison of the head lateral teleroentgenogram, involving 292 persons (both sexes) in their first adulthood period, featuring physiological occlusion of permanent teeth, helped identify the occurrence of different growth types of the facial area of the head (vertical, neutral, horizontal). The analysis of lateral teleroentgenograms included evaluation of the mandible angle size, the total Bjork angle, the ration between the posterior and the anterior face height, the Ricketts face angle, the angle between the occlusal and mandibular planes, and the angle shaped by the skull base plane and the mandibular plane. The obtained measurements allow stating that most people with physiological occlusion reveal the neutral type of the facial part growth (61.99  $\pm$  2.84%), while the horizontal and the vertical types of growth were observed in  $30.48 \pm 2.69\%$ and 7. 53  $\pm$  1.55% of the total number of the participants, respectively.

**KEYWORDS** — physiological occlusion; facial area of head; teleroentgenogram; jaw growth type.

## INTRODUCTION

The issues of the facial skull growth have been the focus of experts' attention for the last four decades. One of the criteria for assessing the maxillofacial area status is the jaw growth. The type of the jaw growth is recommended to be evaluated based on the data obtained through the head teleroentgenogram examination in the lateral projection [4, 11, 17, 25, 28, 30, 34].

#### Aim of study

Identifying the features of the types of facial part growth according based on lateral projection teleroentgenogram data obtained from people with physiological occlusion.

### MATERIALS AND METHODS

Teleradiographic study was performed in 292 people belonging to the age group of the first adulthood period (21–35), with physiological occlusion of the permanent teeth. The main indicator of the growth type for the gnathic face part was the lower jaw angle as measured between the tangent lines to the branch and the body of the lower jaw. One sign was not sufficient to determine the growth type, due to which we evaluated the total Bjork angle, the percentage ratio of the face back and front heights, the angle shaped by the skull base plane and the mandibular plane, as well as other parameters. To study the lateral teleroentgenogram, we employed the major points used for determining the growth type -N(nasion), S (sella), Ar (articulare), Ba (basion), Go (gonion), Me (menton), Gn (gnation), A (subspinal point), B (supramental point), Pt (pterigoidea), C (condylen), and others (Fig. 1).

sion) point to the Me (menton) point. The measurement for the rear height was done from the middle of the Turkish saddle (S, sella) to the lower jaw angle at the point (gonion) Go. The angle at by the skull base plane (N-S) and the mandibular plane (Me-Gn) was calculated as well. In addition, we determined the angle between the occlusal and mandibular planes, where the occlusal line was drawn from the incisor point to the distal cusp of the second lower molar. The Ricketts face angle was measured based on the location of the Pt-Me line regarding the Ba–N line.

Following the aims of the study, the patients were divided into three groups. Group 1 included patients whose indicators mostly corresponded to the neutral growth type of the facial part of the head. Change in the indices was indicative of either the horizontal or the vertical type of the facial part growth. Literature states that the neutral type of growth has the total Bjork angle of  $393-399^\circ$ , the angle of the lower jaw varies from 119 to  $123^\circ$ , the percentage of the face rear height to the front height (S–Go × 100 / N–Me) is to be found within 62-65%. Concerning the angle shaped by the skull base plane (N–S) and the mandibular plane (angle NL–ML), a value of  $29-35^\circ$  indicates the neutral type of growth. The lower gonial angle (N–Go–Me) at the



Fig. 1. Teleroentgenogram of a patient with the location of the major points (a) and parameters (b) for identifying the jaw growth type

The indicated points were connected with lines with the angles between them determined, or the percentage ratio of the linear parameters. The calculation for the total Bjork angle included three angles. First the angle shaped by the N–S and S–Ar lines; second — the one created by the S-Ar and Ar–Go lines; third — the one that the Ar–Go and Go–Me lines shaped. The front face height was measured from the N (naneutral growth type is  $69-77^{\circ}$ , whereas the Ricketts face angle varies between  $89-92^{\circ}$ . Besides, we considered the angles determining the jaws position in relation to the skull (ANS and BNS). The position of the articular head was identified vertically (S–D) and horizontally (C–D), where the D point was the intersection of a perpendicular line to the skull base plane at the S point, and a perpendicular line drawn to it from the C point. The teleradiographic data was recorded in Microsoft Excel spreadsheets. The results were computerprocessed employing standard software packages with the variation statistics method and calculating the arithmetic mean as well as identifying the nonsampling error.

### **RESULTS AND DISCUSSION**

The most objective indicator for the facial part growth type is the lower jaw angle shaped by the tangent lines to the jaw's body and branch. Its size, as a rule, affects the total Bjork angle, the front height of the face, the angles created by the mandibular plane and other planes of the head — the skull base plane, the spinal plane, the occlusal plane. The mandibular angle determines the parameters of the lower gonial angle (N–Go–Me) and the Ricketts face angle. Fig. 2 offers a view on various teleroentgenograms with different values of the mandibular angle. in terms of the ANS angle, which determines the location of the maxilla in the skull facial part. People with physiological occlusion have it varying from 85° to 88°. The parameters of the BNS angle are somewhat smaller, yet, they, too, proved not to depend on the growth type of the facial part of the head. The variability of the ANB angle was within  $2-3^\circ$ . A slight increase in the angle is typical of people with the vertical growth type, while a decrease was observed in case of the horizontal growth type of the head facial part. Notable is the inconsistency of the total Bjork angle as it is determined here. For all types of growth, it was below the values that are to be found in the respective literature. Nevertheless, there were significant differences identified concerning the parameters of the groups under examination. In people with the neutral growth type, the angle varied from 380° to 384°. A smaller angle was typical for the horizontal growth, whereas an increase for the vertical type. The



Fig. 2. Teleroentgenograms of patients with the vertical (a), the neutral (b) and the horizontal (c) type of jaw growth

Of the total number of the participants with physiological occlusion, 181 persons ( $61.99 \pm 2.84\%$ ) had most of their growth-type indicators corresponding the neutral values. 89 persons were identified ( $30.48 \pm 2.69\%$  of the total body of participants) as having parameters pointing at the horizontal growth type. The smallest number of patients were those with the vertical type of growth (22 persons —  $7.53 \pm$ 1.55% of the total number). During that, the trend of the vertical growth was insignificant.

The measurements for the angular parameters of the lateral projection teleradiography can be seen from Table 1.

The study showed that, regardless of the growth type of the facial part of the head, the position of the jaws in relation to the main anatomical references corresponded to the physiological norm. There were no significant differences identified between the groups differences in the mandibular angle had their effect on the lower gonial angle (NGoMe) parameters. For the neutral growth type, its value ranged from 69° to 74° and corresponded to the values obtained through the study. Also, significant differences were revealed based on the angle between the skull base plane and the mandibular line. For the neutral growth type, the value of the parameter was  $29.39 \pm 1.75^\circ$ . In people with the neutral type of growth the Ricketts face angle is approaching the right angle. As far as the horizontal type of growth is concerned, the angle is obtuse; in case of the vertical type of growth — sharp. It is interesting to look at the angle shaped by the occlusal and mandibular planes. For the neutral type of growth, its value varied from 14° to 16°. The systematization of the data allowed establishing the teleroentgenograms basic angular parameters, which are typical of persons with different growth types of the facial part of the head.

Angular teleroentge-	Type of facial part growth		
nogram parameters	neutral	horizontal	vertical
Bjork angle	382.06±2.06	375.33±1.27	388.53±1.67
N-Go-Me angle	71.61±1.98	64.33±1.26	79.15±1.82
Mandibular angle	120.07±1.24	113.22±0.84	127.65±1.68
NL – ML angle	29.39±1.75	19.78±1.92	36.48±2.87
OL – ML angle	15.04±0.48	9.02±0.88	17.52±0.51
Ricketts angle	90.44±1.14	98.89±1.39	86.68±1.38
ANS angle	87.11±1.21	87.33±1.15	86.52±1.34
BNS angle	84.17±1.35	85.67±1.46	82.38±1.96
ANB angle	2.94±0.81	1.67±0.96	4.12±1.83

**Table 1.** Major angular teleroentgenogram parameters for people with different facial part growth, (°),  $(M\pm m)$ ,  $(p \le 0,05)$ 

In addition, we evaluated the linear parameters of the teleradiography, in particular, the height of the anterior and posterior parts of the face, as well as we evaluated their ratio. Also, we evaluated the location of the mandible articular head with respect to the position of the Turkish saddle, both vertically and horizontally.

Table 2 offers the measurements for the teleroentgenograms linear parameters, lateral projection.

**Table 2.** Major linear parameters of teleroentgenograms for people with various facial growth types, (mm),  $(M \pm m)$ ,  $(p \le 0.05)$ 

Teleradiographic	Growth types of facial part of head			
linear parameters	neutral	horizontal	vertical	
N-Me (front height)	115.04±1.64	107.73±1.76	118.49±1.72	
S-Go (rear height)	76.06±1.39	82.09±1.63	72.51±1.44	
S-D (vertical)	19.27±1.35	20.09±1.29	17.47±1.54	
C-D (sagittal)	14.17±1.21	12.61±1.18	11.79±1.23	

The front height of the face in people with the horizontal type of growth was significantly below than that in the vertical type. At the same time, the height of the rear face area in people with the horizontal type of growth exceeded that in people with the vertical type of the face growth. In this regard, the percentage ratio of these parameters changed. The value of the S–Go × 100 / N–Me ratio was: for the neutral growth type of the facial part of the head — 71.61 ± 0.98%; for the horizontal type — 76.24 ± 1.64%; for the vertical type — 61.18 ± 1.64%. The groups of participants manifested no statistically reliable differences in the articular heads location in relation to the skull base and, in particular, related to the Turkish saddle.

## CONCLUSIONS

- 1. The teleroentgenogram head measurements in the lateral projection are objective and informative when studying the size and location of the face skull bones, as well as the main growth directions of the head facial part.
- 2. The growth types of the facial part of the head are determined by the teleroentgenogram basic linear and angular parameters, as well as by the main types of the jaw growth.
- 3. With the physiological occlusion, there have been three main types identified for the growth of the head facial part; their distribution, however, is uneven. The highest number of people with physiological occlusion manifested the telera-diographic values pertaining to the neutral type of growth (181 people  $61.99 \pm 2.84\%$  of the total number). 89 participants were identified to have indicators pointing at the horizontal type of growth (30.48 ± 2.69%). The lowest number of the participants belonged to the group with the vertical growth type (22 persons 7.53±1.55%).
- 4. The study has revealed no stable tendency detected towards the vertical growth of the facial part of the head.

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## BIOMETRY OF PERMANENT OCCLUSION DENTAL ARCHES — COMPARISON ALGORITHM FOR REAL AND DESIGN INDICATORS

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The measuring accuracy of the dental arches linear parameters plays a crucial role in diag-nosing abnormalities and deformations in the dentoalveolar system. The major research method up to date has been the biometric study of jaw stone models [1, 5]. Measuring implies a compara-tive evaluation of the dental arches dimensions against the dimensions of the teeth that constitute the dentition [6]. There have been correspondence indices proposed, the best known of them being the data proposed by Pont, Linder-Harth, Korkhaus, Howe, and by other researchers. At the same time, their advantages and disadvantages have been revealed, with the most rational approaches identified in view of the gnathic and dental types of the dental arches [2, 4]. Correlation has been identified between the dental arch size and the craniofacial parameters, as well as their role in selecting orthodontic treatment [3]. Researchers and orthodontists typically take teeth and dental arch measurements manually using various modifications of dental calipers. These methods are time- and effort-consuming, whereas potential errors cannot be ruled out. The available literature offered us no data that would allow comparing the actual values with the de-sign parameters, which was the aim of the study.

AIM. To develop an algorithm for comparing the actual and the design indicators at bio-metric examination of the permanent occlusion dental arches.

MATERIALS AND METHODS: The study involved 79 persons aged 20 to 25, with no signs of dental pathology and with a full set of permanent teeth. All the participants had their teeth imprints taken on elastic stuff to further transfer the imprints on die-stone models. The biometric measurement was performed with calipers (accuracy — 0.01 mm). In the anterior section, the mesial-distal width of the canines and incisors was measured. The length of the entire dental arch was the width sum of the crowns of the 14 teeth that constitute the dentition. Transversally, the dental arch width between the canines was measured at two points — between the canines cusps and between the canines distal surfaces at the vestibular surface. The width between the second molars was measured between the points located on the peaks of the vestibular distal odontomers cusps. Specific attention was paid to the diagonal dimensions of the dental arches, while the reference point was interincisal point, from which the distance to the canines and second molars location level was measured.

**RESULTS AND DISCUSSION.** The measurement revealed people with permanent orthognathic occlusion had their upper jaw dental arch anterior section length equal to  $46.78 \pm 0.82$  mm, while at the lower jaw the similar measure produced  $36.58 \pm 0.67$  mm. The ratio of these parameters, which was  $1.28 \pm 0.06$ , was used as a criterion for comparing the length of the jaws anterior part. The upper jaw dental arch length was 114.5 mm, at the lower jaw — 108.34 mm, whereas the value of the compliance coefficient of  $1.06 \pm 0.01$ was recommended to be used when comparing the obtained actual values. The values of the ratio of the dental arch length to the length of the anterior part of the arch (upper jaw -2.45, lower jaw -2.96) were used to develop the corre-spondence algorithm for the said parameters. The width of the dental arch anterior part, meas-ured between the canine tearing cusps, was  $39.4 \pm 0.26$  mm and  $31.76 \pm 0.19$  mm for the upper and lower jaws, respectively. At the same time, the transversal dimensions between the canines distal surfaces were 2 mm larger  $(41.32 \pm 0.29 \text{ mm})$ and  $33.79 \pm 0.17$  mm, respectively). The ratio of the dental arch length to the dental arch diagonal dimensions, in particular to the frontal-distal diagonal, was 2.12, and the difference between the design and the actual values did not exceed 2 mm measuring the linear parameters of dental arches and individual teeth allowed developing an algorithm for comparing the actual and the design indicators at permanent occlusion dental arches biometry. The algorithm included a sequence of steps. First, the length of the anterior part of the upper jaw dental arch was measured. Its ratio to the 1.28 coefficient value showed the estimated length of the anterior section of the lower jaw dental arch. After measuring the actual value, the indicators were compared. If the design and the actual values did not match, the measurement was done over. The indices deviation can be used for diagnosing anomalies in the anterior teeth size. Second, the length of the upper jaw

dental arch was identified. Its ratio to the coefficient of 1.06 showed the estimated length of the lower jaw dental arch. The outcomes were interpreted similarly to the length of the dental arch anterior section. Third, the ratio of the dental arch length to the dental arch diagonal dimensions was estimated using the coefficient of 2.12. Normally, the difference in the design and in the actual values should not exceed 2 mm.

**CONCLUSION.** The proposed algorithm for comparing the design and the actual indicators at biometrics of permanent occlusion dental arches offers a way to obtain accurate data concerning the dental arches dimensions for both jaws, as well as to reveal dentoalveolar pathologies. The algorithm included a series of steps to measure the length of the dental arches anterior section, the entire dental arch length, the arch width at the canine and the molar region, and to determine diagonal dimensions employing the proposed compliance coefficients.

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# **CLINICAL FEATURES OF TEMPOROMANDIBULAR JOINT** DYSFUNCTION IN PATIENTS WITH MESIAL OCCLUSION **COMPLICATED BY DENTITION DEFECTS**

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**ABSTRACT** — Mesial occlusion is one of the most severe forms of dentoalveolar anomalies and can be complicated by the temporomandibular joint dysfunction. This study is focused on identifying the clinical features of the temporomandibular joint morpho-functional status in mesial occlusion. 20 patients with mesial occlusion were examined employing clinical methods, zonography, and functional diagnostics. As a result, the clinical signs most typical of this pathology were revealed, which helped reduce the severity of this pathology as a through treatment.

**KEYWORDS** — mesial occlusion, dentition defects, temporomandibular joint, zonography, functiography.

Dentoalveolar anomalies and deformations are fairly common pathologies [14, 18, 24, 28, 35, 39]. As a rule, they come combined and complicated by morphological and functional changes in the maxillofacial area [12, 17, 21, 25, 30, 37].

Specialists are paying a lot of attention to the diagnostics and choice of orthodontic and orthopedic methods for treating patients with dentoalveolar anomalies and deformations [1, 3, 5, 7, 9, 11, 13, 16, 19, 22, 26, 29, 36, 40].

One of the worst types of dentoalveolar anomalies is mesial occlusion [4, 32, 33, 34, 42].

Lack of timely orthodontic or device-based surgical treatments or the patient's rejection of these treatments, will only add to the development of associated



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complications manifested as defects and secondary deformations of the dentition, as well as muscular and joint disorders [2, 6, 8, 10, 15, 20, 23, 27, 31, 38, 41].

#### Aim

To identify morphological and functional maxillofacial changes in patients with mesial occlusion combined with the dental range issues and temporomandibular joint pathologies.

#### MATERIALS AND METHODS

The study involved 20 persons aged 20 through 65, who underwent prosthetic treatment for mesial occlusion combined with the dentition defects and complicated by a temporomandibular joint pathology.

The efficiency of the orthopedic treatment was determined based on the outcomes of clinical and laboratory research. We focused our evaluation on the following symptoms: the face symmetry; the amplitude of the vertical, lateral and onward mandibular movements; the symmetry of mandibular movements when opening the mouth; the pain in the temporomandibular joints and masticatory muscles at the lower jaw palpation and movements; articular noise identification. All the symptoms were scored where the sum of the points indicated the degree of functional disorders — 0 points — no dysfunction; 1–10 points — mild dysfunction; 11–20 points — moderate dysfunction; 20–50 points — severe dysfunction. To evaluate the anatomical and topographic structure of the temporomandibular joint, tomography was used, which was performed using the universal radiographic unit ORTHOPHOS 3 of SIEMENS. The temporomandibular joint and masticatory muscles functions, just like the identification of occlusal disorders were carried out through functiography (by Kleinrok-Hvatova), based on intraoral recording of the lower jaw movements.

The statistical processing was performed directly from the common data matrix of ECXEL 7.0 (Microsoft, USA) also involving certain features offered by the STATGRAPH 5.1 (Microsoft, USA) software, ARCADA (Dialog-MGU, Russia), and implied detecting the median values, its mean root square deviation, and the non-sampling error. Further on, following the patterns commonly employed for medical and biological studies (sample numbers; type of distribution; non-parametric criteria; reliability of the difference of 95%, etc.) the significance of the sampling difference was evaluated subject to the Student's criterion (t) and the respective significance index (p).

#### **RESULTS AND DISCUSSION**

In 60% of the cases, an external examination revealed a face asymmetry in patients with mesial occlusion combined by lateral dentition defects and complicated by temporomandibular joint dysfunction. Mouth opening was impeded — in the vertical plane — in 40% of the cases; in the horizontal plane — in 45% of the cases. The mandibular onward movement issues were observed in 35% of the patients. Deviation affecting the mouth the opening was present in 55% of the cases, while 35% of the cases revealed deflection. Auscultation showed the articular noise pathology in 80% of the patients. Temporomandibular joint pain occurring at a single movement of the lower jaw, was detected in 15%, whereas as far as two or more movements were involved, then pain sensations were reported by 10% of the patients. Masticatory muscle pain at a single mandibular movement was observed in 25% of the cases; at two or more movements — in 10%.

Clinical examination revealed signs of temporomandibular joint dysfunction in all observations — a mild degree of dysfunction was detected in 40% of the cases; moderate — in 40%, and severe — in 20% of the cases. The presence of the clinical signs of the muscular-articular dysfunction confirms the idea that the mesial mandibular displacement is also accompanied by impaired functional status of the masticatory muscles and of the temporomandibular joint. At the same time, the patients experienced abnormal articular noise at mandibular movements; the joint and the masticatory muscle pain, which irradiated to various parts of the head; deviation and deflection when opening the mouth, as well other symptoms. This symptomatology is due to an asynchronous contraction of the masticatory muscles, displaced lower jaw and articular disc in the mandibular fossa, and their non-conventional movement. A number of patients had mesial displacement of the lower jaw, which was due to the loss of antagonist-teeth in the lateral dentition; lack of the mandibular shift into the posterior contact position; direct occlusion; increased abrasion in the front teeth, which maintain the interalveolar height and the lower face height.

The x-ray outcomes showed that the mesial mandibular displacement came accompanied with a disrupted structure and interrelations of the temporomandibular joint elements. Thus, the zonograms in patients with mesial displacement of the lower jaw, revealed a decrease in the articular tubercle height and, as a consequence, a decrease in the mandibular fossa depth. The lower jaw head had mesial position, with the width of the joint cavity in the anterior region decreasing down to 1–2 mm, while in the upper and posterior parts it increased by 3–4 mm (Fig. 1).

Functiographic intraoral observation of the mandible movements helped detect that the gothic angle value was reduced going down to  $85.04 \pm 2.730$ . The gothic angle revealed asymmetry, disturbed straightness and length of the sides. The gothic arch



*Fig. 1. Temporomandibular joint prior to treatment (zonogram): a) right; b) left* 

manifested a shortness in one or two sides, asymmetry and curvature in the lateral movements as well as asymmetry of the occlusal field location. At the first stage of treatment, the mandible position was brought to normal, with the occlusal-articulatory relations of the dentition and interalveolar distances restored, for which the patients were given tooth-guards and occlusal bite splints of various design. At the same time, we were seeking the restoration of the canine position, which contributed to the patients' adjustment under the new conditions of the maxillofacial functioning. The duration of the first stage was 3–6 months.

Once the first stage of the treatment was over, the signs of the temporomandibular joint dysfunction were observed in 70% of the cases. However, patients reported a severity decrease in the clinical manifestations. A mild degree of dysfunction, for instance, was observed in 50% of the cases; a moderate degree - in 15% of the cases, while another 5% were found to have a severe degree of the dysfunction. 30% of the patients had no signs of the dysfunction. An examination of the tomograms taken after the first stage of the treatment was completed, showed no change in the shape and size of the bone elements of the temporomandibular joint. However, the treatment helped change the topography of the mandible heads in the mandibular fossa. Thus, a forced forward position of the mandible heads was eliminated in all the cases, which contributed to restore the symmetry of their both right and left location. As a result, an increase in the width of the anterior, and a decrease in the width of the posterior and upper sections, of the joint space were observed (Fig. 2).



*Fig. 2.* Temporomandibular joint after the treatment (zonogram): *a*) right; *b*) left

The outcomes gained through the first stage of the treatment were fixed through prosthetics done in view of the size and the topographic features of the dentition defects (Fig. 3).

After the treatment, the functiograms showed similar and symmetric sides of the gothic angle. The gothic angle reached  $98.37 \pm 1.820$ . The gothic arch was observed to feature curve smoothness as well as symmetry on the sides. The occlusal field was located on both sides of the middle line of the metal plate.

## CONCLUSIONS

- Dentition defects in the lateral sections, lack of the possibility for displacing the lower jaw in the posterior contact position, direct bite, increased abrasion of the front teeth with mesial occlusion — all these contribute to extra anterior displacement of the mandible.
- 2. Mesial displacement of the mandible, just like distal one, is accompanied by discoordination of muscular contractions, displaced mandible heads and articular disks in the mandibular fossa, their



Fig. 3. Teeth joining: a) before treatment; b) after treatment

atypical movements, and as a result, functional issues in the masticatory muscles and anatomical topographic changes in the temporomandibular joint.

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## DENTOALVEOLAR SPECIFICS IN CHILDREN WITH CLEFT PALATE DURING PRIMARY OCCLUSION PERIOD

#### Sergei Dmitrienko, Michael Porfiriadis, Dmitry Domenyuk, Gasan Budaychiev

Congenital malformations are rated among the top urgent medical and social issues, which is due to the high incidence of the pathologies, as well as the severity of morphological and functional changes in newborns. In the structure of congenital malformations, the cleft upper lip, palate and alveolar process rank second, and belong to the worst malformations of the face and the jaws, which leads to significant anatomical, physiological and cosmetic troubles [2]. A reasonable expansion of indications for biometric studies of jaw models and cephalometric measurements through orthodontic treatment given to children with cleft upper lips, palate and alveolar processes would allow not only objective evaluation of the instrumental treatment effectiveness aimed at improving the shape and the dimensions of dental arches, occlusal ratios, yet would also increase significantly the diagnostic value of anthropometric studies, with meaningful outcomes being obtained for dentistry [1, 3, 4, 5, 6].

AIM. Identifying the specific dentoalveolar features in children with unilateral cleft alveo-lar process at the primary occlusion period.

MATERIALS AND METHODS. The group, which included 37 children aged 4 to 6 with unilateral cleft upper lip and alveolar process, had their facial parameters and dental arches examined. The facial dimensions were measured in two sections, vertically. The nasal area was measured be-tween the glabella points (g) and the subnasale (sn). The gnathic part was taken between the sub-nasal point and the gnathion point (gn). In the event the face width between the zygomatic points (zy-zy) caused no difficulty, then, when measuring the nose width between the most prominent lateral points, the alare (al-al) was measured along both halves of the aesthetic center face line. The measurements allowed assessing the location asymmetry of the nose wings in case of maxillofacial congenital pathologies. A similar measurement method was carried out at biometric examination of jaw stone models. The dental arch width between the second primary molars was taken as the conventional middle line of the upper dental arch. The line was divided into two equal halves and a perpendicular was drawn forward starting from the center.

The width of half-arch at the level of the canines and molars was measured from the conventional midline. This line served a guide for measuring arch depth, and allowed evaluating the interincisal point displacement. The dental arch diagonal dimensions, meanwhile, were measured from the interincisal point to the canines and second primary molars.

**RESULTS AND DISCUSSION.** The study of the maxillofacial region carried out in the study groups has shown that the vertical facial parameters measured from the g-point to the gn-point were  $98.83 \pm 1.82$ mm, the value being below that found in the children's peers who had orthognathic bite, and which was explained by a congenital pathology. The height of the nasal (g-sn) and gnathic (sn-gn) parts was 48.92  $\pm$  0.95mm and 48.96  $\pm$  0.86mm, respectively. The latitudinal facial parameters between the zygomatic points were  $109.85 \pm 1.56$  mm. If the total width of the external nose was  $32.45 \pm 0.32$  mm, then the sizes of the left and right sides in children with cleft upper lips and alveolar processes were different. On the cleft side, the external nose width measured from the aesthetic center line, was an average 2.5 mm above the same measurement on the intact side. The biometric study has shown that the transversal dimensions of the anterior part of the dental arch in children with cleft alveolar processes are most vulnerable to alteration. Notable is the symmetry of the dental arch. The dental arch width measured from the canines to the aesthetic center line, was significantly smaller on the cleft side  $(11.49 \pm 0.42 \text{ mm})$ , while on the intact side the same parameter was  $16.32 \pm 0.25$  mm. In total, the intercanine distance did not exceed 30 mm. The anomaly facilitated the alteration in the parameters in the sagittal direction, which was more prominent in the anterior part of the dental arch. And the alterations were expressed equally on both sides. The anterior section pathology was also to be seen in the magnitude of the dental arch total depth. The depth of the anterior part of the dental arch on the cleft side was  $6.54 \pm 0.82$  mm, while on the intact side it was  $6.91 \pm 0.45$  mm. It is important to note the discrepancy between the dental arch diagonal dimensions in children with congenital pathology, the dimensions of the anterior dental arch diagonals and the entire dental arch of the primary occlusion. The anterior diagonal on the intact side was  $16.52 \pm 0.73$  mm, whereas on the cleft side it was significantly smaller  $(13.41 \pm 0.54, p \le 0.05)$ . The dental

arch diagonal on the cleft and on the opposite sides was  $32.34 \pm 0.46$  and  $33.56 \pm 0.41$  mm, respectively.

CONCLUSION. The study has revealed anthropometric facial specifics and biometric values of dental arches in children with congenital unilateral cleft upper lip, alveolar process and palate. It was observed that on the cleft upper lip side, the external nose width, measured from the aesthetic center line, exceeded that on the intact side by an average of 2.5 mm. The biometric measurements have shown that the transversal dimensions of the anterior dental arch are most susceptible to alteration. The dental arch width, measured from the canines to the aesthetic center line, was significantly smaller on the cleft side  $-11.49 \pm 0.42$  mm, while on the intact side the same parameter measured  $16.32 \pm 0.25$  mm. The entire intercanine distance did not exceed 30 mm. The obtained data can be used in the clinical orthodontics for diagnosing anomalies in the dental arch shape and size, as well as to select the best orthodontic treatment offered to children with congenital unilateral cleft upper lip, alveolar process and palate.

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## IMPROVING ODONTOMETRIC DIAGNOSTICS AT JAW STONE MODEL EXAMINATION

#### Dmitry Domenyuk, Alexander Lepilin, Igor Fomin, Sergei Dmitrienko, Gasan Budaychiev

Studying the teeth morphology is fundamental for identifying the gender, the race, the variability of the dentoalveolar system under different physique types, as well as the variability of the tooth shape subject to the somatic type [1, 5]. Biometric investigation of jaw stone models is of applied and practical importance in clinical dental practice. The major dimensions of teeth in people with physiological types of occlusion have been shown for various gnathic and dental arch types [3, 6]. Notable are researchers' recommendations pointing at the need to employ odontometric data to identify the correspondence between the tooth size and the parameters of the dentoalveolar system and the craniofacial complex as a whole [2, 4]. However, the same odon-tometric parameters are interpreted ambiguously by experts, which makes the research outcomes incomparable.

**AIM.** Developing a teeth measuring algorithm for evaluating odontometric parameters at studying jaw stone models.

MATERIALS AND METHODS. The biometric study was performed on jaw stone models obtained from 107 people (aged 20–25) with physiological types of occlusion and a full set of teeth. As the initial size for odontometry, we chose the mesial-distal width of the crowns on the teeth that constitute the dentition. Besides, on the first and second permanent molars we measured the vestibular-lingual diameter of the crown. For this, a conditional midline was applied on the vestibular and lingual surfaces of the teeth, which connected the medial points of the mesial-distal width near the occlusal surface and the clinical dental neck. The diameter was measured between the said lines at the points corresponding to the location of the tooth

equator. Following experts' recommendations, the size of the variable teeth in each group was compared with the size of the key teeth, using the coefficients that are common in dentistry. The comparative analysis of the size of teeth groups was carried through the Tonn and Bolton methods. Following the Tonn recommendations, the sum of the 4 mandibular incisors was multiplied by a ratio of 4/3 adding a coefficient value that was 0.5 mm at the lower incisors dimensions lying within the range of 22.2–28.1 mm. At smaller sizes, the correlation coefficient was 0.4 mm, while for larger dimensions it was 0.6 mm. To determine the correspondence between the remaining teeth size, the front and full Bolton ratios were used where the ratio of the lower teeth sizes (6 front teeth and 12 teeth constituting the lower dentition) to the antagonists was calculated. During that, the anterior ratio within the normal range was 77.2%, while the full ratio was 91.3%. The difference in the design and real values allowed determining the discrepancy between the upper and the lower teeth size. We used the methods common in statistics, and evaluated the arithmetic mean of the order sample. All the measurements were performed in the automatic mode of the Microsoft Excel software.

**RESULTS AND DISCUSSION.** Through the study, an odontometry algorithm was developed, where the first stage implied measuring the mesialdistal width of the crowns on six anterior teeth, namely, incisors and canines, on jaw stone models. Parameter estimation was performed employing the incisor and canine dental coefficients. For this purpose, the ratio of the lateral upper incisor size to the upper medial incisor was determined. The sizes were calculated only in case the value was 0.8.

Similarly, the value of the canine incisal coefficient (which under normal conditions, for the medial incisor was 0.9, and for the lateral incisor -1.1) was calculated. In case the design values do not match the real values, a repeated measurement is recommended. In case of repeated mismatch between the indicators, one of the teeth was diagnosed with micro- and/or macrodontia.

The lateral incisors of the upper jaw are most vulnerable to reduction. Note to be made that the size of the canine was the most stable, due to which it is recommended to be considered a key tooth of the anterior segment. Further on, the ratio of the incisors in both jaws was compared, with the Tonn method employed for this purpose. The difference between the design values and the real values either required a repeated measurement or was indicative of the teeth size anomaly. The sizes of the 6 front teeth and the 12 teeth of the dental arch were compared with their antagonists, with the degree of discrepancy between the anterior and the full ratio determined.

**CONCLUSION.** The proposed odontometry algorithm allows carrying out a precision biometric analysis for stone models of jaws with permanent teeth physiological occlusion, as well as determining different classes of deviations in tooth size, which is of great importance in odontology, forensic medicine and clinical dentistry.

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## MATHEMATIC SIMULATION FOR UPPER DENTAL ARCH IN PRIMARY TEETH OCCLUSION

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The need for studying individual features of the maxillofacial structure at orthodontic and prosthetic treatment has been proven by many authors, both national and foreign ones [1, 4]. There has been a correlation identified between the shape, the dimensions of the dental arches, and the craniofacial morphometric parameters through different ages [2, 3]. The Hawley-Herber–Herbst method employed for graphic imaging of the dental arch has proven to contain certain faults, due to which correction factors have been developed taking into account the difference between the segment arch length and the length of the chord limiting the segment arch [5,6]. As far as the primary occlusion is concerned, the Schwarz method is recommended, based on the assumption that the dental arches shape through this stage of development is more like a semicir-cle, whose diameter is the dental arch width between the vestibular surfaces of the second primary molars. The methods for constructing dental arches proposed by other authors rely on the segments measurement; however, establishing correlation links between the lateral and anterior segments of the dental arches is not always available.

AIM. Design and explanation regarding the mathematic simulation method for the upper dental arch shape in children in the primary occlusion.

MATERIALS AND METHODS. The biometric study was performed on jaw die-stone models of 83 children who were on the completed primary bite stage (aged 4-6), and whose physiological occlusion corresponded the said age. On the stone models, the dental arches transversal dimensions were taken between the primary canines and second primary molars. The conventional lines connecting the points on the canines and the molars were used as a guide for measuring the depth of the anterior dental arch and the total depth of the arch, respectively. The frontal canine diagonal was taken from the central point to the point on the canine, while the frontal-distal distance reached the point level on the second primary molar. Odontometry was employed to identi-fy the anterior segment length and the dental arch length, as the sum of the width of the tooth crowns constituting the corresponding arches.

**RESULTS AND DISCUSSION.** The linear measurements of the dental arches have shown that the width of the dental arch between the canines was  $34.01 \pm 0.56$  mm, while the depth of the anterior segment was  $9.46 \pm 0.51$  mm. This data allowed determining the circle diameter for the placement of the six anterior primary occlusion teeth. Building a dental arch takes data about the width and depth, which, on the average, were in the said group equal to 49.79  $\pm$  0.41 mm and 25.56  $\pm$  0.31 mm, respectively. The diagonal from the interincisal point to the canine was within the range of  $18.34 \pm 0.32$  mm, whereas the dental arches diagonal dimensions were  $35.52 \pm 0.45$  mm. The data is average and can be used for graphical imaging of the average dental arches, which does not meet the contemporary requirements of orthodontics and patient-centered healthcare. Due to this, a method for constructing a dental arch diagram based on the child's in-dividual features was developed. The ratio of the arch width between the canines to the central angle sine allowed determining the circle diameter for the front teeth. The central angle, accord-ing to the laws of the circle geometry, was the ratio of the arch depth double arctangent to the width between the primary canines. From the top point of the circle, which corresponded to the location of the arch central point, or the interincisal point, a line of diameter extending beyond the circle was drawn. The length of the said line corresponded to the arch width between the molars. A distance corresponding to the dental arch depth, was taken on the constructed diameter. Through the depth's mark a perpendicular line was drawn, and on both sides of the center distances were measured corresponding to arch half-width between the molars. From the interincisal point, on both sides of the arch, a value equal to the anterior section diagonal was used to measure segments thus obtaining a reference point for the canines positions. Through the lower point, which was on the diameter line, a perpendicular line was drawn with two segments measured, equal to the one-and-a-half width of the tooth-alveolar arch in the second primary molars area. The obtained points were used as reference for constructing arch segments from the canine point to the molar point. This way we obtained an arch diagram corresponding to the individual parameters of the primary occlusion dental arches.

**CONCLUSION.** The biometric examination of dental arches on jaw stone models allowed develop-
ing a mathematical simulation method to build an upper dental arch diagram for primary occlusion. The technique is based on the regularities of the circle geometry, where the diameter is defined as the ratio of the arch width between the canines and the central angle sine. The value of the central angle here, according to the circle geometry laws, was the ratio of the arch depth double arctangent to the width between the primary canines. Overlapping the diagram on the upper dental arch model showed their match, which allowed applying the method of arch constructing in clinical orthodontic practice.

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# DIAGNOSTIC VALUE OF CEPHALOMETRIC PARAMETERS AT GRAPHIC REPRODUCTION OF TOOTH DENTAL ARCHES IN PRIMARY TEETH OCCLUSION

#### Alexander Lepilin, Igor Fomin, Dmitry Domenyuk, Sergei Dmitrienko, Gasan Budaychiev

One of the significant and objective ways for diagnosing anomalies in the dentoalveolar system, as well as for controlling the treatment effectiveness and forecasting potential aesthetic changes in the face soft tissue base, implies studying the cephalometric parameters. Diagnosis is given based on clinical and radiological examination, as well as on studying control and diagnos-tic jaw models [1, 3]. There are findings available, which show odontometry of infant teeth and linear parameters of dental arches, as well as methods have been proposed for graphic reproduc-tion of dental arches in view of individual features [2, 5].

The Schwarz method for designing a semicircle has been proposed, where the diameter is constituted by the width of the dental arch between the vestibular surfaces of the second primary molars. The specific features for constructing the dental arch of the primary occlusion have been shown, taking into account the lateral segment length, which includes the sizes of the primary molars and the canine. Notable are works claiming potential employment of the circle geometry regularities for constructing individual shape of dental arches in the permanent teeth occlusion, in view of their gnathic and dental types [4, 6]. However, there is no data available on methods for diagnosing dentoalveolar anomalies in the primary teeth occlusion, taking into account the parameters of the facial part of the head.

**AIM.** Identifying the face and the dental arches basic parameters in children at their primary occlusion stage in order to develop methods for diagnosing maxillofacial anomalies.

MATERIALS AND METHODS. Anthropometric examination of the face and dental arches was carried out involving 67 children (aged 4–6) with a full set of primary teeth without signs of maxillofacial pathology. The anthropometric examination of the face was performed in the vertical direction from the superciliary point (g-glabella) to the nasal point of the subnasale (sn), and from that to the chin point gnathion (gn). This way the vertical dimensions were obtained for the middle (nasal) and lower (gnathic) part of the face. The transversal direction was used to identify the width of the face distal part between the zygomatic points (zy-zy). In the anterior part of the face, the distance between the most prominent alare (al-al) lateral points was measured. Biometric study of the jaw stone models implied evaluating the dental arches width between the canines and the second molars. The arches depth was measured from the interincisal point along the conventional midline of the arc that was perpendicular to the intermolar line. The depth of the anterior part was measured from the interincisal (central) point to the conventional line of the canine locus. The diagonal dimensions were taken from the central point to the point on the canine and up to the point on the second primary molar. Odontometric study was carried out identifying the length of the dental arch anterior section and the length of the entire dental arch, which was required for graphic reproduction of the primary occlusion dental arches. In the reproduction of arches, the circle diameter was taken as the design value equal to the ratio of the arch width between the canines to the central angle sine. In this case, the value of the central angle was the ratio of the double arctangent of the arch depth to its width.

**RESULTS AND DISCUSSION.** The maxillofacial study in the study groups has shown that in case of physiological occlusion, the vertical facial parameters measured from the g-point to the gn-point were  $108.97 \pm 2.64$  mm. The height of the nasal (g-sn) and the gnathic (sn-gn) parts of the face was  $52.72 \pm 1.85$ mm and  $52.96 \pm 1.95$  mm, respectively. The latitudinal facial parameters between the zygomatic points were  $111.85 \pm 1.66$  mm. The width of the anterior face, measured between the nose wings, was  $32.65 \pm$ 0.75 mm. The biometric study of the jaw stone models revealed that the inter-canine transversal distance was  $33.21 \pm 0.23$  mm, while between the second molars it was  $49.79 \pm 0.41$  mm. The total arch depth (sagittal) was  $25.56 \pm 0.31$  mm. The depth of the dental arch in the anterior part was  $9.57 \pm 0.23$  mm. The anterior diagonal was  $18.34 \pm 0.32$  mm, while the diagonal sizes of the dental arches (right and left) were, as a rule, identical  $-35.52 \pm 0.45$  mm. obtained The anthropometric data offer some approximate, average statistical values for the major linear parameters. The most accurate idea of the upper dental arch shape can be obtained through graphic reproduction, which is based on measuring the relatively stable parameters of the dental arches. The outcomes of imposing an individual graphic reproduction on the upper jaw stone model has revealed full compliance of the dimensions at the physiological occlusion of the primary teeth, which can be used in the clinical orthodontics to diagnose anoma-lies and select the best treatment.

**CONCLUSION.** The anthropometric data from studying the face and the dental arches in the children of the study groups provide an idea of the approximate, average statistical parameters for the main linear parameters, whereas graphic reproduction of dental arches will allow deter-mining the individual maxillofacial features.

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# RADIOLOGICAL SPECIFICS OF TEMPOROMANDIBULAR JOINT STRUCTURE IN CASE OF DENTITION ISSUES COMPLICATED WITH DISTAL OCCLUSION

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Dentition defects with no timely treatment can be complicated by lower jaw displaced backwards, which contributes to the development of distal occlusion, altered topography and function of the temporomandibular joint. While treating the pathology, moving the mandible to the front is accompanied with the mandible head movement in the sagittal plane within the man-dibular fossa, due to which it stands out as important knowing the radiological features of the shapes, topography, and the dimensional features of these morphological elements [1-6].

**AIM.** To identify (employing X-ray methods) the major types of the temporomandibular joint structure in the sagittal plane in case of disturbed dentition complicated with distal occlu-sion.

MATERIALS AND METHODS. The survey involved 180 patients aged 20-55, with dentition de-fects complicated with distal occlusion. Lateral tomography (universal radiological unit — Orthophos 3, by Siemens) was performed to evaluate the anatomic and topographic features of the temporomandibular joint. The zonograms measured the width of the mandibular fossa and the head of the lower jaw in the sagittal plane.

**RESULTS AND DISCUSSION.** The zonorams showed that the anteroposterior size of the man-dibular fossa was  $14.69 \pm 0.07$  mm; the minimum width — 10 mm, and the maximum — 17.9 mm. The following types of its shape were identified: narrow — up to 12 mm (11.55 ± 0.17 mm); medium — from 12 to 15 mm (14.15 ± 0.05 mm), and wide — exceeding 15 mm (15.88 ± 0.07 mm). The width of the mandible head was 9.67 ± 0.10 mm, the minimum width being 7 mm, while the maximum of it was 14 mm. The shapes were identified: small — up to 8 mm (7.45 ± 0.06 mm); medium — 8 to 11 mm (9.37 ± 0.06 mm), and large above 11 mm (11.65 ± 0.13 mm).





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Depending on the ratio of the mandibular fossa width and the mandibular head in the sagittal plane in adults with dentition defects complicated with distal occlusion, three types of the temporomandibular joint structure were identified: first — a narrow mandibular fossa (up to 12 mm) with a medium-width mandible head (8–11 mm); medium mandibular fossa (12–15 mm) and a larger mandible head (more than 11 mm); second — a narrow mandibular fossa (up to 12 mm) and a small-width mandible head (up to 8 mm); the mandibular fossa and the mandibular head of medium width (12–15 and 8–11 mm, respectively); a wide mandibular fossa (over 15 mm) and a largewidth mandible head (more than 11 mm); third — a medium-width mandibular fossa (12-15 mm) and a mandible small head (up to 8 mm); a wide mandibular fossa (more than 15 mm) and a medium-width mandible (8–11 mm); a wide mandibular fossa (more than 15 mm) and a small-width mandible head (up to 8 mm).

**CONCLUSION.** In view of the zonographic data above, depending on the ratio of the mandibular fossa width and the mandible head in the sagittal plane in adults with dentition defects complicated with distal occlusion, there were three temporomandibular joint structures identified: first — the mandible head shape exceeding the respective shape of the mandibular fossa; second — the mandible head shape corresponds to the mandibular fossa shape; third — the shape of the mandibular fossa shape.

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# SPECIFICS OF OCCLUSION DISTURBANCES IN ADULTS WITH DISTAL OCCLUSION DUE TO DENTITION DEFECTS

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Occlusion factors at distal occlusion caused by dentition defects play a leading role in the development of the temporomandibular joint pathology, which is due to its close connection with the neuromuscular apparatus of the dentition system as well as the nature of the occlusal contact [1-6]. In this regard, knowing the specific features of occlusion disorders in adult patients with distal occlusion due to dentition defects appears to be quite a relevant issue.

AIM. To identify specific features of occlusion disorders and their dynamics through treatment in adult patients with distal occlusion caused by dentition issues.

MATERIAL AND METHODS. A survey was performed involving 47 patients (age 20–50) who were undergoing orthopedic treatment for distal occlusion due to dentition defects. The occlusion examination was carried out in the oral cavity and on the diagnostic jaw models using the Bio-Art Equipamentos Odontologicos Ltda articulator, which followed by their analysis and calculation of the occlusiogram index (OKG) by N.H. Khamitova.



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**RESULTS AND DISCUSSION.** The occlusion analysis showed that 91.8% of the patients had premature occlusal contacts, including 42.6% in the conventional occlusion; 63.9% — in the anterior occlusion, 34.4% - on the laterotrusive side; 19.7% - on the mediotrusive side. At laterotrusive movement of the lower jaw, only 11.5% of the cases were identified to have group contact of the teeth on the working side; the canine contract was identified in 14.7%, while another 8.2% of the patients had mixed contact of the teeth. 65.6% of the patients revealed pathological occlusion at laterotrusive movement of the lower jaw. The occlusiogram index was  $38.50 \pm 3.50$  conventional units. Moving the lower jaw to the front was carried out with functional-guiding orthodontic devices. The outcome of restoring the occlusal disorders was the normalized

relationship of the dentition in static and dynamic occlusion, with establishing *canine guidance*, as well as *canine protection* or *group guiding function* on the laterotrusive side, and lack of premature occlusal contacts. The second stage implied prosthetics.

Due to the treatment, premature occlusal contacts were eliminated in all cases. The occlusiogram index went up from  $38.50 \pm 3.50$  to  $71.29 \pm 1.90$ conventional units (p <0.05). The *canine guidance*, the *canine protection* and the *group guiding function* were restored in 85.2% of patients.

**CONCLUSION.** Given the above, in adult patients, distal occlusion caused by dentition defects facilitates the development of more severe occlusion disturbances — there is a decrease in the number of antagonizing teeth pairs as well as in the occlusal contacts area; a disturbed teeth joining in the static and dynamic occlusions, while the *canine guidance*, the *canine protection* and the *group guiding function* are affected, too. The orthopedic treatment resulted in restored occlusal relations of the dental rows as well as led to an increase in the occlusiogram index up to  $71.29 \pm 1.90$  conventional units (p <0.05), which showed improvement in the parameters that point at optimal occlusal relations.

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# FUNCTIONAL STATUS OF MASTICATORY MUSCLES AT OCCLUSION DISTURBANCES ACCOMPANIED WITH DISPLACED MANDIBLE

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Occlusion disorders accompanied with a displaced mandible lead to a change in the tem-poromandibular joint topography and the function of the masticatory muscles affecting their co-ordinated activity. The functional disorders severity in the masticatory muscles, their nature as well as the dynamics through the treatment can be reliably controlled via electromyographic study [1-6].

AIM. To carry out an evaluation of the electromyographic activity of the masticatory muscles in adults with dentition defects complicated with distal occlusion, depending on the muscular-articular dysfunction degree.

MATERIALS AND METHODS. The study implied identifying functional status of the masticatory muscles in 180 patients aged 20–55, who had dentition defects complicated with distal occlusion. The comparison group included 107 people with an orthognathic bite and with no defects in the dentition. The degree of functional disorders was determined subject to M. Helkimo's clinical dysfunction index. The electromyographic activity of the masticatory muscles was studied with the electromyography interference method employing the Neuromyan electromyography, Model 4 01. The examination was focused on the activity of the masticatory, temporal and suprahyoid muscles at ground state of the lower jaw, at dentition compression, as well as at voluntary and set chewing.

**Results and discussion.** The electromyographic study showed coordinated activity of the masticatory muscles with no sign of spontaneous activity at rest in the comparison group. At compressed dentition, the amplitude of the biopotentials of the masticatory muscles in the central occlusion position was 599.82  $\pm$  10.93 microvolts ( $\mu$ V); of the temporal ones — 425.96  $\pm$  6.03  $\mu$ V, and in the suprahyoid muscles — 394.48  $\pm$  5.89  $\mu$ V.

In patients with dentition defects complicated with distal occlusion, a comparison of the masticatory biopotentials amplitude revealed average data typical of mild, moderate and severe dysfunction. In case of a mild dysfunction, for instance, the biopotentials amplitude of the masti-catory and the temporal muscles turned to be reduced down to  $548.53 \pm 7.85 \,\mu V \,(p < 0.001)$ and 400.44  $\pm$  4.41  $\mu$ V (p <0.05); at a moderate degree – to 465.59 ± 8.88 mkV (p <0.001) and 358.73 ± 5.31  $\mu V$  (p <0.001); at a severe degree – down to 368.62 ± 10.89  $\mu$ V (p < 0.001) and 331.89 ± 4.31  $\mu$ V (p < 0.001), respectively. During that, the biopotentials amplitude of the suprahyoid muscles went up — to  $412.21 \pm 2.85$  $\mu$ V (p <0.05) at a mild dysfunction; up to 443.56 ± 3.88  $\mu V (p < 0.001)$  at an average degree of dysfunction, and to  $470.94 \pm 3.81 \,\mu V \,(p < 0.001)$  at a severe one. Besides, electromyograms done when the lower jaw was in the state of relative ground state (physiological rest) revealed spontaneous activity of the masticatory muscles, which reached 100  $\mu$ V, while during mastication the rhythmic alteration between the bioelectrical activity and rest phases in the masticatory muscles was disturbed.

**CONCLUSION.** The above has shown that an electromyographic study performed on adult pa-tients

suffering from dentition defects complicated with distal occlusion allowed revealing reduced a decrease in the biopotentials amplitude of the masticatory and temporal muscles, along with an increase in the biopotentials amplitude of the suprahyoid muscles at dentition compression. At the same time, there has been a connection identified for the biopotential amplitude of the masticatory muscles, typical of mild, moderate and severe degrees of muscular-articular dysfunctions.

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# CLINICAL IMAGE OF TEMPOROMANDIBULAR JOINT DYSFUNCTION IN PATIENTS WITH DENTITION DEFECTS COMPLICATED WITH DISPLACED MANDIBLE

Sergey Konnov, Catherine Pichugina, Valery Konnov, Alexey Bizyaev, Svetlana Salnikova, Anoush Arushanyan, Vezifa Mikailova Department of Orthopedic Dentistry, Saratov State Medical University, Saratov, Russia E-mail: konnovvaleriy@rambler.ru Dentofacial anomalies and deformities, dentition defects, as well as premature occlusal contacts come accompanied with a mandibular displacement, which, in turn, leads to pathological changes of the temporomandibular joint and masticatory muscles. These changes can be of different nature and may vary in terms of their clinical manifestations, can lack symptoms or be aggravated with pain symptoms, which will affect not the dentoalveolar system alone yet also the patient's psycho-emotional status [1-6]. Given that, it appears relevant to be aware of the clinical manifestations in patients with occlusive disorders complicated with displaced mandible.

AIM. To identify the clinical symptomatology features and the severity of the temporoman-dibular joint dysfunction in patients with dentition defects complicated with the mandible displacement.

MATERIALS AND METHODS. A clinical examination was held involving 72 patients with dentition defects complicated with a displaced mandible. The examination implied evaluating the face symmetry; amplitude of mandibular vertical, lateral and anterior movements; the symmetry of mandibular movements at opening the mouth; the pain in the temporomandibular joint and masticatory muscles during palpation and mandibular movements; the articular noise severity when moving the mandible.

**RESULTS AND DISCUSSION.** Patients with dentition defects complicated with a displaced mandible, revealed a limited amplitude of maximal opening in the vertical plane in 43.1% of the cases, while the mandible movements were limited to 25-37 mm in 22.2% of the cases, with another 20.9% of the cases having it below 25 mm. The mandible movements in the horizontal plane were limited in 45.8% of the cases; 30.5% had it limited down to 5–9 mm was, with 15.3% of the cases having the same value below 5 mm. The limited amplitude of the mandible anterior movement was observed in 36.1% of the patients, while in another 25% of the patients the limit was down to 3-5 mm, and in 11.1% of the patients — below 3 mm. Opening of the mouth was accompanied with a change in the mandible movements symmetry of the in 90.3% of the cases — the deviation was 55.6%, while the deflection accounted for 34.7% of the cases.

Pain sensations in the temporomandibular joint at mandibular movements were registered in 15.3% of the patients. Masticatory muscles produced pain at movement in 31.9% of the cases. The functional test performed through pressing the patient's chin backwards proved positive in 34.7% of the cases, offering another 23.6% when pressed from the side. 20.8% of the patients reported sense of pain at palpation of the temporomandibular joint, whereas similar sensations were recorded in 40.3% of the cases at palpation of the masticatory muscles. The muscle activity asymmetry during compression of the jaws at the conventional occlusion was noted in 23.6% of the patients. The temporomandibular joint auscultation and palpation helped identify the joint noise pathology in 88.9% of the patients.

**CONCLUSION.** Given the observations abovementioned, an examination of patients with dentition defects complicated with a displaced mandible, revealed signs of temporomandibular joint dysfunction in 97.3% of the cases. At the same time, 30.6% of the patients said had a mild degree of dysfunction; moderate dysfunction was detected in 43.1% of them, while in 23.6% of those examined the dysfunction could be described as severe.

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# INCREASE OF THE LYMPH NODE FUNCTION AS A RESULT OF PHYTOSTIMULATION IN OLD AGE

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**ABSTRACT** — Age-related changes in mesenteric lymph node reflect the general process of ageing in the experiment. These changes of lymph node are associated with reduction of structural and functional compartments. There is a decrease in drainage and immune function of lymph nodes in the elderly and senile age. We have realized the idea to control the lymphatic system functions using phytotherapy. Phytotherapy provides improved drainage and immune functions of the lymph node by increasing the size of functional compartments, intensification of cellular proliferation. Phytotherapy has a structural-modifying effect, which is important for improving the non-specific resistance of the body at the late stage of ontogenesis.

**KEYWORDS** — lymph node, gerontology, phytotherapy .

#### INTRODUCTION

The most priority in medicine is the problem of providing an immune protection and increase in nonspecific resistance of an organism at elderly and senility age. Scientists did not study completely a phenomenon of lymphatic system as instrument of providing a drainage and detoxication of endoecological space at old age [1-4]. First of all, search of ways of control of functions of lymphatic system is necessary for counteraction to aging. It is possible to make it by means of lymphotropic technologies of preventive medicine if to consider the concept of the lymphatic region [1]. It is necessary to recognize as the most perspective direction of prevention of age changes lymphatic (lymphoid) systems. The idea of control of functions of lymphatic system is implemented in different preventive and therapeutic programs with use of non-drug methods of treatment. The greatest attention is deserved phytotherapy which is widely used in medicine. The lymphatic component of the mechanism of action of phytotherapy remains poorly studied [5]. There is an urgent need for scientific justification of expediency of phytotherapy for correction of age changes of lymphoid and lymphatic systems. The result



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has practical value for optimization of rehabilitation at a stage of late ontogenesis.

The purpose is studying influence of phytotherapy on structure and function of the lymph node which underwent age changes.

#### MATERIALS AND METHODS

The experiment is made on 160 white rats males of different age (3–5 months and 1.5–2 years) who conditionally divided into two groups of young and old animals. Old animals are an adequate model of age-induced immune deficiency. The experiment on animals was carried out according to the international rules and norms (European Communities Council Directives of 24 November 1986, 86/609/ EEC) with the general anesthesia of painful manipulations.

All the animals received a standard briquetted forage at free access to water. The mesenteric lymph node is chosen as a research object. We used biologically active herbal remedy (phytocomposition) which contained Hedysarum theinum Krasnob., Bergenia crassifolia (L.) Fritsch., Rhodiola rosea L., Vaccinium myrtillus L., Vaccinium vitisidaea L.), Ribes nigrum L., Rosa majalis Herrm., Thymus serpyllum L. and dietary fibers. Phytocomposition is a source of bioflavonoids, microelements and other biologically active agents which have adaptogenic and lymphotropic effects [3, 4, 5]. Action mechanism of bioflavonoids and microelements are connected with activation and proliferation of immunocompetent cells [6, 7]. The daily dose of phytocomposition was 0.1-0.2 g/kg, and it was added to a standard forage by an animal of different age within one month.

We conducted a histologic research of mesenteric lymph nodes. Lymph nodes fixed in 10% neutral formalin. We adhered to the classical scheme of dehydration and embed in paraffin with preparation of histologic sections. Histological sections of lymph nodes painted hematoxylin and eosine, azury and eosine, Masson's trichromatic stain. The morphometric analysis of structural components of a lymph node was carried out by means of a morphometric grid [8].

Statistical data processing was performed with licensed statistical software package StatPlus Pro 2009, AnalystSoft Inc. Data were expressed as average arithmetic with definition of a standard (mean square) error. Belonging to normal distribution was defined when calculating criterion of Kolmogorov–Smirnov and the accompanying indicators. In work the correlation analysis with definition of a correlation coefficient of Brave–Pearson is used. A P value < 0.05 was considered statistically significant.

#### RESULTS

The structure of a lymph node changes with age. Comparative analysis showed age differences in a structure of a lymph node of old and young animals. There is an increase in the areas of the capsule (in 1.6 times), medullary cords (in 2.1 times) and reduction of subcapsular and medullary sinuses (in 1.3 and 1.8 times respectively), the cortical plateau (in 2.1 times), lymphoid follicles with the germinative center (in 1.4 times), by 12% of a paracortex for with age (Table 1). The direct dependence between saturation immunocompetent cells of structurally functional zones of a lymph node and type of an immune response takes place. The immune response is lowered as on humoral, and cellular type at old animals. Phytocorrection causes positive changes of structural and functional zones of a lymph node of old animals (Table 1). Change of intranodal zones is followed by compaction of a lymph node after phytotherapy at old animals. There is an increase in size of a cortical and medullar ratio. Phytotherapy increases intensity of an immune response on humoral type as the area of B-dependent compartment of a lymph node changes (Table 1). Strengthening of a limfoproliferation after phytotherapy leads to formation of temporary lymphoid structures — lymphoid are called «tertiary lymphoid organs» [3, 9, 10]. The ectopia of lymphoid follicles is noted in a subcapsular zone and medullary substance of lymph nodes and outside lymph nodes after phytotherapy at old animals (Fig. 1).

#### DISCUSSION

First of all, it is connected with the structural and modifying effect of phytodrug when aging of a lymph node takes place. The phytotherapeutic effect consists in optimization of structure and function of a lymph node according to the principles a lymphosanitation, a lymphoprotection and a lymphostimulation [1-5,11, 12]. One of effects of the strengthened cellular proliferation is formation of new lymphoid structures (lymphoid follicles). Neolymphoid aggregates are necessary for implementation of an adaptive immune response [9, 10, 13] that is important for neogenesis of lymph nodes [14–16]. Formation of lymphoid follicles is result of phytostimulation of an immune response [3, 13]. It is a fact in evidence increase drainage and immune functions of a lymph node as a result of phytotherapy of old animals [3, 5–7, 11]. Phytotherapy is means implementation of technology of recovery

*Table 1.* The area of structural and functional zones of a mesenteric lymph node of young and old animals and after intace of bioactive phytocomposition (BAP), %

Structures	Young animals	Old animals	Old animals with intake of BAP
of lymph node	1	2	3
Capsule	5.72±0.19	9.43±0.45*	9.04±0.48
Subcapsular sinus	4.57±0.17	3.38±0.27*	4.50±0.22°
Cortical plateau	7.74±0.31	3.78±0.24*	4.28±0.24°
Lymphoid follicle without the germinative center	4.18±0.17	3.32±0.22*	4.32±0.21°
Lymphoid follicle with the germinative center	5.69±0.19	3.03±0.26*	4.62±0.46°
Paracortex	16.02±0.56	14.29±0.54	12.28±1.11
Medullary cords	10.55±0,24	22.03±0.72*	16.63±1.62°
Medullary sinus	7.31±0.29	3.89±0.35*	5.61±0.61°

**Note:** level of the statistical importance of distinctions  $-*P_{1-2} < 0.05$ ;  $^{o}P_{2-3} < 0.05$ .  $n = 20 - number of rats in each group and the statistical importance of distinctions <math>-*P_{1-2} < 0.05$ ;  $^{o}P_{2-3} < 0.05$ .  $n = 20 - number of rats in each group and the statistical importance of distinctions <math>-*P_{1-2} < 0.05$ ;  $^{o}P_{2-3} < 0.05$ .  $n = 20 - number of rats in each group and the statistical importance of distinctions <math>-*P_{1-2} < 0.05$ ;  $^{o}P_{2-3} < 0.05$ .  $n = 20 - number of rats in each group and the statistical importance of distinctions <math>-*P_{1-2} < 0.05$ ;  $^{o}P_{2-3} < 0.05$ .  $n = 20 - number of rats in each group and the statistical importance of distinctions <math>-*P_{1-2} < 0.05$ ;  $^{o}P_{2-3} < 0.05$ .  $n = 20 - number of rats in each group and the statistical importance of distinctions <math>-*P_{1-2} < 0.05$ ;  $^{o}P_{2-3} < 0.05$ .  $n = 20 - number of rats in each group and the statistical importance of distinctions <math>-*P_{1-2} < 0.05$ ;  $^{o}P_{2-3} < 0.05$ .  $n = 20 - number of rats in each group and the statistical importance of distinctions <math>-*P_{1-2} < 0.05$ .  $n = 20 - number of rats in each group and the statistical importance of distinctions <math>-*P_{1-2} < 0.05$ .  $n = 20 - number of rats in each group and the statistical importance of distinctions <math>-*P_{1-2} < 0.05$ .  $n = 20 - number of rats in each group and the statistical importance of distinctions <math>-*P_{1-2} < 0.05$ .  $n = 20 - number of rats in each group and the statistical importance of distinctions <math>-*P_{1-2} < 0.05$ .  $n = 20 - number of rats in each group and the statistical importance of distinctions <math>-*P_{1-2} < 0.05$ .  $n = 20 - number of rats in each group and the statistical importance of distinctions <math>-*P_{1-2} < 0.05$ .  $n = 20 - number of rats in each group and the statistical importance of distinctions <math>-*P_{1-2} < 0.05$ .  $n = 20 - number of rats in each group and the statistical importance of distinctions <math>-*P_{1-2} < 0.05$ .  $n = 20 - number of distinctions <math>-*P_{1-2} < 0.05$ .  $n = 20 - number of distinctions (-*P_{1$ 



Fig. 1. Ectopia of lymphoid follicles in a mesenteric lymph node. Old animals. Phytotherapy. Hematoxylin and eosin stain. Magnification x240.

correction of the lymph node which underwent age changes that provides increase in nonspecific resistance of an organism.

#### CONCLUSION

Original herbal drug has the lymphotropic and structural modifying effect. Phytotherapy provides increase drainage and immune functions due to recovery of structure with increase in the size of compartments, strengthening of a lymphoid proliferation in a lymph node at a late stage of ontogenesis. It leads to increase in nonspecific resistance of an organism at elderly and senile age. The lymphotropic phytotechnology is positioned as a possibility of improvement of quality of life and maintaining health through optimization of structure and functions of a lymph node in relation to elderly and senile age.

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# THE ROLE OF ERYTHROCYTES IN CEREBRAL ISCHEMIA

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The research was supported by the FEFU Science Foundation under the state task 17.5740.2017/6.7.

#### RELEVANCE

Cerebral ischemia occurs as a result of insufficient cerebral blood flow in regard to cerebral metabolic functions. The main cause of death of neurons in the age aspect and with ischemia is apoptosis, a genetically programmed cellular event that follows ischemia and leads to biochemical and morphological changes in the cells of the cerebral cortex. Enhanced attention to the mechanisms of a human brain neurons aging and the features of this process in ischemia of brain caused by the high mortality rate in the world due to stroke or apoplexy [3].

In spite of numerous concepts about neuronal damage due to ischemia or stroke, the problem of etiology and pathogenesis of neuron death still not solved completely. Treatment, which is not based on pathogenetic mechanisms, without knowledge about etiological principles is only symptomatic one [6]. To the one of a key pathogen for insult development, independent from ischemic or hemorrhagic forms, today are disturbance in the system of neural, endothelium dependent and myogenic mechanisms of regulation of trophic ensuring in the human brain structures. But 60% of death rate, 30% of disability and only 10% successful returning to active life and work of such patients, casts doubt in correct using of treatment based on these theories and shows a high relevance of this study [1, 2].

#### AIM

To study the dynamic of aging mechanisms of microcirculation in the paraventricular zone of III ventricle of human brain in condition of ischemia in the area of precentral gyrus.



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Galina Reva



Iliya Zhuravlyov

#### MATERIAL AND METHODS

The characteristics of changes in the system of "neuron-neuroglia" in age aspect and ischemia in the part of human brain locating far from damaged zone were described. Clinical material was taken with the permission of the ethical committee of the FEFU, in accordance with the legislation of the Russian Federation on the rules for the collection of cadaveric material. Brain biopsies of 69 patients who died from ischemia were studied using immune histochemistry methods to detect apoptotic cells, as well as on the expression of CD68 CD163 marker cells. Analysis of the results and illustrative material was obtained with the help of a microscope by Schlimpus with the software for morphometry.

#### RESULTS

We found, that age changes of neurons in paraventricular zone of hypothalamus lead not only to lipofuscin accumulation, but also, in condition of chronic ischemia, deposition of transferrin in cytoplasm of neurons that closely related with incapability of cells to internalize and utilize oxygen. This conclude that there is disturbance in the system of oxygen ejection by hemoglobin to neurons, adaptive accumulation of iron for compensation of oxygen dependent energetic processes in the neuron and intoxication of brain tissue by hemoglobin metabolites, follows to apoptosis of neuroglia and neurons. This inducts the process of disbalance in the system of "neuron-neuroglia", which is a trigger factor for development of ischemic stroke.

#### DISCUSSION

The mechanisms of pathogenesis of a brain ischemia and stroke can be attributed to cascade of reaction caused by oxygen deficiency of neuronal energetic request, also related from the central mechanisms of erythropoiesis regulation. Considering a toxic of hemoglobin metabolites, the damage a systems of eritrogenin and erythropoietin, we presume that this process is not local but generalized. which requires appropriate medical measures, inducting compensatory-adaptive mechanisms on a higher level [4, 6]. The obtained data that in the zones remote from the ischemia region, the changes of the hemato-encephalic barrier are identified, hemosiderin accumulates in the neurons. These data do not confirm the results of other researchers obtained in the models of experimental animals that brain ischemia is a local problem of circulatory disturbance in the zone death and apoptosis of neurons. Brain ischemia is a generalized problem associated with abnormalities in erythrocytes, distortion of oxygen transfer to tissues and destruction of red blood cells before returning to the spleen.

Our data are consistent with the results of studies by Yao Z, Wang L, Wu X, with coauthors (2017), who found that defects in the biochemical composition of erythrocyte membranes are observed in patients with brain ischemia [5].

The role of phosphatidylserine (PS)-mediated procoagulant activity (PCA) in stroke remains unclear. To ascertain this role, early dynamic evolution of PS exposure on blood cells and released microparticles (MPs) and the corresponding PCA were evaluated in patients with acute ischemic stroke (AIS). Thrombin generation promoted by platelets and MPs at 12 h was significantly higher in patients with cardioembolism than in patients without.

The thrombophilic susceptibility of AIS patients can be partly ascribed to PS exposure on blood cells and the release of MPs. Therefore, we consider it promising to study the state of erythrocytes and platelets in patients who have suffered a stroke both in terms of predicting the course of the disease, and in terms of preventing repeated strokes. Also, these data can be used to study the biochemistry of red blood cells in order to use them as targets for effective therapeutic measures and drug delivery.

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# **REGULATION OF VASCULOGENESIS AND ANGIOGENESIS IN THE HUMAN BODY**

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The research was supported by the FEFU Science Foundation under the state task 17.5740.2017/6.7.

#### RELEVANCE

Relevance According to the opinion Ahluwalia A, Jones MK, Brzozowska I, Tarnawski AS. (2017), regeneration of blood vessels (neovascularization) is critical for tissue injury healing. The contribution of bone marrow-derived endothelial progenitor cells (BMD-EPCs) to neovascularization during tissue injury healing is not fully elucidated and it is not clear whether BMD-EPCs can form new capillary blood vessels independently or jointly with fully differentiated endothelial cells (ECs) [1].

The most studied is the relationship between vasculogenesis and osteogenesis in birds. So, in the studies Huang SC, Zhang LH, Zhang JL, Rehman MU, Tong XL, Qiu G, Jiang X, Iqbal M, Shahzad M, Shen YQ, Li JK. (2018) tibial dyschondroplasia (TD) is the most-prevalent leg disorder in fastgrowing chickens; it is intractable and characterized by abnormal endochondral bone formation of proximal tibial growth-plates (TGPs) [2].

Tanaka R. and co-authors (2018) was showed that autologous endothelial progenitor cell (EPC) therapy is commonly used to stimulate angiogenesis in ischemic repair and wound healing. However, low total numbers and functional deficits of EPCs make autologous EPC therapy ineffective for diabetes. Currently, none of the known ex vivo culture techniques can expand and/or ameliorate the functional deficits of EPCs for clinical usage [3]. It is possible that, the process of vascular formation in endochondral bone appears to initiate the pathological changes in TD, and improvement of





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this process during coupling with osteogenesis may be a potential therapeutic approach to treat this intractable disease.

Vasculogenesis is a complex process by which endothelial stem and progenitor cells undergo de novo vessel formation. Quantitative assessment of vasculogenesis has become a central readout of endothelial progenitor cell functionality [4].

The growth and formation of vessels in the pre- and postnatal period of the development of the body is through vasculogenesis, angiogenesis and arteriogenesis. Angiogenesis is the formation of new capillaries from postcapillary venules, which is carried out through activation of endothelial cells, expression of proteases in them, extracellular matrix degradation, proliferation and migration of these cells, the formation of primary high-permeability vascular structures, the subsequent stabilization and "maturation" of these structures through the involvement of pericytes and smooth muscle cells (GMC) and their organization in a complex three-dimensional vasculature. Knowledge about factors regulating vasculogenesis remains limited. The cellular repressor of E1A-stimulated gene (CREG) has been reported to be involved in maintaining cellular differentiation and endothelial homeostasis [3]. The main stimulus to angiogenesis in physiological and pathological conditions is a lack of oxygen (hypoxia or ischemia), which, through the activator of the transcription of angiogenesis factors - hypoxia-induced factor-1 (HIF-1), induces the expression of many angiogenic factors and primarily the regulator of angiogenesis in both

the embryonic and postnatal period of the body -VFF and its receptors VEGF selectively stimulates the proliferation and migration of endothelial cells (EC), their precursors and monocytes that express receptors to it, increases vascular permeability, promoting the swelling of plasma proteins into the circulatory space that is necessary for EC migration, induces the expression of endothelial NO synthase and the formation of NO, which contributes to vasodilation and stimulates the expression of proteases that destroy the bonds between the EC and the extracellular matrix, which is necessary for directional cell migration.

In the process of stabilization and "maturation" of newly formed immature vascular network involved: 1) angiopoietin-1, suppressing EC proliferation, reducing vascular permeability, which helps to attract pericytes; 2) platelet FR (PDGF), which attracts pericytes and GMC; 3) transforming FR-beta 1 (TGF-beta 1), stimulating the synthesis of matrix proteins. The process of angiogenesis is strictly regulated by RF in time and space, and this must be taken into account when planning the tactics of therapeutic angiogenesis. In the postnatal organism, the stable state of the vessels is maintained by a balance between the activators of angiogenesis (mainly PD and cytokines) and its inhibitors (thrombospondin, inhibitors of matrix metalloproteases and plasminogen activators, endostatin, etc.) and the shift of this balance towards the activators, as a rule, a short-term, leads to the activation of angiogenesis, for example, in inflammation, wound healing, ischemia. Insufficient physiological angiogenesis due to insufficient production of FF or expression of their receptors, or increased production of its inhibitors, can contribute to the increase in the severity of ischemic diseases (CHD, chronic lower limb ischemia). Angiogenesis leads to an increase in the density of the capillary network in ischemic tissues and a decrease in peripheral vascular resistance, which is necessary to ensure tissue perfusion, but without arteriogenesis, it is insufficient for complete revascularization.

Comşa Ş, Ceauşu RA, Popescu R, Cîmpean AM, Raica M. was found (2017) hMSC stimulated the CAM mesenchymal cells (cMSC) to acquire endothelial and pericyte-like features and to generate cord/capillary-like structures (CLS) in the chorionic epithelium and the mesoderm, but they also entered these structures (CD34+/SMA (smooth muscle actin)+ hMSC). Simultaneously, hMSC induced a process of sprouting angiogenesis in the mesoderm, CD105+ hMSC being identified in the proximity of the angiogenic areas and was shown, that hMSC and CAM establish a genuine hotspot of vasculogenesis, which may evolve to a valuable experimental model for this research field. [5].

Arteriogenesis - the formation of collateral vessels from non-functioning arteriolar compounds - is the most effective revascularization process, providing blood flow around the occlusion site. The most important stimulator of arteriogenesis is an increase in the shear stress above the occlusion site, caused by an increase in blood flow, which promotes the expression of adhesion molecules by endothelial cells and subsequent accumulation of monocytes in the vessel wall secreting a large amount of RF, of which the main regulators of arteriogenesis are FGF fibroblasts, as well as PDGF, VEGF and CXC-chemokines [6].

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# THE ROLE OF NEUROGLIA IN THE HUMAN VITREOUS

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The research was supported by the FEFU Science Foundation under the state task 17.5740.2017/6.7.

#### RELEVANCE

The human eye of the eye is the least studied structure. In this case, any change in the vitreous is a universal damaging factor, both for the induction of the pathology of the lens and the retina, so the relevance of the study of the histophysiology of the vitreous humor is beyond doubt [4, 15]. The importance of increasing intraocular pressure in glaucoma remains a subject of acute debate, as is the induction of this pathology by abnormalities in the structure of the vitreous body (VB) [1, 7, 16]. At the same time, at the present stage the vitreous body of birds and animals [10, 18]. Numerous studies have raised a number of questions on the production of vitreous fibers, which require further in-depth analytical research [9, 14].

#### PURPOSE OF THE STUDY

To carry out phenotyping of the vitreous humor cells of the human eye.

#### MATERIAL AND METHODS

The study examined the material obtained from medical abortions, forensic medical autopsies of people who died from trauma; as well as material obtained during surgical interventions for post-traumatic enucleation of the eyes, at the age of 4 weeks of intrauterine life to 85 years. The studies were performed with the help of classical staining with hematoxylin and eosin, impregnation with silver by the Kahal, and also with the method of immune histochemistry with the use of markers CD68, CD163, CD204. The microscope Olympus Bx51 with a digital camera CD 25 and proprietary software was used to analyze the obtained material. Identification of immunocompetent cells was carried out according to the same scheme, in spite



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Anna Zudina

Nataliya Kostyuk

of different antigen localization in cellular structures: membranes, lysosomes, Golgi complex.

#### **RESULTS OF THE STUDY**

We have established that the vitreous body of the human eye (VB) consistently goes through the following stages of development: 1) embryonic mesenchymal cell 2) fetal vascular, which undergoes gradual apoptosis and desolation by the 8th month of the fetal period; 3) definitive, or final-fibrous connective tissue. By the time of birth VB is practically formed, finds of embryonic vessels can be associated with developmental abnormalities [8]. The complexity of the structural organization of the febrile vitreous body is not the same in its various departments. We have established that there are areas that are limited to membranes having a thickness of up to 20 µm and optically empty. It is also noted that the major larger fibers of the febrile core have a longitudinal direction. Small fibers with a thickness of 1 mm or less can be arranged obliquely, interwoven into larger ones. The fibrils of the core and the dissolved collagen along with hyaluronic acid

contribute to the preservation of the gel-like state and play the role of the soft skeleton VB. According to the ordered arrangement of fibers Vitreous can be attributed to the formed fibrous connective tissue. We noted that the fibers of the febrile skeleton are woven into the optic nerve shells in the zone of the disc, which ensures a high contact strength.

In analyzing the age-related changes in the vitreous fibrous core, it was found that the number of fibers gradually decreases, and this dynamics is initially inherent in fibers predominantly of the transverse direction. The network loops become irregular and uneven, which, in our opinion, may be due to the adaptation of vitreous cells to changes in physiological conditions and an increase in their synthetic activity. In the future, this process will be accompanied by depletion of the plastic properties of vitreous cells and, correspondingly, a decrease in the formation of fibers of the core of the vitreous. We have established that in the vitreous body, in addition to the febrile core, the cells are identified. Analysis of own results showed that the distances between vitreous cells can be different, this depends on their topography in VB. We observed an unequal number of cells in different sections of the VB.

Most of them in the zone bordering the ciliary body, as well as on the back surface of the vitreous. We found that the cells are located near the processes of the ciliary body, and near the lens, at the posterior pole of VB near the retina, or at a distance of 100 μm from the vitreoretinal border. Our results indicate that the number of cells per 1 mm<sup>2</sup> of the cut reaches an average of 7, and the cell density decreases toward the posterior pole and the center of the vitreous. We have noted the age-related dynamics of the decrease in the number of hyalocytes in humans. With age, the quantitative ratio of cells of different forms varies: at a young age, round ones predominate, with one or more nuclei located on the periphery of the VB; in adulthood, the number of stellate and spindle-shaped, with contacting processes, located also in the cortical layer increases; In the vitreous body of the eyes of older people, globular cells predominate, with a bubble in the cytoplasm, which are located centrally.

It is established that hyalocytes vary not only in size and shape, but also in relationships with the fibrous core.

We identified two types of cells of the vitreous body of the human eye: type I — cells of the vitreous producer, two species — A and B; II type of cells — leukocytes. According to our data, cells related to the collagenous core of the VB (group A) and freely located in the vitreous (group B) belong to the first type. Group A has a spindle-like shape, the cells seem to be soldered into the fibrous core of the vitreous.

They resemble the Müller cells of the retina in their structure. Another group of cells — B, located in the vitreous freely, is characterized by large dimensions, light cytoplasm, basophilic nucleus and free location in the matrix VB. These cells have scalloped edges and look like fibroblasts and fibrocytes of loose fibrous connective tissue. The cell form is either round or oval, the cytoplasm passes into the intercellular substance without clear boundaries, the cell membrane is not identified. The kernels are round, ovoid, oblong, or bean-shaped, up to 8 µm in size. We assume that group A of the cell type is hyalocytes, possibly of a neuroglia nature. Group B of type I cells, in our opinion, refers to connective tissue originating from the mesenchyme surrounding the vitreous embryonic vessels - fibrocystic and fibroblasts. Type I cells are the producers of the intercellular matrix vitreous, its febrile core and the basic substance. According to our data, the II type of cells morphologically corresponds to the leukocyte pool. Since they are naturally leukocytes, they easily change shape, forming processes. In the center of the vitreous humor, where there is more moisture, these cells undergo a vacillation, turning into a bubble. Their presence in the predominant quantity in people of older age groups is due to the fact that the vitreous body of the elderly is more diluted than in children. You can treat bladder cells as a degenerative form of leukocytes [5]. We have established that the II type of cells located loosely between the loops of the collagen-fibrous backbone, derivatives of the stem cell of the blood (SCB). With the help of immune histochemistry, we found out that in the vitreous body of the human eye there are different cell differentiations of blood stem cells. Some of the cells in our study are labeled CD163, which indicates their monocytes origin and phagocytic function. Cells with the labeling of fibroblasts, mast cells CD204, as well as CD68 cells, which mark the antigen-presenting function and belonging to interstitial dendritic cells, are identified. This indicates the possibility of reparative regeneration after vitrectomy after autologous and heterotransplantation of hyalocytes.

We have established that the proliferative activity of hyalocytes changes during the development of the eye and is dependent on the stage of ontogenesis. In the embryonic and fetal period, the proliferative activity of the vitreous humor cells is high enough, after birth it decreases, then is at approximately the same level until age 45. After 45 years, the figures of mitosis in vitreous cells were observed as a very rare phenomenon

The age-related involution of the vitreous humor consists in the formation in it of various sizes of cavities containing liquid fractions. Involution changes include filamentous destruction, which manifests itself after 20 years, growing after 40 years. It is connected, in our opinion, with the age-related decrease in the synthetic and proliferative properties of hyalocytes — the own cells of the vitreous body of the human eye.

#### DISCUSSION OF THE RECEIVED DATA

Many authors argue that the vitreous does not have a structure that can be studied microscopically. Worst considered vitreous as a secret of cells and considered the detected fibers as an artifact [1]. The theory of the structure of VB alveolar, lamellar, radial-sectoral, according to our data, are untenable, are insolvent, in contrast to febrile, with which the results obtained by us agree. In this case, the treatment of fibrous vitreous body cannot be unambiguous. The location, thickness and direction of vitreous fibers suggest that they are not only a supporting structure, but also participation in the hydrodynamics of the eye, and also in visual functions through the correct distribution of the light flux in the sagittal direction [6, 12].

The widespread hypotheses of Meyer, Smith and Gallardo on the production of hyaluronic acid in vitreous by cells of the ciliary body (VB) were based on data on the absence of CT cells. Studies to determine the concentration of hyaluronic acid in the anterior, posterior and peripheral parts of the CT showed that its content near the ciliary body is only half the concentration present in the posterior part of the vitreous. Contrary to this data, Snead D. R. J., James S., Snead M. P. (2008), who did not find a definite regularity in the quantitative ratio of hyaluronic acid in the center and on the periphery VB [17].

The opinion of the researchers who state that there is no febrile core in the vitreous is based on the results obtained with the aid of the sampling of material with needles with a very small diameter. This could cause a misconception about the structure of the VB, since, of course, that in this case the elements of the core could not get into the composition of the extract, but only the dissolved collagen.

The contemporary state of the question of the structure of the vitreous body of the human eye indicates the absence of convincing morphological data in favor of the presence of hyalocytes in it, therefore it is the subject of heated discussions. Wayne J. (2003) did not find cells in the vitreous body of the human eye [18]. Balazs E.A., Toth L.Z., Ozanics V. (1980) indicate that vitreous cells are present only in the cortical layer of the CT eye of animals [1].

The mesodermal concept of the origin of vitreous Sholler and Lieberculhn gave way to the ectodermal theory of Tornatola, linking its formation to the retina. Then, the concept of an analogy of the soft membrane preformed into the vitreous in the specific conditions of the eyes of Redslop and Gartner was confirmed [1]. Hypotheses, the authors of which tried to relate the production of the vitreous with cell elements, did not find confirmation. The transudation theory of Keccler's theory of the basal membrane of Frans, the secretory concept of Vensen and Granacher, the ectomesodermal Studnitska treat the vitreous as a product of transudation, secretion or preformation of embryonic vitreous vessels and intercellular substance. Balazs Hamburg, Seaman, Storm, Gartner identified hyalocytes and fibroblasts (fibroblasts) among the vitreous cells of the eye, Balazs considers them to be different cells, and Francois classifies them as one type of cell at different stages of development [1]. It should be noted that even today the genesis of hyalocytes has not been fully clarified. Boltz-Nitulescu G., Grabner G., Förster O. suggested that these CT cells are hematogenous derivatives [3, 9]. Balazs, Teng, Horven (1980) their occurrence is associated with embryonic vessels, neuroectoderma or with wandering cells such as leukocytes. Kita T., Hata A. (2007) refer them to microglia, counting the derivatives of monocytes [9].

Mashemer (1975) suggested the retinal pigment cells as a possible source of hyalocytes. The concept of Balazs, which confirms the bone marrow origin of the CT reticular cells, which later turns into hyalocytes, was previously controversial, thanks to markers of progenitor cells and activated monocytes, which are identified in vitreous and other eye structures [2, 11, 16].

In our opinion, the cells of the immunophagocytes link identified in our work play an important role in the physiological and reparative regeneration of the vitreous humor. We adhere to the conclusions of Newsome (1976) Francois (1978) on the neuroglial and neuromesenchymal origin of type I hyalocytes associated with the febrile skeleton and free, especially since, according to the literature, the discovery in them of the synthesis of reticules and collagen testifies in favor of their core production functions vitreous [7, 8]. This serves as an additional confirmation of the presence in the vitreous body of various cellular diferrons [13]. We can assume that the functioning of the organ of vision in conditions of immunodeficiency, inherent in its avascular structures, contributes to the performance of antigen presentation by residual cells of the vitreous.

Thus, according to our own data and literature data, the localization, morphological structure and functions of hyalocytes indicate their important role in the development and functioning of the VB and the organ of vision in general.

#### CONCLUSIONS

In our study, the vitreous humor of the human eye is formed by a special kind of formed connective tissue, represented by cellular differents of different origin and functions, consisting of a basic gel-like substance into which the fibrils of the correctly organized collagenous fiber frame are immersed.

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### RACIAL AND GENDER COMPARISON OF ANTHROPOMETRIC PARAMETERS OF THE FOOT

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**ABSTRACT** — This paper takes a new look at the anthropometric parameters of the foot in relation to gender and racial differences. A total of 274 feet of African and European young men and women were examined. Anthropometric parameters of the foot were measured and the foot arches determined using the Shtriter index. In conclusion, we have obtained comprehensive results proving racial and gender differences in anthropometric parameters of foot. We have confirmed that in terms of race or gender, Africans or men are prone to developing flatfoot whilst Europeans or women — high arched foot.

**KEYWORDS** — parameters, African, European, women, men, race, gender.

#### INTRODUCTION

The architecture of the human foot has been identified as being complex and has over the years transformed to adapt to different environmental (external) and internal conditions. The foot plays a major role to support the body weight during standing position and also serves as a lever to propel the body forward during movement [1]. The Medial Longitudinal Arch (MLA), the lateral longitudinal arch (LLA), the anterior transverse arch (ATA) and the posterior transverse arch (PTA) constitute the arches of the foot [1]. Anthropometry is the branch of ergonomics that deals with body shape and size. The parts of the human body varies in size and in shape, thus, there is a need to take these variations into consideration whenever a product is designed for their use. The absence of the application of ergonomics principles could result musculoskeletal disorders [2]. In our opinion, the knowledge and understanding of anthropometric parameters of the foot could be relevant in the field of preventive medicine, orthopedics and traumatology, sports medicine, forensic medicine and education.

#### MATERIAL AND METHOD

A total of 137 healthy young Africans (37 women, 32 men) and Europeans (38 women, 30 men) were consecutively recruited for this cross-sectional study at the medical institute of RUDN University. The participants were between the ages of 18 and 27. Participants who had recently gone through surgery on their foot were exempted. The study and all matters relating to it was done following good clinical practice. All participants, meeting the inclusion criteria voluntarily agreed to join the study and signed an informed consent before being enrolled.

#### Anthropometric measurement

The subjects' height and weight were obtained using a stadiometer and electronic bathroom scale respectively. Using the formula: weight (kg) divided by square of the height in meter, the Body mass index (BMI) of each subject was calculated. Pedigraphy was used to obtain the footprints of the participants following methods as used by Muzurova L.V. and Kochelaevskaya I.E. [3]. In brief, the subjects were requested to stand upright on the platform of the pedigraph for at least 5 minutes so that the total weight of the body would be evenly distributed across the feet. Next, the investigator helps the participant to get back to sitting position. The investigator controls the foot position on the platform so as to prevent foot slip, a fact that would invalidate the test. In full weight bearing, footprints of both feet were imprinted on A3 sheet using non-irritant blue ink. From the footprints as shown in (Figure 1a.), the following anthropometric parameters were measured from the footprint using a meter rule: Foot Length (FL) L-M, Foot Width D-E, Length of Medial Longitudinal Arch (LMLA) O-G, Length of Lateral longitudinal arch (LLLA) O-F, Width of Anterior Transverse arch (WATA) F-G, and Width of Posterior Transverse arch A-C (WPTA).

#### The shtriter index

The shtriter index method was used to distinguish the various foot arches (forms of foot) by determining the heights of foot arches. This was achieved by drawing a line tangential to point E and V. Then, a perpendicular line (A-B) is drawn from the mid-point (point B) of the line E-V to the outer lateral edge, point A. Line A-C is marked between point C (which is the intersection between the inner medial edge of the footprint in the arch area and line A-B) and point A, as shown in Figure 1a.

Formula in calculating shtriter index:

Shtriter index =  $(AC/AB) \times 100\%$ 

Hence, base on the value of the shtriter index, the foot can be grouped into the following category:

1) Very high-arched foot -0-36%;



*Fig. 1. a* – *Plantogram / Normal Arched foot; b* – *High-Arched foot; c* – *Flatfoot* 

- 2) High-arched foot 36.1–43%;
- 3) Normal-arched foot -43.1-50%;
- 4) Low-arched foot 50,1–60%
- 5) Flat-arched foot (flatfoot) 60.1-70%

Flattening Index of foot. The flattening index is also used to determine height of the foot arch. It is the ratio of width of the posterior transverse arch to the width of the foot. From figure 1a, Flattening index = AC/DE.

#### Statistical analysis.

The obtained data for the measured parameters were statistically analyzed using Excel. The confidence interval was set at 95%. In all statistical tests, a p-value (two tailed) <0.05 was considered as statistically significant. The unpaired t-test was used to compare the measured parameters.

#### **RESULTS AND DISCUSSION**

All anthropometric measurements were thoroughly checked for significant differences. Broadly speaking, all the anthropometric parameters of the foot were significantly higher (P<0.05) in males than in females across both races. This is in consistent with previous study by [4] and also confirms sexual dimorphism with respect to race. Furthermore, racial comparison of African (14.2±0.12) and European  $(13,5\pm0.10)$  women demonstrated a significant difference (p<0.05) in LMLA, also in the case of African  $(15.6\pm0.13)$  and European  $(14.9\pm0.11)$  men. The present study revealed a significant difference (p<0.05)in LLLA and WPTA between African (14.4±0.12;  $3.7\pm0.12$ ) and European (13.9 $\pm0.09$ ; 2.9 $\pm0.14$ ) men, however, the analysis did not identify any significant difference (p>0.05) in LLLA between African  $(12.8\pm0.08)$  and European  $(12.7\pm0.09)$  women but

reported significant difference (p<0.05) in WPTA, 3.4±0.13 and 2.5±0.01 respectively. Throughout this paper the following modifications were made on the grouping of foot arches (foot forms) based on Shtriter index (SI): Very High-Arched Foot and High-Arched foot were combined and given a common name -High-Arched Foot (HAF) (Figure 1b), Low-Arched foot and Flat-Arched foot – Flat Foot (FF) (Figure 1c), meanwhile Normal Arched Foot (NAF) (Figure 1a) remained unchanged. In this present study, based on Shtriter index, (33%, 16%, 51%) African women, (25%, 22%, 53%) African men, (74%, 8%, 18%) European women and (50%, 17%, 33%) European men reported HAF, NAF and FF respectively. The results of this study indicate that, Africans or men are more likely to develop flatfoot compare to Europeans. This concurs well with [5].

#### CONCLUSION

Our work has led us to conclude that distinction in anthropometric parameters of the foot in terms of race and gender is a fact and not a myth. This paper has highlighted the importance of anthropometric measurements. The findings might not be transferable to other ethnic groups or race that were not considered in this current study. Future work should focus on enhancing the quality of the device used in measuring the anthropometric parameters of the foot.

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# THE IMPACT OF ANTIRETROVIRAL THERAPY REGIMENS WITH NICAVIR AND TENOFOVIR ON THE LEVEL OF VIRAL LOAD IN THE ACUTE STAGE OF HIV INFECTION

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The experience of using nicavir, whose virological efficacy is proven in previous studies [1], and tenofovir in the first-line antiretroviral therapy of the acute stage of HIV infection is presented [2,3].

MATERIALS AND METHODS. Diagnostics and treatment of 6 patients in the acute stage of HIV infection was carried out followed by observation for 8–12 weeks. All patients began to receive antiretroviral therapy (ART) of the first line in the 2NIOT and 1 NNRTI.

**RESULTS AND ITS DISCUSSION.** The diagnosis of HIV infection for all patients was established on the basis of laboratory tests: two-time ELISA, PCR with the determination of HIV proviral DNA, HIV RNA against a negative immune blot test (IB) in three cases and detection of env41 protein also in 3 cases. Further diagnoses were confirmed by the method of IB with the detection of antibodies to HIV-1 proteins with an interval of 4–28 days between the studies.

The 1<sup>st</sup> observation group (3 men S., P., T. at the age of 56, 31 and 30 years old) received the scheme with nicavir in therapeutic doses — 2 tablets of 200 mg twice a day — in combination with lamivudine and efavirenz. Patients in the 2<sup>nd</sup> comparison group of 3 (1 woman O. 38 years and 2 men H. and K. 24 and 30 years) were assigned combined ART with the inclusion of tenofovir in combination with lamivudine and efavirenz. All preparations were used in standard dosages. The baseline level of HH RNA of HIV in patients of both groups was from 3 000000 to more than 10 000 000 copies/ml. In the group of patients receiving ART with the inclusion of niacavir, the rate of decrease in the HV RNA of HIV for 4 weeks of treatment was on average 3,846 log10; in the comparison group — by 3.387 log10.

Thus, the rate of decrease in viral load was comparable in both study groups, in the 1<sup>st</sup> group there is a tendency to a faster decrease in the index. **CONCLUSIONS.** Rapid reduction in the level of viral load — after 4 weeks from the start of therapy (an average of 3.846 log10 and 3.387 log10 in the 1<sup>st</sup> and 2<sup>nd</sup> groups, respectively). Moreover, in patients of the 1<sup>st</sup> group there is a tendency to a more rapid decrease in the index.

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# THE DYNAMICS OF HISTOMORPHOLOGICAL CHANGES IN THE LIVER AFTER ACUTE CLOZAPINE POISONING

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**INTRODUCTION.** Clozapine is an atypical antipsychotic drug, which is widely used in medicine. It is metabolized in the liver [1,2].

Several studies have shown pathological changes in the liver in case of clozapine poisonings [3,4]. Morphological changes in the liver were studied presumably at late stages of the pathological process.

THE AIM OF THE STUDY. The aim of the study is to reveal morphological changes in the liver in acute clozapine poisoning 3 and 24 hours after the intoxication.

MATERIALS AND METHODS. We performed a comparative study of histological sections of the liver of outbreed male rats weighing 290–350 g. Study group 1 included 5 rats treated with clozapine oral dose of 150 mg/kg and decapitated 3 hours after the intoxication. Study group 2 included 5 rats treated with clozapine in the same dose and decapitated 24 hours after drug administration. Control group included 5 intact animals of the same sex and age. We used Fisher's ratio test to estimate the reliability of the difference between the groups. The presence of the sign was considered to be reliable if the sign didn't appear in one group and appeared in 4 or 5 cases in the other group.

**RESULTS.** No pathological changes were observed in the group of comparison (controls). 3 hours after clozapine administration we observed the following histological changes: venous plethora. 24 hours after the intoxication we observed venous plethora, which was more severe than 3 hours after the intoxication, lack of hepatocyte nuclei staining, vacuolization of the cytoplasm.

**CONCLUSION.** All these histomorphological changes among with the histomorphological changes and the results of chemical analysis can be used to diagnose clozapine poisonings and the cause of death. A morphometric analysis of liver tissue is to be performed for more definite diagnostics.

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# ON THE ISSUE OF PRECONCEPTION CARE IN PATIENTS WITH PATHOLOGY OF THE CARDIOVASCULAR SYSTEM

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#### ABSTRACT

OBJECTIVE: To assess the clinical efficacy of preconception care of women with cardiovascular pathology. MATERIAL AND METHODS: 138 women with cardiovascular diseases were examined during pregnancy, 68 of whom underwent preconception preparation. RESULTS: preconception care allowed to reduce the percentage of preterm birth and rate of caesarean section, and to improve perinatal outcomes. CONCLUSION: the proposed scheme of preconception preparation in patients with cardiovascular pathology takes into account risk factors, severity of diseases, possible complications. This scheme of preconception care is proposed for women of reproductive age who plan a pregnancy or are already pregnant and are preparing for childbirth.

**KEYWORDS** — pathology of the cardiovascular system, pregnancy, preconception care, perinatal outcomes.

Cardiovascular system diseases in pregnant women and people of reproductive age are still one of the main causes of complications during pregnancy and childbirth [1-3]. In this case a great importance belongs to observations of hemodynamics in the process of preconception care. Ensuring hemodynamic stability guarantees reduced risk of hemodynamic disorders while providing clinical medication or surgical intervention in patients suffering from CVD [4, 5]. Normal pregnancy is always associated with significant hemodynamic overload, which is associated with fluid retention, increased volume of circulating blood and, as a consequence, cardiac output [6-8]. In conditions of altered hemodynamics associated with the presence of any pathology of the cardiovascular system, the development of pregnancy can pose a threat to the mother's (especially during childbirth) and the child's health (throughout the gestation period, which is primarily due to the tendency to lack of uterine-placental blood flow) [9–12]. In conditions of physiological pregnancy on the background of increasing volume of circulating blood, hemodynamic changes occur, increasing the overall load on the cardiovascular system [13–15], which is especially important in patients with heart diseases. In women with heart disease, the frequency of operative delivery is higher due to indications regarding the cardiovascular system.

Newborns of mothers with heart diseases often have a lower Apgar score, lower growth-weight indicators, which may affect the further physical and mental development of the children.

Thus, the cardiovascular system pathology significantly reduces the reproductive potential of women of childbearing age. Timely adequate correction can compensate for the pathological process and help to choose the most correct individual tactics of pregnancy management [16]. Timely use of complex correction of cardiovascular pathology at the preconception stage can significantly improve the results of reproductive potential. That is why at the stage of preconception preparation, it is important to take into account the indicators of hemodynamics in order to predict the risks of possible complications during pregnancy. All methods of correction at the stage of preconception care can be divided into 2 stages: 1) diagnosis 2) choice of the most optimal methods of correction.

#### MATERIAL AND METHODS OF THE RESEARCH

Preconception preparation was carried out in 68 women with CVS pathology planning pregnancy. The following parameters of hemodynamics were evaluated: the dynamics of the rhythm of cardiac contractions, stroke volume by ECHO-CG, arterial pressure. Parameters of hemostasis: D-dimer, thrombin-antithrombin complex (TAT), fragments of prothrombin 1 + 2 (F1 + 2), platelet activation by aggregatogram. The term of preconception care was 3 months. The comparison group consisted of 70 pregnant women with various cardiovascular diseases, who came under our observation already during pregnancy on terms from 8 to 24 weeks.

Modern preconception preparation of patients with CVS pathology should provide for multi-stage and dynamic indicators [17–19]. The program of preconception preparation for patients with cardiovascular diseases we developed provides for a set of preventive measures aimed at minimizing the risks of cardiovascular system dysfunction during pregnancy management and childbirth. The main task of such preparation is to correct the existing disorders of the mother's health before pregnancy, so that she comes to the gestational period in the best state of health and full psychological preparedness. The algorithm of preventive and diagnostic measures consists in the complex approach of patient management taking into account the risk of possible complications both cardiovascular ones and the course of pregnancy on the whole (Fig. 1).

- folic acid 1 mg per day (4 mg per day for hyperhomocysteinemia and/or MTHFR C677T mutation);
- Dipyridamole (75 mg/day);
- Natural micronized progesterone;
- Group B vitamins, antioxidants (omega-3 polyunsaturated fatty acids);
- LMWH when thrombotic readiness is detected (D-dimer, TAT, dopplerography of the main vessels, presence of a personal or family thrombotic anamnesis).

Later, during pregnancy, natural progesterone and dipyridamole, multivitamins and LMWH were used under the control of D-dimer and TAT complex. Data on the developed treatment program are given in Table 1.

In the course of pregnancy management in the patients of the study groups, we evaluated the following parameters of hemodynamics:

- 1) The presence of regurgitation with the measurement of the volume of regurgitation in %;
- 2) Dynamics of changes in blood pressure;
- 3) Heart rate;
- 4) Intensity of heart chambers dilatation;
- 5) Ejection fraction.

The registration of these parameters in all the groups was carried out three times: in the period of 18-22 weeks, then in the period of 26-30 weeks and before delivery in the period of 34-38 weeks; but only in the 1<sup>st</sup> group the above parameters were evaluated before pregnancy as well [20].





For correcting the pathological changes identified at the stage of the examination, the following prescriptions were made at the  $4^{th}$  stage of preconception preparation:

#### **RESULTS OF THE STUDY**

At the stage of the preconception examination, various changes in hemodynamics were detected in 41 patients (60,3%), while only 22 patients (32.4%) Table 1. Methods of prevention and therapy in patients with CVD

Fertile cycle	1 <sup>st</sup> trimester	2 <sup>nd</sup> -3 <sup>rd</sup> trimesters	Postpartum period
Dipyridamole (75 mg) B group vitamins Folic acid (400 mcg/day – 4 mg/ day with hyperhomocysteinemia, MTHFR C677T mutations LMWH with elevated throm- bophilia markers (D-dimer, TAT, F1 + 2) Omega 2	LMWH under the control of D-dimer Folic acid Natural progesterone Multivitamins for pregnant women Magne B6 (from 12–14 weeks) Dipyridamole 75 mg LMWH in the presence of a pre- thrombatic ctate	LMWH Folic acid Natural progesterone (up to 28-30 weeks) Multivitamins for pregnant women	LMWH for at least 10 days postpartum Switch to Warfarin according to indications Multivitamins for pregnant women and lactating mothers
Natural progesterone			
natural progesterone			

had subcompensated changes and required correction.

Evaluation of the parameters of the dynamics of the state of the cardiovascular system was significantly different in the examined groups. However, even in spite of the measures taken at the preconception stage, as well as corrective measures during pregnancy, the state of the cardiovascular system worsened as pregnancy progressed, and by the end of the third trimester, 40% of the patients in the study group had severe pathological changes.

In the comparison group, in women who did not undergo preconception preparation but only treatment and corrective measures during pregnancy, already in the second trimester in 40% of cases there was a significant functional stress of the cardiovascular system that reached a peak at the gestational age of 34–38 weeks, when pathological changes were detected already in 60–65% of all patients.

In the process of pregnancy progression, the patients of the 1<sup>st</sup> group had an increase in the regurgitation degree from 5-10% in the second trimester to 15-25% at the term of 26-30 weeks, and before the birth regurgitation reached 20-30%. In the comparison group, the rates of regurgitation were more diverse within the group, and already in the  $2^{nd}$  trimester it was within a wide range of 10% to 30%. At the period of 26-30 weeks, the median of regurgitation was already within 25%, but in some cases, it reached 40%. When analyzing the degree of regurgitation before delivery, the spread of the scores within the group was even more significant; in the presence of pathological changes the median was around 30%, but in some patients it reached critical values up to 50% or more.

In both groups, there was no pattern in the dynamics of heart rate during pregnancy, but it was found that as the gestation period increased, we noted a decrease in the number of patients with normal heart rate.

So, in the 1<sup>st</sup> group in the 2<sup>nd</sup> trimester, there were 16% of patients with bradycardia and 22% of patients

with tachycardia. In the 3<sup>rd</sup> trimester, there were 10% of patients with bradycardia and 35% with tachycardia. Before delivery — already 4,5% with bradycardia and 38% with tachycardia. In the same time, only 2 patients had a bradycardia with heart rate less than 55 beats per minute, and the maximum heart rate exceeded 105 beats per minute in only 3 patients with tachycardia.

In the 2<sup>nd</sup> group, the variability of the heart rate was even more significant in the group as a whole. In the 2<sup>nd</sup> trimester, bradycardia was noted in 16% of patients, and tachycardia in 30%. In the 3<sup>rd</sup> trimester, these patients were 13% with bradycardia and 36% with tachycardia. Before delivery there were already 7% with bradycardia and 37% with tachycardia. At the same time, the peak values of bradycardia in some patients reached 47 beats per minute, the median of bradycardia was at the level of 50–55 beats/min. In the presence of tachycardia, the median was 95–100 beats/min, and in 6 patients it exceeded 105 beats/min.

When assessing ECHO-CG parameters in the  $1^{st}$  group, beginning from the  $2^{nd}$  trimester, the ejection fraction decreased in the dynamics, while at the term of 34–38 weeks the median was below the norm, and there was considerable variation in the whole group. Signs of dilatation of various parts of the heart also increased in the course of pregnancy progression; at the examination at the period of 26–30 weeks, pathological changes of the heart were observed in 32% of patients, and already at the term of 34–38 they were observed in 50% of all patients of the study group (Table 2).

In the 2<sup>nd</sup> group, the changes in ECHO-CG parameters were more pronounced, and already in the 2<sup>nd</sup> trimester, 27% of the patients had pathological changes. The ejection fraction was reduced in 31% of patients in the 2<sup>nd</sup> trimester; then, with the progression of pregnancy there was a further decrease in the ejection fraction in 47% of patients at the term of 26–30

Measured parameter	18–22 weeks	26–30 weeks	34–38 weeks
Ejection fraction (%)	62±13,9	57±11,2	48±23,4
EDV of the right atrium (ml)	84±17,3	87±12,1	95±11,0
Diameter of the right ventricle (mm)	18±7,1	21±9,9	26±10,9
Size of the left atrium (mm)	29±4,2	34±5,1	38±5,7
End-systolic dimension of the left ventricle (mm)	31±3,9	35±4,7	39±6,1
End-diastolic dimension of the left ventricle (mm)	46±10,3	50±8,2	56±9,8

Table 2. Dynamics of ECHO-CG parameters in patients of the study group

weeks and in 61% at the term of 34-38 weeks. Also, there was an even larger spread in the group as a whole if compared with the 1<sup>st</sup> group. Signs of dilatation of various parts of the heart also increased in the process of pregnancy progression; during examination in the 2<sup>nd</sup> trimester there were noted in 24% of, at 26-30 weeks — in 39% of patients, and at the term of 34-38 they were observed in 61% of all patients of the comparison group (Table 3).

was 5,8±0,3–7,1±0,3 points. In 47 patients (67,1%) of the 2<sup>nd</sup> group, the current pregnancy ended in premature birth. 36 (76,6%) had a cesarean section, 11 (23,4%) delivered through natural birth canal at 32–36 weeks of gestation. The average weight of newborns was 2250±430 g, the height — 40.3±3.6 cm, the average value of the Apgar score for the group was 4,2±0,7–6,1±0,4 points (Table 4).

#### Table 3. Dynamics of ECHO-CG parameters in patients of the comparison group

Measured parameter	18–22 weeks	26–30 weeks	34–38 weeks
Ejection fraction (%)	52±16,7	48±13,4	44±18,1
EDV of the right atrium (ml)	88±22,5	98±26,7	101±27,3
Diameter of the right ventricle (mm)	23±7,8	27±14,9	30±9,8
Size of the left atrium (mm)	32±5,5	36±7,6	41±7,2
End-systolic dimension of the left ventricle (mm)	38±4,7	41±7,0	44±6,5
End-diastolic dimension of the left ventricle (mm)	52±13,4	61±10,1	63±16,1

In the 1<sup>st</sup> group of pregnant women, 32 women (47%) had births in time out of 68. Of these, 21 patients (65,6%) had a cesarean section, 11 (34,4%) delivered through natural birth canal. The average weight of newborns in this group was  $3110 \pm 187g$ , the height  $- 48.5 \pm 2.5$  cm; the average Apgar score for the group was  $6,2 \pm 0,5-7,5 \pm 0,5$  points. In 36 patients (53%), the current pregnancy ended with premature birth. 23 of 36 patients (64%) had a cesarean section, 13 (36%) delivered through natural birth canal at 32-36 weeks of gestation. The average weight of newborns was  $2400 \pm 256$  g, the height  $- 42.5 \pm 2.4$  cm, the average Apgar score for the group was  $4,8 \pm 0,6-5,4 \pm 0,6$  points.

In the  $2^{nd}$  group, 23 women (32,9%) had birth in time. Of these, 18 patients (78.3%) were had a cesarean section, and 5 (21,7%) had a delivery through the natural birth canal. The average weight of newborns was 2950 ±360 g, the height — 44,5±3,5 cm, the average value of the Apgar score for the group

#### CONCLUSION

It was noted that some patients are relatively easy to tolerate the physiological stresses associated with pregnancy, in the presence of CVP, and others are experiencing a strong overstrain, which leads to severe complications, decompensation, and in some cases, to death [21-23]. A similar trend was demonstrated in the framework of our study, especially in the comparison group among women who did not pass the stage of the preconception care. In the process of examination, there were significant differences within the group in the change in hemodynamic parameters as pregnancy progressed. In the study group, among women who have completed the stage of preconception preparation, the differences within the group are also present, however, they are not so pronounced.

As a result of preconception care, there was a significant improvement in hemodynamic parameters during pregnancy in patients of the 1<sup>st</sup> group compared

#### GYNECOLOGY, OBSTETRICS, PEDIATRICS

Term of delivery	Way of delivery	1 <sup>st</sup> group (n=68)		2 <sup>nd</sup> group (n=70)	
		Number	%	Number	%
Birth in time	Total	32	47,06%	23	32,86%
	Natural childbirth	11	34,38%	5	21,74%
	Cesarean section	21	65,63%	18	78,26%
Premature birth	Total	36	52,94%	47	67,14%
	Natural childbirth	13	36,11%	11	23,40%
	Cesarean section	23	63,89%	36	76,60%

Table 4. Outcomes of delivery in study groups

with pregnant women of the  $2^{nd}$  group. Given that both the spectrum and severity of CVP in patients of the  $1^{st}$  and  $2^{nd}$  groups were comparable, these data show the effectiveness of the measures on the stage of preconception preparation. Thus, the implementation of the preconception preparation can generally reduce the severity of regurgitation and largely prevents the occurrence of sub- and decompensated degrees of impairment. We were able to demonstrate a decrease in the percentage of premature births and the percentage of cesarean section in the  $1^{st}$  group compared with patients of the  $2^{nd}$  group. There was also an improvement in perinatal outcomes in patients of the  $1^{st}$  group, especially those who gave birth on time.

The concept of implementing preconception preparation we proposed in patients of reproductive age in the presence of cardiovascular pathology takes into account risk factors, severity of diseases, and possible complications. During the examination, one should take into account: indicators of the hemostasis system, parameters of hemodynamics, parameters of metabolic and endocrine homeostasis, genetic research data. The purpose of correction is to compile a possible prognosis of CVD development in the near future in preparation for pregnancy.

Based on the conducted research, we proposed a scheme for preconception preparation of patients with CVD (Fig. 2).

From the perspective of modern concepts for the implementation of preconception preparation of patients of reproductive age in the presence of cardiovascular pathology, it is required to: identify risk factors for complications of the underlying disease and complications of pregnancy. Examination and detection of hypercoagulation state, violations of hemodynamic parameters, lipid spectrum of blood, genetic and acquired thrombophilia in the fertile cycle allow to assign effective corrective and preventive therapy of the revealed disorders.

Thus, the proposed technique of preconception care can help in identifying existing CVP in patients.

This scheme of preconception preparation is proposed for women of reproductive age who plan a pregnancy or are already pregnant and are preparing for childbirth.

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*Fig. 2. Basic scheme* of preconception preparation of patients with CVD

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# DIAGNOSTIC SIGNIFICANCE OF THE DETECTION OF PROLIFERATIVE ACTIVITY OF THE CERVICAL EPITHELIUM

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The research was supported by the FEFU Science Foundation under the state task 17.5740.2017/6.7.

THE RELEVANCE OF RESEARCH. High mortality, low survival rates of patients due to late diagnosis of cervical cancer requires development of new methods for detecting cancer. According to statistics, this pathology is diagnosed in approximately 500,000 new cases every year, thus there are 14–16 cancer patients with cervical cancer per 100 000 population [3]. The issue of the diagnostic significance of the proliferative activity of the epithelium in the diagnosis of cells and tissues malignancy is now controversial, since the main questions in the pathogenesis of tumors are still unresolved. At this stage of researches the etiological key importance of the human papilloma virus (HPV), trichomoniasis, clamidiosis and other infections in the cervix carcinogenesis is the subject of contentious debates. The issue of the origin of tumor cells is controversial, the malignization of cambial tissue cells and the oncological mutational transformation of the genome are open to question, since transformed cell is immediately came under to apoptosis [4, 10]. The advanced concept of cancer cells circulation in the blood hasn't yet been confirmed. Attempts to treat cancer patients with the injection of HSC programmed differentiation stem cells have been unsuccessful because there is undeveloped and unreasonable conceptual platform under them [7]. The significance of the Ki-67 gene activity in malignancy is now in question





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[8, 9]. Therefore, at this stage diagnosis and preventive measures, unfortunately, are purely empirical, and sometimes speculative, and they require getting the additional scientific facts. This was the basis for our choice of the scientific research direction. The goal of research was to identify the activity of the Ki-67 gene in diagnosis of the mucous membrane of the cervix pathology in the zone of transition of stratified squamous epithelium into a single-layered cylindrical epithelium against the background of microbial infections in postmenopausal women [6].

**MATERIAL AND METHODS.** The material from postmenopausal women without any inflammatory processes in the mucous membrane of HSC was used as a control in the amount of 5. The material from women against the backgrounds of chlamydial (27), trichomonous (25) and papillomavirus (31) infections was studied in a comparative aspect. We used classical histological methods of staining with hematoxylin and eosin for obtaining a general morphological pattern, as well as an immunohistochemical method for detecting the proliferation marker of cells - proliferating cell nuclear antigen Ki-67 protein (DAKO, Denmark). The material was analyzed with the Olympus-Bx82 microscope and the PDx82 digital camera with a firmware.

**RESEARCH RESULTS AND DISCUSSION. The** main methods of diagnosis of changes in the cervix were examination in mirrors, simple and extended colposcopy, assessment of vaginal microbiocenosis, cytological examination of impression smears (so-called PAP-smears) and target biopsy followed by histological examination. Given that inflammation of exo- and endocervix can simulate a pattern of cellular atypia during a cytological study, all morphological studies were performed after the sanitation of the vagina. We noted that among women aged 46 years and older ectopia was observed in 7,3% of cases. Sometimes colposcopic pictures can be variegated and combined with a transition zone, but in ectopia of postmenopausal women they didn't have significant differences. It has been established that in the postmenopause the ectopia in the form of focal areas of the cylindrical epithelium was not detected in either case. Sometimes residual effects of ectopia in the form of a transformation zone (TZ) with open and closed glands were observed.

Against the ectopia polyps were found in 2,8% of cases, while in the group of women older than 45 years it was observed in 15% of cases. Polyps more frequently develop at the age of 40-50 years, and recurring of polyps was observed in 18% of patients. Polyp is the proliferation of the mucous membrane of the cervical canal with involvement of the underlying fibrous tissue in this process. The reasons of the polyps' occurrence in the examined patients were associated with a disorder of hormonal and immunogenic homeostasis, and inflammatory processes. Polyps in our observations were less often covered with a cylindrical epithelium, while they had a bright red acinous surface. More often, the polyps were covered with stratified squamous epithelium, in this case they were pink and smooth.

In our researches, when polyps were detected on the uterine cervix, it was noted that this focal proliferation of the stratified squamous epithelium along with the underlying connective tissue with the phenomena of cornification. Externally the papilloma is a pink or whitish verrucose formation. In most cases, the base of the papilloma was broad, less often - in the form of a thin pedicles, and sometimes an external growth was noted. Disorder in the structure of the basal and free plane of the surface epithelium and hyperaemia of the vessels of the proper mucous plate were noted. The basilemma of the epithelium was not identified, leucocytic infiltration was observed not only in the proper mucous plate but also in the lumina of the glands.

Analysis of the proliferative activity of the cervix mucosal epithelium made it possible to establish that, despite the duration of postmenopause, weak proliferative phenomena in stratified squamous and cylindrical epithelium of the cervix can be observed during this period and, respectively, in the first year of postmenopause, proliferative types of smears amount 75%.

In the presence of polyps and inflammatory processes due to chlamydial and trichomonous infections in the cervical mucosa the proliferative activity not only increases in the epithelial plate, but also takes place in its own plate. We noted disorders in the structure of the epithelial plates and lamina propria of the mucous membrane, the disruption of the basilemma, while the daughter cells bloom to the surface of the mucous membrane. It was noted that in case of chlamydial infection the atrophy of the cylindrical epithelium is most franked with the lowest proliferative activity of the epithelium.

Against the age-related estrogen deficiency and overlaying of chlamydial and other infections there are more franked morphological changes associated with epithelial damage, presented as a type of atrophic colpitis (vaginitis) and nonspecific cervicitis. At the same time, there are dystrophic changes in the underlying stroma, associated with worsening of trophicity, decreasing of microcirculation of blood flow and processes of transudation in stroma and all layers in the mucous membranes of the reproductive tract of postmenopausal women. Conclusion report. There are actually no targeted strategies for predicting the fate of cancer of the women's reproductive system now. Sui M., Pei Y., Li D., Li Q., Zhu P., Xu T., Cui M. (2016) as well as other authors note that the delay in diagnosis and treatment can lead to irreversible damage and severe disease [10]. The authors noted that there were rare cases of cervical adenocarcinoma, which is difficult to diagnose because of deep location, endogenous growth, deceptively nonmalignant appearing of the tumor cells and lack of communication with the human papilloma virus (HPV). Liang S.N., Huang Y.J., Liu L.L. et al. (2015) consider that the expression of Ki67 gene is closely associated with the occurrence and development of cervical carcinoma, noting that there is a positive correlation between Ki67 gene and malignancy, and that it can serve as a biomarker for cervical cancer [9].

Kanthiya K., Khunnarong J., Tangjitgamol S., et al. (2016), analyzed the 40-year base of literature data in the evaluation of Ki67 expression in cases of cervical intraepithelial neoplasia (CIN) and cancer, in contrast to the majority of authors who considered Ki67 expression in 100% of all invasive carcinomas. The analysis results showed 75,4% of the cases of CIN 2–3, 22,6% of the cases of CIN1, and 11,3% of the cases of neoplasia, and obtained a direct association of Ki67 gene activity with the severity of cervical disease especially exhibiting high sensitivity and specificity for CIN2. There was a lack of protein detection in 6 and 7 cases of CIN1 and CIN2, respectively [8].

According to Zhao J., Guo Z., Wang Q., Si T., et al. (2017), the cervical cancer mortality is associated with genotypes of papillomaviruses 16, 18, 58 and 52 [11], but other authors [7,2] consider cytological studies to be more reliable. There were very few large-scale studies dedicated to contamination by the human papillomavirus virus and determination of the dominant type of virus for women in our country. Programs existing at the current stage do not allow assessing the scale of the defeat of women by the human papillomavirus and other infections that occur without vivid clinical symptoms in our country. Nevertheless, the existence of more than 200 strains of human papillomavirus, spontaneous recovery in 98% of cases does not support the advisability of vaccination [5]. The data available at the time indicate the coincidence of prevalence ratios of types 16 and 18 of papillomavirus infection in the Russian Federation and in European countries [2]. High oncogenic types of viruses amount 58% and that fact can alert and explains the high incidence of cervical cancer. The expansion of diagnostic resources, including monitoring of proliferative activity based on analysis and comparative characteristics of regenerative potential indexes in the cervical mucosa with the health model for the corresponding age group, is the most promising in the development of strategies for the prevention, treatment and rehabilitation of postmenopausal women. As in the works of Prilepskaya V.N. (2008), we observed that regardless of the duration of postmenopause weak proliferative phenomena could be in stratified squamous and cylindrical epithelium of the cervix during this period. Our results are consistent with the results of Calil L.N., Igansi C.N., Meurer L., Edelweiss M.I., Bozzetti M.C. (2011), we also found a statistically significant association between cervical mucosa diseases caused by HPVI, Trichomonas, Chlamydia trachomatis and Ki67 gene activity [1]. At the same time, we noted that against the background of a chronic course of infections, the activity of Ki67 gene is statistically significantly reduced which may be due to damage of cambial cells and depletion of the regenerative potential.

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# PECULIAR FEATURES OF HEART ACTIVITY METABOLIC CORRECTION IN CHILDREN AND ADOLESCENT ATHLETES

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#### ABSTRACT

53 children aged 10–14 years, involved in athletics during 1–1,5 years were treated against stress-dependent cardiomyopathy of varying degrees by coenzyme Q10 and inosine dosage by age for 6 weeks. The feasibility of cardiometabolic therapy with this combination of drugs at the preclinical stage of the disease and the need to control the effectiveness of the treatment with the help of both biochemical indices: the level of troponin-T and the activity of the myocardial fraction of creatinephosphokinaza in the blood serum, and the main spectral parameters heart rate variability (TP, VLF, HF) are established. In case of children with a significant deviation from the norm the course of therapy should be more than 6 weeks.

**KEYWORDS** — children involved in sports activities, stress-dependent cardiomyopathy, coenzyme Q10, inosine, biochemical indices (MF-creatinphosphokinaza, troponin-T), spectral indices of cardiac rhythm variability.

The problem of sport pathology at the tender age is particularly topical nowadays. And this is due to the development of sport among children and young people, early sport specialization and absence of individual approach at various stages of training process. 40% of sportsmen have desadaptative changes, known as stress-dependent cardiomyopathy because of the unbalance between physical and mental activities and individual performance capacity. Behind this disease lies the disfunction of stress-limiting system, disorder of autonomic regulation of cardiovascular system, dysmetabolism with energy production deficitsand oxidative stress. When diagnosing stress-dependent cardiomyopathy it is very important, together with other medical and clinical data, to consider changes in the rate of cardiac injury markers: troponin-T and activity of myocardial fraction of creatinphosphokinaza (MF-CPhC) fraction in blood serum and basic spectral variables of heart rate variability (HRV) reflecting bothvegetative sufficiency and myocardium energy supply [1, 2].

Careful monitoring of cardiovascular system condition during sport activities enables to diagnose heart disorderson a timely basis and hence adequately providemedical and preventive care and treatment.



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Recurrent energy (mitochondrial) deficiency develops during strenuous exercises and thisfact reasonably determines the prescription for sportsmen of metabolic drugsthat contribute to the process of energy supply [3,4].

A component of mitochondrial respiratory chain, coenzyme Q10, is one of the most common metabolic drugs in sport cardiology. It is known to be used for rehabilitation and preventive purposes during the period after and before sporting competitions, as well as forfast recovery after strenuous exercises especially for sportsmen with significant repolarisation abnormality. The evidence reveals that a course of inosine treatment decreases troponin-T level and activity of MF-CPhK. This medicine increases myocardium energy balance, has antihypoxic and antidysrythmic effect [5].

The aim of investigation is to establish peculiarities of combined use of coenzyme Q10 and inosine in management of stress- dependent dysfunction of cardiovascular system of young sportsmen.

The characteristic of children and methods of investigation. 146 children at the age of 10-14 (average age  $12\pm0,5$ ) were observed. They were doing athletics for 1-1,5 years. These children had periodic medical examination of SBEHP AR Regional curative-physical-culture dispansery. Sportsmen with organic heart and nerve diseases, and those who had acute respiratory infections (during last month), as well as the ones who were taking any metabolic drugs, were not examined. The research was conducted during basic course of training in autumn and winter period.

The research included physical examination of organs and systems, with special attention to cardiovascular system. Sportsmen underwent tests to determine the condition of activity rate of MF-CPhC by method of IFA and troponin-T rate was checked with the help of enzyme immune test-system produced by Beringer Manheim company. Moreover, sportsmen underwent standard electrocardiogram (ECG), echocardiography (Echo-CG) for medical reasons with the interpretation of data in compliance with the standards. Besides, research of the condition of basic spectral variables of HRV was made using "Polyspectr-12E" unit of Neurosoft both at rest and via orthostatic test for the evaluation of myocardium energy supply. The analysis of the results in investigation was done with the usage of variative statistics general methods.

Results and discussion: a very thorough analysis of clinical, laboratory, instrumental results of 146 young sportsmen allowed to establish that 53 children had symptoms of stress- dependent cardiomyopathy. All children were prescribed 2 mg/kg/day of coenzyme Q10 (ubihinon) by mouth during breakfast and 0,6–0,8 g/day of inosine by mouth before meal 3 times a day for 6 weeks.

Using randomizing technique, there were formed 2 groups comparable to the age and gender, physical exertions level and condition cardiovascular system. The first group consisted of 22 (41,5%) sportsmen with expressed features of heart abnormality, which were diagnosed with stress- dependent cardiomyopathy. The 2<sup>nd</sup> group consisted of 31 (58,49%) children that just had some laboratory abnormalities affected by changes of spectral variables of heart rate variability.

When generating their clinical evidence, the following factors were considered: complaints, condition cardiac border, heart rate, peculiaritiesofauscultatory presentation such as heart tone, heart murmur, abnormality level of biochemical data: troponin T level and activity of creatinphosphokinaza-MB in blood serum. Besides, attention was paid to the changes in ECG and echocardiogram – condition of diastolic myocardium function, the left ventricular myocardium mass index and the condition of the basic spectral parameters of HRV: total frequency (TP), very low frequency (VLF), low frequency (LF), high frequency (HF) ranges at rest and during orthostatic tests. When estimating HRV parameters it was noted that the most expressed changes were during orthostatic tests rather than at rest. That's why, the condition during orthostatic tests will be considered hereafter.

Children from the first group most commonly had the following clinical results: 16 children (72,7%) complained of the shooting heartache, 18 (81,8%) had fatigue after training, 12% (54,54%) of young sportsmen had heart tone dullness, 10 (%) sportsmen had soft systolic noise at the apex, more rarely sportsmen had bradyarythmia- 9 (40,9%) cases. Most sportsmen (17 children (77, 7%)) had increased activity of MF-CPhC, 15 (68, 18%) sportsmen had increase of troponin – T level. The ECG results showed: sinus bradyarrhythmia in 11 cases (50%), T-wave inversion at 2 and more leads was diagnosed for 12 (54,5%) sportsmen, ST segment depression in 2 and more left chest leads was diagnosed in 9 cases (40,9%).Echocardiogram revealed diastolic dysfunction for 12 (54,5%) athletes, increase of left ventricular muscle mass index over 220 g/m<sup>2</sup> in 6 (27,3 %) children.

According to analysis of HRV spectral parameters it was revealed that a lot of children (21 children (95,5%) have a decrease of the basic HRV spectral parameters. It was pointed out that the following indices changed a lot: total frequency ( $p_1 < 0,01$ ), very low frequency ( $p_2 < 0,01$ ), and high frequency index ( $p_3 < 0,001$ ). The decrease of these indices is the result of predominance of influence of sympathetic outflow to the heart. Therefore, the sympathicotonic type of rate regulation can be observed as being predominant, and this fact is the evidence of inner stress rhythm tensionand thus proves that the diagnosisis accurate.

No distinct clinical changes were revealed in the second group. Significant abnormality of biochemical indices was found: increase of MF-CPhC activity was observed for 20 (64,5%) children, increase of troponin-T level was diagnosed in 24 (77,4%) cases. When comparing the values of basic of HRV, their decrease was noted for 8 (25,8%) athletes of the group under examination comparing to normal level. However, the intensity of these indices in the first group was notably higher: TP ( $p_1$ <0,05),VLF ( $p_2$ <0,01), HF ( $p_3$ <0,01). It speaks of lower degree of incidence and intensity of changes in such variablesfor this group.

It was noted that the increase in the activity of MF-CPhC and troponin-T for the observed children correlated with the decrease in the values of TP, VLF, HF (k=-0, 75; k<sub>1</sub>=-0,77; k<sub>2</sub>=-0,79). This is caused by metabolic disorders occurring in the myocardium associated with muscle loading that leads to decrease in myocardium energy security.

Thus, the increase of the level of cardiomyocyte damage markers detected in the observed group of young athletesin addition to decrease in the values of the basic HRV variables, enables to diagnose preclinical stage of stress-related cardiomyopathy which needs appropriate metabolic management.

Immediately after the course of treatment all observed children were examined. Patients of the first group after the medicines were cancelled had improvement in some individualperception: the number of complaints of pain in heart was decreased by 31%, the fatigue after exercisereduced by 50%. The objective data showed: 3 (13,6%) children had a reduction in the heart rate, diminished heart tone was detected in 4 (18,2%) cases, only 5 (22,72%) young athletes still had soft systolic noise at the apex. In addition, positive shifts in laboratory-instrumental indicators were revealed. Optimization of hemodynamics was accompanied by a decrease in the levels of biochemical markers of myocardial damage for significant part of children in this group. The increase in activity of MF-CPhC was preserved in 8 (36,4%) cases, deviation from the norm of Troponin-T levels in 7 (31,8%) cases. Notably, there was a decrease in the level of this abnormality which also indicated the effectiveness of the therapy.

ECG shows that complex medication regimen contributed to a double decrease in the severity of disadaptation changes in the cardiovascular system: recovery of heart rate, that was initially reduced, in 4 (18,2%) cases, 50% decrease in the frequency of repolarization anomalies. However, attention was paid to the fact that not all children had normalization of ECG-indicators. Echocardiogram showed the retention of diastolic dysfunction in 5 (22,72%) cases together with normalization of the main index of diastolic function of the myocardium for the majority of observed children. In addition, there was a tendency towards recovery of the basic spectral variables of HRV, but at the same time they differed significantly from the norm (Table 1). In the second group, after treatment, biochemical and instrumental parameters came back to norm. The level of troponin-T (p > 0.05) and the activity level of CPhC-MF ( $p_1 > 0.5$ ) in blood serum did not differ significantly from the norm(Table 1). The instrumental tests showed the same trend for the basic spectral parameters of HRV (Table 1): TP (p > 0.05), VLF ( $p_1 > 0.05$ ), HF ( $p_2 < 0.5$ ).

Thus, combined use of cardiometabolic drugs has been proved: coenzyme Q10 and inosinefor children with stress-related cardiomyopathy of varying severity. With regard to the above mentioned, the course of such treatment for young athletes with a significant deviation from the norm of laboratory-instrumental indices should at least 6 weeks or more. Moreover, the use of cardiometabolic therapy for children at the pre-clinical stage of disease and monitoring their condition, both with the help of biohemical indicis and the basic parameters of HRV, was proved to be reasonable and consistent.

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*Table 1.* The state of laboratory-instrumental data in the studied groups of children before and after therapy

Data	MF-CPhC(f/l)	Troponin-T (ng/l)	ТР (мс 2)	VLF (мс 2)	LF (мс 2)	НF (мс 2)
Groups	Before therapy					
First (n=22)	56,6±0,4***##	0,076±0,005***##	2120±526,4***##	910±218***##	710±112**#	480±128 ***##
Second (n=31)	38,7±0,5***	0,044±0,006 ***	2890±504,1**	1120±422,1**	890±124*	690±144**
After therapy						
First (n=22)	45,3±0,5	0,045±0,05	2970±507	1248±418	930±134	640±134
Second (n=31)	31,6±0,4	0,039±0,05	3221,4±556,4	1369,2±432,4	1011,2±465,4	712,4±284,1

\* — value of reliability by comparing values with conditionally healthy ones;

\*—p>0,05; \*\*—p<0,05; \*\*\*—p<0,01;

# — reliability values by comparing data in the first and second groups among themselves; # — p > 0,05; ## — p < 0,05.

Consequently, the combinationuse of coenzyme Q 10 and inosine for children engaged in sports contributes to the normalization of the main symptoms of stress-related cardiomyopathy. However, the fact that there were still changes in clinical-biochemical and instrumental indices among some of the athletes from this group indicated that there should be a longer course of treatment with these medications.

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# FEATURES OF NATURALLY PROGRESSING CONGENITAL HEART DEFECT — DEFECTS OF THE INTERGENEOUS PARTITION IN CHILDREN

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#### RELEVANCE

Cardiovascular diseases today are one of the prevailing causes of morbidity and mortality in children. In the structure of the cardiovascular pathology of children of newborns and the first year of life, 65–70% are occupied by CHD. In Europe, the incidence of CHD in children is 6.65 per 1000 live births. About 50% of children with CHD have critical defects of the neonatal period, which provides specialized care in the first hours and days of life. The level of diagnosis of CHD, including prenatal, in recent years has improved significantly due to the increase in cardiosurgery in Tajikistan. According to statistics, the defect of the interventricular septum is one of the leading places among the CHD.

#### *The purpose and objectives of the study*

the features of the natural course of CHD in children — the defect of the interventricular septum.

#### MATERIALS AND METHODS OF RESEARCH

Under supervision were 76 children with CHD–VCD at the age of up to 5 years. All patients underwent general clinical research methods, including chest x-ray, ECG and ultrasound of the heart. Depending on the severity and prognosis of the disease, patients are divided into 3 groups. In 1 group, defects with relatively free flow and outcome (28) are classified. According to the ultrasound of the heart, the size of the defect was up to 0.6 mm, the second group consisted of patients with a more severe course of the defect, whose defect size was more than 0.7 mm (28). The third group of patients consisted of 26 patients in whom the defect of the septum was within 10–30 mm.





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#### **RESULTS OF THE STUDY**

At small defects (1–3 mm), there were usually no signs of circulatory disturbance. Children developed normally and did not need treatment. Clinically, he heard a rough systolic murmur in the 4–5 intercostal space. To the left of the sternum. With moderate defects (more than 7 mm), signs of circulatory disturbances appeared from 1.5–2 months of life. There was rapid fatigue in feeding, sweating, mild dyspnea, tachycardia, and a history of frequent respiratory diseases.

There was a systolic tremor, the  $2^{nd}$  tone split and strengthened in the pulmonary artery, followed by cardiac arrest for 3 years, heart failure progressed, children lagged behind in physical development. In patients of the third group, signs of circulatory disturbances were manifested from 1 month of life. Pronounced dyspnea and tachycardia, coughing, stagnation wheezing in the lungs, enlargement of the liver. In the anamnesis all children of this group had recurrent bronchitis, pneumonia. The cardiac hump, the 2<sup>nd</sup> tone accent on the pulmonary artery, and a part of the patients except for systolic murmur in 3–4 intercostal spaces to the left of the sternum were marked by mesodial tolicular noise in the apex associated with a relatively mitral stenosis, due to a large discharge or diastolic noise, associated with the relative failure of the pulmonary artery valve. In children with a large defect, signs of total heart failure were noted. Pulmonary hypertension developed as a rule, by the second half of the year, the pressure gradient between the right and left ventricles was more than 35 mm Hg.
With a small defect, the ECG is normal. The clinical symptoms of combined myocardial hypertrophy of both ventricles are combined with an average or large defect of the septum. Deep Q tooth in right thoracic leads in combination with signs of myocardial hypertrophy of both ventricles, rSR form; rR; R or RS in leads V1.

Electrocardiographically, the signs of hypertrophy of the right and left ventricles, and the overload of the left atrium were noted in the  $2^{nd}$  and  $3^{rd}$  groups of patients. On the roentgenogram of the chest with the average especially large defects of the interventricular septum — cardiomegaly due to the left atrium, left ventricle, less than the right. Arterial overload of pulmonary blood flow.

When rentgenographing chest organs in patients with small dimensions of VSD, there are no abnormalities. With large defects of the partitions, the pulmonary pattern is strengthened, the waist is smoothened, the ventricles are enlarged, and the arch of the pulmonary artery is often swollen.

When echocardiographic study revealed dilatation of the left atrium, dilatation and hypertrophy of the left and right ventricles, increased pressure in the pulmonary artery and right ventricle.

An increase in the right ventricle index, an increase in the rate of dynamic movement of the mitral valve, associated with accelerated blood flow through it, an increase in the end-diastolic diameter of the left ventricle.

At follow-up in patients of the 1<sup>st</sup> group, the VCD spontaneously closed in 8 children, which was confirmed by ultrasound of the heart, in 1 patient developed bacterial endocarditis, in the remaining children of this group, the cardiac insufficiency of 1-2 degree was gradually developed. In the 2<sup>nd</sup> and 3<sup>rd</sup> group, on the background of pulmonary hypertension, cardiac insufficiency developed in different degrees, so in 32–2A degree, in 9–2B degree, in 7–3 degree. During 3 years of observation, heart failure progressed in 10 patients, followed by Eisenmenger syndrome, i.e. sclerotic stage of pulmonary hypertension, leading to an inverse venous-arterial discharge, characterized in children by the appearance of cyanosis of the cheeks, lips, and fingertips. In 38 children, hemodynamic disturbances did not change for several years.

In 12 patients with a small and medium defect of the interventricular septum in the anamnesis, the size of the defect was reduced. Conservative therapy consisted in the appointment of diuretics, cardiac glycosides, potassium preparations, metabolites, vitamins and the treatment of concomitant diseases.

31 patients with VSD were operated with a favorable outcome.

#### CONCLUSIONS

In children with CHD of VSD with a defect size of up to 7 mm, signs of circulatory disturbance were 1-2 A degree and developed gradually. At moderate and large defects of partitions more than 7 mm, signs of ND of different degree were noted. With large defects of the partitions, cardiac insufficiency rapidly progressed and pulmonary hypertension developed, which necessitates earlier diagnosis and timely surgical correction of the defect.

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## MECHANISM OF THE HEPATITIS C WITH GLOMERULONEPHRITIS AND CANCEROGENESIS

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The research was supported by the FEFU Science Foundation under the state task 17.5740.2017/6.7.

ABSTRACT — The work presents morphological characteristic pathogenic structure changes in the kidneys, lungs and liver in patients with hepatitis c, including HIVinfected. Showing pathogenic mechanisms of hepatitis c associated with violation of the metabolism of hemoglobin, anoxic link revealed as well as apoptosis hepatocytes and cellular components of hem tissues barriers liver, lung and kidneys with Glomerulonephritis, cirrhosis and carcinogenesis in patients with hepatitis c, including HIVinfected.

**KEYWORDS** — ischemia, hepatitis, glomerulonephritis, carcinogenesis after low, apoptosis, cirrhosis, HIV infection, pneumonia, blastocysts, blood tissues barriers.

## RELEVANCE

There is still a point of view that different pathogens are associated with increased risk of cancer.

However, the main culprits among the infectious causes of cancer, both for human and animal viruses that are associated with the 20% of cancers. Very strict criteria used to identify their oncogenic properties made it possible to classify as only six human oncogenic viruses.

At the same time Rodríguez-Nóvoa S, MorelloJ, González M, et al. (2008) noted that the use of antivirals for HIV infection causes hemolysis and increases hyper bilirubin anemia. It has been proven that the majority of patients with hepatitis c, including people with HIV receiving antiretroviral therapy, develops resistant anemia, decreased intake of toxic drugs.



Mariya Tuchina

It is known that anemia at the present stage is not an exhaustive justification pathophysiology as disclosure mechanisms reduce the hemoglobin in the blood of patients with hepatitis c and HIV infections. This assumes that the anemia has multifactor nature that explains cases of failed attempts of empirical application of erythropoietin in treatment of patients with hepatitis c and HIV infections.

Given the poor prognosis, study of mechanisms of development of renal diseases, cirrhosis and liver carcinogenesis on the background of hepatitis c, including HIV-infected in relation to anemia and anoxia is at the present stage, the most important.

#### MATERIAL AND METHODS

In the work material of the liver, kidneys and lungs of patients with hepatitis c, including HIVinfected was used. The age of patients was from 30-38 years. The monitoring group comprised 14 patients who died as a result of injuries that are incompatible with life, presumably without somatic pathology, ranging in age from 24 to 76 years. Biopsy is a multistage material tests on samples of writing in preparation for histological research of immediately after sampling.

Used classic histological research methods with hematoxylin-eosin staining to obtain total morphological pattern. Material analysis was carried out using a microscope Olympus-Bx82 and CDh82 digital camera with proprietary software.

This work was supported by Science Foundation Far Eastern Federal University (FEFU), in the frame work of the State task 2014/36 of 03.02.2014 and of the international Grant FEFU (Agreement No. 13-09-0602 of November 6, 2013).

## THE RESULTS OF THEIR OBSERVATIONS AND DISCUSS THEM

Found that in the liver of a patient with HIV, infected by hepatitis c virus in blood outflow system identified by macrophages containing cytoplasm phagocytes pigment Brown in color, with color pigment in cytoplasm of phagocytes or inside blood vessels varies from reddish to dark-brown. The endothelium of blood vessels can be saved partially, while misplaced, with cores arranged perpendicular to the basal membrane, but in most parts of the surface vessel destroyed. Against the backdrop of diffusely located brown pigment are identified by macrophages with dark inclusions in the cytoplasm.

In the liver parenchyma of the morphological picture of acute hepatitis with leukocyte infiltration expressed inter lobules tissue enlargement of the bile duct, apoptosis of hepatocytes, fatty liver dystrophy, and cirrhosis.

When microscopies are detected by the bodies Councilman, which some authors consider cluster star reticule endothelial cells, lymphocytes, macrophages, and neutrophils in necrotic masses formed in viral hepatitis in the liver resulting in apoptosis of hepatocytes, others microscopic homogenized eosinophil cells, detectable in around capillaries spaces with liver necrosis of hepatocytes, occurring as a result of apoptosis in different diseases.

In our studies in patients with HIV and hepatitis c process violations in the filtration barrier kidney associated with destruction of erythrocytes and the release of hemoglobin into the parenchyma of kidney, his capture by macrophages with subsequent evacuations across basils membrane barrier route. In this part of the parenchyma of kidney is characterized by flushing the system renal vascular glomeruli's, another part of the renal corpuscles is the picture of necrosis, and a large part of the kidney parenchyma presented kidney cells with signs of irregularities in the system of urine and urine and blood barrier, glomerulonephritis and extensions in which arteries filled with pigment and macrophages with phagocytes pigment inclusions in the cytoplasm.

We found that in the cortical parenchyma and Medulla of kidney vessels hyperemic. In vascular glomeruli's bringing arterioles and capillaries network expanded, taking away arterioles in extended gleams observed hemolysis cells, capture of iron by macrophages, as well as the presence of pigment in the proximal tubules. The presence of characteristic signs in morphological picture kidney damage manifested hyperemia, higher, the destruction of red blood cells, diffusion of transferrin and its capture by macrophages, in our opinion, can testify to the same mechanism of pathogenesis of renal and hepatic pathology of HIV and hepatitis C.

In the lungs of patients with HIV infection and hepatitis c amid pneumonia deaths is observed blastocysts advanced alveolar epithelium, hyperemia of the blood vessels, lung tissue infiltration blastocysts detection in the blood vessel lumen diffusely scattered pigment and macrophages with cytoplasm filled with dark pigment, alveoli or necrotic collapsed. The cartilage fragments revealed not only the process of apoptosis cartilage cells, but also pockets necrosis. In the parenchyma of the lung blastocysts are extended in the gleam of the alveoli, bronchi and lung gleams moves. At the same time in the lumen of blood vessels are identified by macrophages, cytoplasm which is filled with transferrin.

#### DISCUSSION OF THE RESULTS

We revealed an identical morphological picture of pathological changes in liver, kidney and lungs of patients with hepatitis c and hepatitis c HIV infection associated with the destruction of hemoglobin, erythrocyte hemolysis and advanced in the process of cellular anoxia.

Besides the already known and submitted by many authors for signs of pathological changes in organs associated with hyperemia parenchyma, apoptosis and degeneration, fibrosis and cirrhosis with local necrotic changes leukocyte infiltration, found all bodies of brown pigment accumulation in the system of blood outflow. Histological study of Renal Biopsy usually indicates the presence of infiltration glomerulus activated macrophages. When the macrophages loaded with pigment black, morphologically corresponding protein complex with iron-transferrin.

We assume that the dark pigment accumulation in the cytoplasm of macrophages corresponds to transferrin, a product of the metabolism of erythrocytes and hemoglobin destroyed hemolysis. This is indirectly confirmed by numerous studies have investigated the reduced hemoglobin in the peripheral blood of patients with hepatitis c and HIV infected but not shown mechanism of anemia.

In our opinion, the pathological process in the liver, lung, and kidney infection HIV infected hepatitis c virus begins with hypoxia, caused by an oxygen explosion, necessary for the induction of phagocytosis of pathogens, endings and then apoptotic and necrotic cells due to Anoxia associated with aggressive destruction of erythrocytes and the release of hemoglobin in the plasma of the blood vessels of the lungs, liver and kidneys. This process results in the release of transferrin with the subsequent seizure of his by macrophages. Because of the impossibility to transfer oxygen to the tissues, as well as not fulfilling the second function of hemoglobin-the transfer of carbon dioxide, cell bodies were forced to switch to the use of free dissolved oxygen in plasma. With the arrival of hemoglobin in the blood, taking into account its high toxicity when intra vascular dissolution and released into the blood plasma, begins massive cell death due to ischemia/anoxic and intoxication.

The second link exposure to pathogenic virus hepatitis with vasa so that stem cells and early cellspredecessors of erythropoiesis in norm obey near regulation provided by their interaction with neighboring cells and stem bloods cells of the bone marrow stroma.

Anemia associated with adverse prognosis in chronic form of hepatitis C, HIV infection is marked by many authors. Found in the liver pronator erythropoietin submitted erythrogensin, together with erythrocytes poètinogen buds produced prenatally Kupfer cells , respectively, and kidney podocytes. When cerebral alveolar epithelium, hepatocytes and the UUT and, as a consequence, their loss, declining elaboration of all constituent of erythropoietin, Mrr erythropoiesis and regeneration, controlling the breeding of metabolites. Anoxia leads to a decrease in energy processes cells, apoptosis, necrosis and development of cirrhosis of the liver, glomerulonephritis. It can be assumed that this is the same mechanism of brain neuronal damage in hepatitis C, as there is evidence of hepatitis c virus detection in the endothelium of blood vessels in the brain.

A key factor in the mechanisms of systemic damage to the walls of blood vessels, including the participants of blood tissues barriers may be phagocytes transferrin with aggressively destroying macrophages endothelium to release into the blood stream. Regular measurements of hemoglobin of the blood of patients with hepatitis, especially HIV infected, could help identify which patients are at greatest risk of HIV disease progression to conduct therapeutic intervention.

Particularly high risk for the development of processes such as cirrhosis, Glomerulonephritis and carcinogenesis in patients with hepatitis c and HIV infected in the absence of a pathogenically justified the treatment and understanding of mechanisms of pathogenesis, which leads to unwanted complications.

Thus, there is a need to develop a randomized trials of high methodological quality assessment for strategic effects on anemia in persons infected with hepatitis c virus and human immunodeficiency.

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# **TOPICAL ISSUES OF MODERN GASTROINTESTINAL ONCOLOGY**

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The research was supported by the FEFU Science Foundation under the state task 17.5740.2017/6.7.

## INTRODUCTION

According to statistics the gastric cancer is one of the leading causes of cancer death [1]. Cancers of the orpharyngeal tissues, esophagus, stomach and colorectal are among most common causes of death throughout the world. Every year more than 1 million people were diagnosed with gastric cancer. In the Russian Federation gastric cancer takes 3<sup>rd</sup> place after lung cancer and skin cancer and makes 32 cases per 100 000 population per year. The main problem is that its genesis is not well studied. We did not find enough information about changes in immune homeostasis of gastric mucosa So far, the issues of the nature of cancer cells have been the subject of heated discussions, the questions of transformation of the genome of the cambium of the original tissue have not been solved or proven, nor oncogenes and anti-oncogenes in the genome of cancer cells have been found, as they are normally present in all cells and regulate apoptosis and proliferative activity in norm. The viral concept of L.A. Zilber, supplemented by the author with immunology of cancer, still has both supporters and opponents based on the grounded laws of the Snell transplantation, which in principle reject the presence of antitumor immunity. in terms not only of reparative regeneration, but also physiologic. Data on the achieved respectable overall survival when using the OTSGC-A24 cancer vaccine in patients with advanced stomach cancer require additional studies. Johnson IT. Cruciferous believe that there are many concepts of carcinogenesis in the gastrointestinal tract, one of them is based on risk groups with malnutrition and cites evidence of a lack of cancer due to inadequate intake of plant foods [3].



Oleg Pererva

Lam SY, Yu J, Wong SH, Peppelenbosch MP, Fuhler GM. (2017) attempted to associate carcinogenesis with the microbiota of the gastrointestinal tract [4].

Flanagan DJ, Austin CR, Vincan E, Phesse TJ. argue, like other researchers Wnt signaling regulates several cellular functions including proliferation, differentiation, apoptosis and migration, and is critical for embryonic development [2]. Stem cells are defined by their ability for self-renewal and the ability to be able to give rise to differentiated progeny. Consequently, they are essential for the homeostasis of many organs including the gastrointestinal tract. But these signaling paths have been studied only in experiments on insects and animals, the influence of the same signals in the human body on genomic transduction is under question.

Consciousness of the problem of mechanisms of carcinogenesis at the present stage puts these urgent issues on the agenda, requiring immediate resolution. This determined the direction of our research.

## METHODS

Biopsy material obtained from cardia, gastric body, antrum and fundus according the Sydney's recommendation as the gold standard of the World Health Organization. Analysis of results carried out in according with the criteria of the morphologic section the Sydney classification, supplementing the international gastritis classification and visual-analog scale with semi quantities evaluation standards of morphologic changes of microbes media, as well as the presence of spontaneous recovery of 98% in the case. Biologic samples and gastric biopsy material were obtained at the 203 upper GI-scope for patients ranging in age from 34 to 78 years in time from 2004 to 2017, on the basis of four medical hospitals in Vladivostok (Russia), for patients with gastric complains and without any manifestations.

We research next immunocytes: CD4 – T-helpers and other cells: CD5 – activity cells ; CD8 – T-killers; CD10 – stem cells antigen (OLL); CD34-mobilized blood stem cells (OML, OLL, endothelial cells, GIST) ; CD117 Marker GIST; CD 68 – Macrophages. Antigen presentation; CD 163 – Macrophages; CD 204 – Mast cells; c-kit – receptor factors stem cells.

## RESULTS

The existence of HBP was determined using microbiologic and molecular-genetic examinations of selected strains helicobacter pylori with subsequent analysis on pathogenic microorganism genes in the genome. HBP infection received additional confirmation using immune histochemical techniques using antibodies to helicobacter. Additional proof of the blood came from helicobacter using scanning electron microscopy. The results of their observations. Microbiological method research gave HBP culture from 95% (193 из 203) patients who are using the molecular-genetic analysis have been described as Cag A-, Vac A- positive stains with established cag PAI and cag A gene: AAABC Cag A, severe type and truncated (shortened) ABC Cag A, type of unknown function. It was showed, T-cells more, then B cell, and CD4+more, then CD8+. In epithelial layer are T-cells with high content γδ-population (– 15–30%), rapid dominance CD8+-cells over CD4+, the presence of unusual subpopulations of cells. A portion of these T-cells not in the thymus develops, but in mycropatch, are localized in intestinal. Using immune histochemistry revealed the different phenotypes of cells monocytes on differons CCM, and connective tissue mast cells in the mucosa's own discs. Immune histochemistry was identifycate the HBP, gene activity Ki67, CD4, CD5, CD8, CD10, CD34, CD68, CD117, CD163, CD204, c-kit –receptor factors stem cells, mine hazard firm DAKO to illustrate and further comparative analysis the dynamics of disease in different periods.

The virulence genotype of *H. pylori* in the Far Eastern Russia is mostly *cagA*+ and *vacA*+ (s1/m1). *cagA* modification is European type (ABC), distinct from Japan (type ABD). Metronidazole resistance of *H. pylori* is prevalent in Russia, in contrast to Japan.

Participation in the immunocytes feature provided mechanisms for restructuring of connective and epithelial structures woven own LPs at physiological and mucosal reparative regeneration of the stomach wall. Identification of immune cells was carried out on the same circuit, despite the different antigen location in cellular structures: membranes, lysosomes, nucleus, Golgi complex just as us growth and rejuvenation of stomach cancer, registered a case of cancer in women 36 years.

As other authors, we find increasing the number of infiltrate type cancer. Carcinogenesis marked with the same frequency in patients without previous gastric ulcers, they had gastritis: Erosive – ulcerative or atrophic.

#### DISCUSSION

Dynamics changes of macrophage in stomach wall infiltration responded to increased proliferative activity of epithelial mucous membrane, and was highest when the proliferative activity has dropped due to the depletion of the cambium. Single work focused on phenotypes cell infiltration mucous membrane stomach and tumors [7].

Immunocytes in normal tissue are in epithelial layer in a small number of. With Helicobacter pylori infection the number of the disc in the epithelial immunocytes proliferative activity is increasing. When metaplastic cancer and effector immunocyties absent in the epithelial layer reservoir and large quantities are identified in your own disc of mucous membrane. With salinization free the increasing number of CD cells c-kit –receptor factors stem cells.

#### CONCLUSION

The following problems in the fight against malignant neoplasms have to be solved : a lack of effective preventive strategies to control risk factors or effects on pre-tumor lesions; lack of optimal methods for early detection of clinically significant localized tumors for their subsequent radical treatment; lack of low-traumatic and effective methods of treatment of early cancer; The lack of medicines to effectively treat common tumors; and, finally, with the abundance of methods available to the oncologist, we still cannot say in each specific case which of them will be most effective in a particular patient [6]. Modern ideas about mechanisms of carcinogenesis do not correspond to the needs of practical public health, there is a need to revise existing deadlock concepts of malignancy and formation of tumors in the human body as a whole for the development of pathogenically substantiated methods of treating this formidable pathology [8].

In total, 1 383 066 cases were analyzed by Okuyama A, Higashi T.(2018). They found that based on this cancer registry-based analysis, older patients-in particular those ≥85 years old at diagnosis and with advanced stage cancer-are less likely to receive anticancer treatment than younger patents are. Further research is warranted to identify patient characteristics that predict which older patients are most likely to benefit from active treatment [5].We have similar data that in patients over 80 years of age, the forms of cancer are less aggressive. To a greater extent, the accompanying pathological processes are combined in the clinical picture.

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## A NEW ADJUNCTIVE THERAPY TO SUPPORT MULTI-MORBID GERIATRIC PATIENTS WITH COPD AND IMPROVE THEIR QUALITY OF LIFE

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**ABSTRACT** — In a pilot study, the clinical effects on ten multi-morbid geriatric patients with COPD was examined over 5 days using a new novel device that is worn around the waist that specifically stimulates the diaphragm muscle. The device induced slow deep rhythmic breathing in all the patients resulting in an increase in partial oxygen pressure (by 1.7%), decreased heart (by 5.8%) and breathing (by 13.8%) rates. All changes were statistically significant (p<0,05). There was a clear improvement of their general condition and feeling and therefore this device offers great potential to be used as a safe, easy to use alternative adjunctive treatment for COPD patients.

**ZUSAMMENFASSUNG** — In einer Pilotstudie an 10 multimorbiden geriatrischen Patienten mit COPD wurden die klinischen Effekte eines neuartigen Gerätes untersucht, das um die Taille getragen wird und spezifisch das Zwerchfell stimuliert. Das Gerät rief bei allen Patienten tiefe, langsame und rhythmische Atmung hervor, woraufhin der Sauerstoffpartialdruck um 1,7% stieg, die Herzfrequenz um 5,8% und die Atemrate um 13,8% sanken. Es wurde eine klare Verbesserung des Allgemeinzustandes erreicht. Das Gerät hat somit das Potential, als sichere und einfach anzuwendende adjuvante Therapie für COPD eingesetzt zu werden.

#### INTRODUCTION

*Chronic obstructive pulmonary disease (COPD)* is characterized by persistent airflow limitation that is usually progressive. It is associated with a chronic inflammatory response in the airways and lungs to noxious particles or gases. The persistent airflow limitation results from a combination of diffuse small airway disease and destruction of the lung parenchyma (emphysema). 5–10% of adults aged over 40 years have COPD, and its prevalence is expected to continue increasing in the next decade. The key risk





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factor for COPD is tobacco smoke, but occupational exposure, pollution and genetic factors also play a role. The most important symptoms of COPD are breathlessness on exertion and chronic cough with or without phlegm. Fatigue, anorexia and weight loss can arise as the disease progresses. Treatment is multimodal, including smoking cessation, treatment with bronchodilators as well as inhibitors of inflammation, physical exercise and oxygen therapy. Overall, the COPD mortality rate for men and women in Europe, age standardized to the European Standard Population, is about 18 per 100.000 inhabitants per year.

Although the progressive decline of lung function in COPD patients is irreversible using pharmacotherapy, medications can prevent and control symptoms, and reduce the incidence of COPD exacerbations.1) Medication adherence levels for COPD medications have been found to be well below the levels typically observed for treatments for other conditions.

Furthermore, COPD patients typically have multiple chronic comorbidities including conditions such as hypertension, coronary atherosclerosis, other heart diseases, lipid disorders, diabetes, osteoporosis, and sleep apnea [2].

Comorbidities contribute to the overall severity and manifestations of the disease. They can occur in mild, moderate or severe COPD and they increase the risks of hospitalization and mortality of COPD independently [3–8].

A major factor contributing to the poor compliance of COPD medication is the multiple side-effects that users suffer, such as headaches, shakiness, fast irregular heart beat, cramping of limbs, mood swings and weight gain [9]. Moreover, these patients have extreme difficulty to breathe deeply as is conditional for the use and effectiveness of the inhaled bronchodilators.

Therefore, it is of utmost importance from the patient perspective to provide an alternative treatment that can be used as a support to the prescribed medication that can increase the quality of life of these patients.

In this study we examined the use of a new active wearable diaphragm stimulating device. It is a beltshaped device that generates mechanical impulses (not electrical) with a defined frequency. It is placed around the abdominal region, adjacent to the costal arch. Within a few minutes of operation, it activates the diaphragm to contract in a rhythmic manner and induces deep abdominal breathing thereby facilitating a more efficient exchange of gases in the lungs without any effort on behalf of the patient. Furthermore, abdominal breathing is known to be accompanied by

## **STUDY OBJECTIVES**

It was the primary objective of the study to investigate the effects on patients of the device on several clinical parameters (changes to breathing, heart rate and partial oxygen pressure). The secondary objective was to report global clinical impressions.

## **STUDY SYNOPSIS**

The study was conducted at the Geriatric department of the Paracelsus-Clinic, in Adorf, Germany from April 2014 to May 2014. The number of planned and analyzed patients was 10, all female, between the ages of 71 and 92 and all signed a patient consent form. Patients had COPD with multi-morbid indications varying from diabetes Type II, hypertension, stroke, obesity and congestive heart failure. The device was used twice a day for 20 minutes for 5 days. Clinical parameters were reported at the end of each day from 5 days.

## RESULTS

Using the device resulted in an increase in partial oxygen pressure by 1.7%, decreased heart rate by 5.8% and breathing rate by 13.8%. These beneficial effects were already visible at the end of the first day of treatment. All changes were statistically significant (p<0,05).

All (except one) patients reported an improvement in general condition and feeling. The one patient reported an unpleasant feeling caused by the impulse pattern in the abdomen.

Two patients had bowel movement again. No safety issues were observed.

	Heart Rate		Breathing Rate		Saturated Oxygen Levels (%)		
	Before After		Before	After	Before	After	
Mean	83,8	78,9	17,7	15,2	93,7	95,2	
SD	15,9	13,5	1,8	1,7	1,3	1,9	

**Table 1.** Effect of using the Belt Device on clinical parameters

N=10

Before = prior to using device on Day 1

After = following 2nd treatment with device on Day 5

increased parasympathetic activity [10]. This activity is characterized by an improved oxygen consumption, decreased heart rate, and decreased blood pressure, as well as increased theta wave amplitude in EEG recordings, accompanied by the experience of alertness and reinvigoration [10].

#### CONCLUSION

The diaphragm stimulating device demonstrated an improvement in the tested parameters of co-morbid COPD patients, especially in slowing the breathing rate and increasing the blood oxygen saturation levels. These effects were already observable with the first day of use and remained constant throughout the study. The results strongly underscore the importance of diaphragmatic breathing and its multiple physiological benefits to the health of patients suffering from COPD and other co-morbidities.

The device also showed that it is easy to use, comfortable for patients and without concern for unwanted side-effects.

Further studies are needed to confirm these findings and to evaluate the benefits of the device in the therapy of COPD.

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## CLINICORADIOLOGIC CHARACTERISTICS OF PATIENTS WITH RENAL TUBERCULOSIS

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ABSTRACT — In recent years there has been an increase in the incidence of extrapulmonary tuberculosis, often occurring under clinical simulation of various nonspecific diseases. Among extrapulmonary forms urogenital tuberculosis predominates. In addition to social significance, the medical and social problem of nephrotuberculosis and tuberculosis of the genital organs is caused by the late diagnosis of these conditions, when conservative treatment becomes ineffective, thus causing disability and social disadaptation in working age patients. This article aims to increase the alertness of general practitioners to early detection of tuberculosis.

**KEYWORDS** — tuberculosis of the kidneys, urogenital sphere, disability, diagnosis.

## RELEVANCE

In the structure of extrapulmonary forms of tuberculosis, tuberculosis of the genitourinary system occupies a leading position; its share in different countries is 30-40% [6]. Abroad in patients who have ever undergone pulmonary tuberculosis, renal tuberculosis develops in 8-10% of cases [5]. In the Russian Federation, the number of patients with extrapulmonary forms of tuberculosis varies and does not tend to stabilize: on the contrary, there is an increase in the number of newly diagnosed patients with nephrotuberculosis. The discrepancy between the dynamics of the incidence rate of respiratory tuberculosis and extrapulmonary localization is due to the lack of detection and diagnosis of extrapulmonary tuberculosis, especially in the early stages in the absence of manifestation of the pulmonary process.

According to the literature, genitourinary tuberculosis manifests, averagely, in 5 years after the primary infection in 75% of cases, and in 25% of cases this period lasts 15 years or more [7].

One of the causes of torpid, sometimes prolonged course of tuberculosis of urogenital organs, is not always justified use of fluoroquinolones having tuberculostatic effect, which leads to the formation of atypical forms of Mycobacterium tuberculosis with weakened virulence and altered morphological properties. In such situations, extrapulmonary tuberculosis often oc-



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curs under clinical simulation of other diseases and is diagnosed at the last stage of tubercular process, when conservative treatment has little effect. It should be noted that about a quarter of patients have multidrugresistant strains of Mycobacterium tuberculosis, which significantly complicate medical treatment, worsens the prognosis of the disease and causes a high percentage of organ-resecting operations leading to disability of patients.

Therefore, it is necessary to introduce practical health care strategies to improve clinical and diagnostic measures for early detection of extrapulmonary tuberculosis and its timely and effective treatment.

Aim

To determine the prevalence, clinical peculiarities of genitourinary tuberculosis and to evaluate its interaction with the pulmonary localization of a specific process.

### MATERIALS AND METHODS OF STUDY

The research was approved by the ethical committee of Astrakhan State Medical University. Protocol No 2 from March 18, 2014. In our work with patients we followed the ethical principles laid down by the Helsinki Declaration of the World Medical Association (1964, 2000). Voluntary informed consent of all patients for participation in the research was obtained.

The study involved 26 patients with tuberculosis of the urinary system, undergoing hospital treatment in Astrakhan Regional Clinical Antituberculosis Dispensary in 2016: 18 males (69,2%), 8 females (30,8%). The age of the patients ranged from 25 to 46 years. There were 12 residents of Astrakhan (46,2%), 14 residents of the Astrakhan Region (53,8%); 17 newly diagnosed patients (65,4%), 9 patients with recurrence (34,6%). Non-employed persons amounted to 74%. Contact with a person infected with tuberculosis was traced in 11 (42.3%) patients. There were 4(15.4%)patients in penitentiary institutions, 2(7.7%) patients from the focus of death, 5 (19,2%) patients from family contact . Out of 26 patients, 17 (65.4%) started treatment with specific drugs for the first time. The treatment was carried out according to the specified standard modes of anti-tuberculosis chemotherapy, in particular, the draft amendments "Instructions for chemotherapy of TB patients" — Appendix No 6 to the Order of the Ministry of Health of the Russian Federation No 109 from March 21, 2003 "On improvement of anti-tuberculosis measures in the Russian Federation", Order of the Ministry of Health and Social Development No 109 from March 21, 2003 "On improvement of anti-tuberculosis measures in the Russian Federation", "The concept of chemotherapy and etiological (microbiological and molecular biological) diagnosis of tuberculosis in the Russian Federation at the present stage", developed in 2011 in Moscow, Order of the Ministry of Health of the Russian Federation No 951 from December 29, 2014 "On approval of methodological recommendations for improving the diagnosis and treatment of pulmonary tuberculosis."

## **RESULTS AND DISCUSSION**

Extrapulmonary tuberculosis was identified in 16 (61.5%) patients who were seeking medical assistance and had complaints, in 10 (38.5%) patients by means of fluorography. According to clinical forms of urogenital tuberculosis, patients were distributed as follows (Table 1).

Table 1 shows that the tubercular papillitis was diagnosed more often — 19 cases (73,1%) (r = 0.9; p < 0.01).

The distribution of clinical symptoms in patients with tuberculosis of the urogenital system is shown in Table 2.

The coupling of the urinary system tuberculosis with pulmonary localization of a specific process was revealed in 9 cases (34,6%).

A radiological picture of a specific process in the pulmonary tissue was characterized in the majority of cases by an extensive (lobar, polysegmental) lung tissue involvement — 7 (26,9%) (r = 0,7) and by a limited (within 1–2 segments), often unilateral damage — 2 (7.6%) (r = 0,9).

The frequency of concomitant pathology in patients is shown in Table 4.

Table 4 shows that socially significant diseases such as alcoholism (17 (65.4%) (r = 0.5)), diabetes mellitus and symptomatic hypertension were more often detected in the group of patients with isolated urinary tract infection.

In addition, the attention was paid to the fact of untimely diagnosis of renal tuberculosis due to a prolonged dispensary observation of patients in the general treatment network for nonspecific diseases. Prolonged course of the diseases torpid to conventional management is likely to get the attention of general practitioners to a specific damage of the urinary tract.

Microscopic examination of urine for the presence of Mycobacterium tuberculosis (MBT), was positive in 55 patients (82.1%), by the method of inoculation of medium was confirmed in 100% of cases. Drug susceptibility of Mycobacterium tuberculosis to antituberculosis drugs is preserved in 44 (65.7%) cases, mono resistance to isoniazid in 1 (1.5%) case, multid*Table 1.* Distribution of patients with the urinary tract tuberculosis according to clinical forms

Clinical form of tuborcularia	Number of patients				
	abs	%			
Cavernous renal tuberculosis	7	26,9			
Tuberculous papillitis	19	73,1			
Total	26	100			

**Table 3.** The incidence of the urinary tract tuberculosis in combination

 with tuberculosis of the respiratory system

	Form of tuberculosis of the respiratory system							
Form of urogenital	Disseminated		Infiltrative		Cavernous			
tuberculosis	abs	%	abs	%	abs	%		
Cavernous renal tuberculosis	-	-	-	-	1	3,8		
Tuberculous papillitis	6	19,2	2	7,6	-	-		
Total	6	23	2	7,6	1	3,8		

**Table 4.** The frequency of concomitant pathology in patients with isolated urinary tract involvement and the associated pulmonary localization of a specific process

Concomitant pathology	Patien with is urinar infect	its solated y tract ion	Patients with con- jugate pulmonary localization of a specific process		
	abs	%	abs	%	
Anemia	4	15,4	1	3,8	
Alcoholism	17	65,4	5	19,2	
Symptomatic hypertension	8	30,8	2	7,6	
Kidney disease (history of pyelonephritis)	7	26,9	5	19,2	
Drug addiction	1	3,8	1	3,8	
Diabetes mellitus	6	23,1	4	15,4	
Syphilis	4	15,4	1	3,8	

rug resistance to isoniazid and ethambutol in 2 (3%) cases, isoniazid and pyrazinamide — in 1 (1.5%) case, and in 8 patients (11.9%), multiple drug resistance was determined (simultaneous resistance to isoniazid and rifampicin).

## CONCLUSIONS

Tuberculosis of the urinary organs is widespread, both in the Russian Federation and, in particular, in the Astrakhan region. Pulmonary papillitis with a subclinical course is predominantly present. Comor**Table 2.** Severity of clinical symptoms in patients with the urinary tract

 tuberculosis

Gummtome	Number of patients			
Symptoms	abs	%		
Weight loss	4	15,4		
Weakness	8	30,8		
Subfebrile body temperature	10	38,5		
Night sweats	2	7,7		
Loss of appetite	3	11,5		
Frequent urination	9	34,6		
Hematuria	6	23,1		
Pain in the lumbar region	7	26,9		
Arterial hypertension	8	30,8		
Objective data: satisfactory state	21	80,8		
the state of moderate severity	5	19,2		

bid pathology are diseases that are of medical and social importance, such as diabetes mellitus, anemia, alcoholism, symptomatic hypertension, which, in the presence of symptoms of intoxication and torpidity of general clinical treatment, may be the reason for targeted search for specific damage to the organs of the urinary system.

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## LIFESTYLE RISK FACTORS FOR CHRONIC NON-COMMUNICABLE DISEASES IN AN INNER BRAZILIAN CENTRAL-WESTERN MUNICIPALITY

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**ABSTRACT** — AIMS: to study the epidemiology of lifestyle risk factors among a population from a municipality of the Central-Western Brazilian region. METHODS: a validated food frequency and lifestyle questionnaire (smoking, alcoholic drinking, sleep) were applied to adults from 18 to 70 years old of a Central-Western Brazilian municipality. RESULTS: More men (26.8%) than women (14.3%) declared drinking three or more days per week (p=0.0006). Considering sleeping hours, 18.5% and 21.4% of men and women slept only up to 5 hours per night with no statistical difference. Only 4.6% of men and 10% of women eat five portions of fruits each day. The frequency of meat consumption of 5 to 7 days per week reached 61.4% for women and 67.6% for men. Furthermore, only 5.7% and 9.3% of women and men (respectively) had eaten two portions of cereals almost every day. In respect of consumption of fried foods by 5 to 7 days per week, men (50.93%) did it more than women (27.2%), with p<0.0001. Finally, women consumed more bakery, candies and sweeties than men 5 to 7 days per week. CONCLUSIONS: although consumption of fruits, vegetables and legumes was lower, excessive intake of meat and its products, as well fried foods and bakery foods/candies/sweeties were found in the present study.

**KEYWORDS** — sleep, fried foods, foods of confectionery, fruits, legumes, meat.

## INTRODUCTION

In only three decades there was an incredible rise in both incidence and prevalence of overweight, obesity and metabolic syndrome among Brazilians (Schmidt et al., 2011). Although the obesity epidemic is influenced by different risk factors, certainly the most important factor is the unfavorable change of the traditional Brazilian diet to Western diets, especially those rich in processed and ultraprocessed foods (Schmidt et al., 2011; Martins, Levy, Claro, Moubarac & Monteiro, 2013; Louzada et al., 2015).

According to the "National Health Study", a population-based Brazilian study, about 40% of Brazilians eat excessive amounts of meat and its products, a great proportion of the population regularly enjoy soft



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drinks (25%), and fifth of the population regularly eat bakery foods, candies and sweeties, both eating habits which unfavorably increased the risk of development of chronic non-communicable diseases (CNCD) among Brazilians (Claro et al., 2015).

Recently, the burden of chronic non-communicable diseases and its risk factors among Brazilians were also pointed out by another important epidemiologic survey, the Vigitel (Malta et al., 2015; Malta et al., 2016), as well as other regional and local studies.

In this manner, unhealthy lifestyles such as physical inactivity, smoking, alcohol abuse, inadequate intake of fruits and vegetables, associated with several socio-environmental factors, such as low income and poor educational level, precarious working conditions, lack of leisure opportunities, lack of or insufficient social support, poor quality of health information available to the general public, and other crucial issues have contributed to the development of CNCD in the Brazilian population (Sá & Catarina, 2010; Dias et al., 2011; Schmidt et al., 2011; Galego et al., 2014; Farias jr et al., 2014; Garcia & Freitas, 2015; Malta et al., 2015; Azevedo & Silva et al., 2016).

Nevertheless, CNCDs continue to be important causes of premature mortality and high treatment costs for the population and the Brazilian National Health System (SUS) (Alves & Morais Neto, 2015; Tavares et al., 2015).

Then, due the scarcity of studies regarding food consumption and other lifestyle risk factors in inner

regions, the objective of the present study was to study the epidemiology of lifestyle risk factors among a population from a municipality of the Central-Western Brazilian region.

#### **METHODS**

Bom Jardim de Goiás, located at  $16^{\circ} 12' 36'' \text{ S}$ ,  $52^{\circ} 10' 19'' \text{ W}$  (GeoHack, 2018), has 8,423 inhabitants and a population density of 4.55 inhabitants/km<sup>2</sup>, and is located in middle-west region of the Goiás state – Brazil (IBGE, 2018).

Considering the population of the Bom Jardim de Goiás and a confidence level of 95%, the sample size needed was estimated in 368 inhabitants by the use of the survey system software (https://www.surveysystem.com/sscalc.htm).

However, the final sample comprised 534 subjects (210 women, and 324 men) from 18 to 70 years old. Socioeconomic characterization of the population is show in Table 1.

**Table 1.** Socioeconomic characterization of the studied population from

 Bom Jardim de Goiás, GO, Brazil, 2018

Variable	Categories	Ν	%
Age	18–34	287	53.75
	34–59	194	36.33
	≥60	53	9.92
Education	Illiterate	40	7.5
	Fundamental	246	46
	High school	227	42.5
	College	21	4
Ethnicity	Afrobrazilian	229	42.9
	Caucasian	282	52.8
	Indigenous	23	4.3
Gender	Female	210	39.3
	Male	324	60.7
Familial income*	$\leq$ 1 M.S.	251	47
	$\geq$ 1-2 M.S.	131	24.6
	> 2 M.S.	122	22.8
	Not answered	30	5.6

\* In National base salaries per month (US\$281.00)

In January 2018, the Brazilian minimum salary was R\$954.00 which is equivalent to US\$281.00 according to the Ministry of work and employment (http://portal.mte.gov.br/sal\_min/).

The inclusion criteria were to be willing to participate in the study and sign the informed consent form. Exclusion criteria were the refusal to participate in the study, as well as being bedridden, invalid, pregnant or lactating.

In order to evaluate food habits, sleep, and other lifestyle risk factors, a dietary questionnaire regarding food frequency intake was used (Spanhol & Ferrari, 2015). The instrument was adapted from previously validated food frequency and daily habits questionnaires (Vieira et al., 2002; Spanhol & Ferrari, 2015). Questionnaires were applied between November 2017 and April 2018.

#### Ethical and statistical aspects

Before engaging into the research people received an explanation regarding the procedures and they signed a written informed consent. This study is a subsample from study "The Epidemiology and Risk Factors of Chronic Non-Communicable Diseases: Development and Application of a Health Promotion Scale (HPS) which was approved by the Ethics Committee on Research of the "Campus Universitário do Araguaia" from "Universidade Federal de Mato Grosso (UFMT)" (protocol CAAE: 62989416.1.0000.5587). Statistical analysis was done using the program Epitools" (Australia). In order to correct, standardize and balance the samples by gender, a two-tailed, 2-proportion z-test was performed. Statistical significant differences were considered when p<0.05.

## RESULTS

In accordance with national profile, smoking behavior is decreasing. Among women, only 10% declared smoking, whereas 25,9% of men did it. This difference was significant with p<0.0001.

In respect of alcoholic drinking, more women (51.4%) than men 31.5% declared not drinking which was significantly different with p<0.0001. The proportion of women and men which drunk up twice per week was 34.3% and 41.7%, respectively, with no significant difference (p=0.0865). Beyond that, more men (26.8%) than women (14.3%) declared drinking three or more days per week (p=0.0006) (Fig. 1).

Considering sleeping hours, 18.5% and 21.4% of men and women slept only up to 5 hours per night with no statistical difference (p=0.4086). Furthermore, more women (57%) than men (44.4%) slept up to 7 hours/night (with p=0.004). More men slept eight hours or more compared to women (p=0.0001) (Fig. 2).

In respect of daily intake of five portions of fruits, 41.4% of women and 50.9% of men did it only once per week. Furthermore, only 4.6% of men and 10% of women eat five portions of fruits each day. Other fruit consumption patterns are presented in Fig. 3. There was no difference comparing women to the men.

On contrary to fruit consumption, meat and meat products eating was higher amongst the subjects. The frequency of meat consumption of 5 to 7 days per week reached 61.4% for women and 67.6% for men. Other meat and meat products consumption patterns are presented in Fig. 4.

Women tend to drink milk and eat dairy foods more than men (Fig. 5). However, as observed in that figure, only 21.3% of men and 30% of women consume milk or dairy in a daily basis.

More men (25%) than women (15.7%) did not eat cereals (p=0.01). After all, only 26.8% of men and 40% of women ate 2 portions of cereals once per week. Furthermore, only 5.7% and 9.3% of women and men (respectively) had eaten two portions of cereals almost every day (Fig. 6).

The consumption of two portions of legumes was also lower, since 35.7% of women and 32.4% of men did it once per week. However, considering the consumption of 2 portions of legumes by 2 to 4 times per week, the frequency of intake was higher among men (56.5%) compared to women (37.1%) (p<0.0001), whereas adequate consumption of legumes, e.g., 5 to 7 times per week was higher among women (20%) than man (5.5%) (p<0.0001). Other aspects are presented in Fig. 7.

If consumption frequencies of fruits, legumes and cereals were lower, the daily intake of fried foods and bakery, candies, and sweeties were higher.

Considering the consumption of fried foods by 2 to 4 days per week, women (45.7%) eaten more compared to the men (15.74%) with p<0.0001. On the contrary, observing the consumption of fried foods by 5 to 7 days per week, men (50.93%) did it more than women (27.2%), with p<0.0001 (Fig. 8).

Very interesting was an inverse pattern of consumption of bakery foods, candies, and sweeties among women and men. Although more men (51.9%) than women (30%) (p<0.0001) eaten bakery, candies and sweeties by 2 to 4 days per week, more women (50%) than men (19.4%) did it by 5 to 7 days per week. (Fig. 9).

#### DISCUSSION

In the present study, smoking prevalence was higher among more men (25,9%) compared to women (10%). Our results differ from the results from the ELSA-Brazil cohort study which reported prevalence of smoking of 14.4% for men and 12.2% for women (Faleiro et al., 2017).

In respect of alcoholic drinking, more women (51.4%) than men (31.5%) declared



Fig. 1. Frequency of drinking of population from Bom Jardim de Goiás, Brazil



Fig. 2. Sleeping hours of population from Bom Jardim de Goiás, Brazil



Fig. 3. Consumption of 5 daily portions of fruits by week in the population from Bom Jardim de Goiás, Brazil



*Fig. 4.* Consumption of meat and meat products by week in the population from Bom Jardim de Goiás, Brazil



*Fig. 5.* Consumption of milk and dairy foods by week in the population from Bom Jardim de Goiás, Brazil



*Fig. 6.* Consumption of 2 daily portions of cereals by week in the population from Bom Jardim de Goiás, Brazil



*Fig. 7.* Consumption of 2 daily portions of legumes by week in the population from Bom Jardim de Goiás, Brazil



*Fig. 8.* Consumption of fried foods by week in the population from Bom Jardim de Goiás, Brazil



**Fig. 9.** Consumption of bakery foods, candies and sweeties by week in the population from Bom Jardim de Goiás, Brazil

not drinking, and the prevalence of alcoholic drinking was higher amongst men than women. This gender difference is in accordance with the National Health Study-NHS (Machado, Monteiro, Malta & Lana, 2017). However, the prevalence of alcoholic use in the present study was higher compared to the NHS.

Still regarding alcoholic drinking, the current results are similar to those found in Barra do Garças (MT state), a nearby city (Spanhol & Ferrari, 2016). The prevalence of alcoholic drinking of women

Considering sleeping hours, 18.5% and 21.4% of men and women slept only up to 5 hours per night. Sleeping less than 7–8 hours per night increases the risk and severity of both anxiety and stress-related symptoms (Almondes & Araújo, 2003; França et al., 2011).

Sleeping less than 8 hours, especially 5 hours or less, raises the risk and mortality by hypertension, type 2 diabetes, obesity and cardiometabolic syndrome (Chaput, McNeil, Després, Bouchard & Tremblay, 2013, Colwell & Matveyenko 2014; Tamakoshi & Ohno, 2004; Tufik, Andersen, Bittencourt & Mello, 2009; Santos, Ferrari & Ferrari, 2015; Wu et al., 2012).

In the present study, about 38% adequately consumed fruits from 2 to 4 days per week, and only 4.6% of men and 10% of women eat five portions of fruits each day. Results of the current study were in accordance with the ELSA-Brazil cohort study which observed that men ingested less fruits and vegetables than women (Faleiro et al., 2017). This gender difference was also reported in a nearby city from Legal Amazon (Spanhol & Ferrari, 2016).

On contrary to fruit consumption, meat and meat products eating was higher amongst the subjects. The frequency of meat consumption of 5 to 7 days per week reached 61.4% for women and 67.6% for men. These results are similar to those found in another study covering health professionals from three nearby municipalities of the same region (Wadi & Ferrari, 2017).

Women tend to drink milk and eat dairy foods more than men, but regular intake of milk and dairy was lower. Data from the current study corroborates a previous report in nearby municipalities (Wadi & Ferrari, 2017). A national survey also reported more consumption of dairy and milk by women in relation to the men (Possa et al., 2017).

Intake of milk and dairy foods of this study was also lower than the observed in Sao Paulo, Southwest Brazil (Ferrari & Ferreira, 2011).

More men (25%) than women (15.7%) did not eat cereals (p=0.01). After all, only 26.8% of men and 40% of women ate 2 portions of cereals once per week. The daily consumption of two portions of cereals was only 5.7% and 9.3% among women and men, respectively.

Considering the consumption of 2 portions of legumes by 2 to 4 times per week, the frequency of intake was higher among men (56.5%) compared to women (37.1%), whereas adequate daily consumption of legumes was higher among women (20%) than man (5.5%). A similar lower pattern of intake of legumes was found in a previous study covering the same geographic region (Wadi & Ferrari, 2017).

According to the Interheart, a cohort of 52 world's nations, it is very important to note that an adequate intake of vegetables and fruits comprises one of the most important modifiable factors that can materially diminish the risk for myocardial infarction (Yusuf et al., 2004).

If consumption frequencies of fruits, legumes and cereals were lower, the daily intake of fried foods and bakery, candies, and sweeties were higher.

Considering the consumption of fried foods by 2 to 4 days per week, women (45.7%) eaten more compared to the men (15.74%). On the contrary, observing the consumption of fried foods by 5 to 7 days per week, men (50.93%) did it more than women (27.2%). These data revealed a very excessive intake of those foods even when compared with a previous study developed in the same region (Wadi & Ferrari, 2017).

Very interesting was an inverse pattern of consumption of bakery foods, candies, and sweeties among women and men. Although more men (51.9%) than women (30%) (p<0.0001) eaten bakery, candies and sweeties by 2 to 4 days per week, more women (50%) than men (19.4%) did it by 5 to 7 days per week. The prevalence of consumption of bakery, candies and sweeties was very higher compared to the national prevalence as noted in the VIGITEL study (Malta et al., 2015). The consumption of bakery, candies and sweeties was also very higher compared to data from the NHS (Claro et al., 2015).

#### CONCLUSION

In this population from Central-Western Brazil the consumption of fruits, vegetables, cereals, legumes and milk/dairy products is not adequate and there is an excessive intake of fried foods and bakery, candies and sweeties. Those eating habits increase the risk for chronic non-communicable diseases.

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# ENDOTHELIAL DYSFUNCTION IN THE ANAESTHESIOLOGIST'S PRACTICE

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**ABSTRACT** — A detailed review offers an overview of the theoretical and practical aspects of endothelial functions and conditions for the endothelial dysfunction. It also covers the surgical and anaesthetic issues of the endothelial dysfunction formation.

**KEYWORDS** — endothelium, endothelial dysfunction, vasodilation, arterial hypertension.

Anaesthetic support is considered adequate for a given operation on a particular patient if it allows to maintain the compensatory abilities of the body in the course of an operative intervention without causing any pathological reactions at the same time (V.L. Vanevsky, 1983).

The purpose of the review is to study the possibility of influencing the processes of endothelial dysfunction as an adequacy factor of anesthesia.

## THEORETICAL ASPECTS

The role of the endothelium in the regulation of body functions. Endothelium is a monolayer of epithelial cells that participates in the immune function, stabilisation of the vascular tone and structure of the vascular wall (1). In anaesthesia, the most important effects are those that affect the vascular tone. The importance of this function is confirmed by the fact that the degree of risk of occurrence of cardiovascular events is determined by the vasodilatation potential of the endothelium (2).



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Endothelium executes its functions through the release of nitric oxide (NO) and the activity of the nitric oxide synthase (eNOS). Depending on the con-

ditions, they may have the opposite direction (dilation – spasm, hemostasis – antithrombotic activity, etc.).

Since the endothelium covers all the vessels, its functions are manifested in all parts of the channel, including microcirculation (MCR). With a uniform contribution to the total spectral activity (20% for the neurogenic, endothelial and myogenic links) (3), the endothelium integrates the effects of all effects on the vascular wall (4). In this sense, any changes in homeostasis are triggers in the formation of the endothelial dysfunction. Stress (including surgery), hypoxia, endotoxemia and other conditions lead to the degradation of the nitric oxide with the formation of peroxynitrite. The consequence is angiospasm and cytotoxic processes.

Conditions for the development of the endothelial dysfunction. The vascular endothelium, occupying a "strategic" position, accepts the action of the damaging factors (5). All processes, accompanied by a decrease in the synthesis and bioavailability of the nitric oxide, are manifested in violation of the vasodilation, the main mechanism of the endothelial dysfunction (6).

The endothelial dysfunction of the arteries is considered to be one of the integral mechanisms of the formation of hypertension. Excess production of free radicals overcomes the protective mechanisms of the antioxidant system as a result of changes in the endothelial function of the vessels: endotheliumdependent vasodilation; the synthesis of adhesive molecules and growth factors increases, the platelet aggregation and thrombosis grows and the apoptosis is accelerated (7). In response to stress, there is an imbalance between the depressor and pressor vascular influences with a predominance of the constrictor component (8).

The vascular endothelium, controlling the vascular tone, is influenced by the hemodynamics in its turn. In the normal condition, the pulse wave increases the shear stress (which in turn is inversely proportional to the viscosity and directly proportional to the blood flow velocity), increasing NO production and expanding the arteries. The resultant reverse rebound blood flow leads to the development of the main component of increased pulse blood pressure – isolated systolic hypertension; there is a violation of the rhythmic NO production, creating conditions for the development of the endothelial dysfunction (9).

## ENDOTHELIAL DYSFUNCTION AS A RESULT OF THE DEVELOPMENT OF THE MAIN (SURGICAL) PATHOLOGY

During the development and treatment of the surgical pathology, the stress of the endothelial functions to the degree of the dysfunction occurs in cases associated with the development of endotoxemia and the use of antibiotics. Both processes are caused by the treatment of a surgical infection, an antibiotic therapy, intestinal microbiocinosis disorders and the surgical stress (10). As a result of the endotoxin aggression and the antibiotic-induced endotoxinemia, conditions are created for the manifestation of the endothelial dysfunction. A special place is given to the dysfunction resulting from the endotoxin aggression in developing peritonitis and the dysfunction that persists in the remote period (11).

#### ENDOTHELIAL DYSFUNCTION IN THE FORMATION AND CORRECTION OF A CONCOMITANT PATHOLOGY

Arterial hypertension is the most frequent concomitant pathology and one of the main factors of the cardiovascular risk. Doubling cardiovascular and fatal events, it is one of the main causes of death in Europe (12).

For the anesthetist, a hypertensive patient is a common situation in which it is necessary to assess the risk and depth of the cardiovascular system and select the pharmacological load and the anaesthesia/analgesia program (13). It is not only necessary to take into account the effects of the arterial hypertension on the perioperative period but also those of the corrective therapy and the methods of anesthesia. In this case, the severity of the arterial hypertension is associated with the intensity of its correction. It is believed that the inclusion of diuretics in pharmacological combinations is a factor which determines the severity of the arterial hypertension and the aggressiveness of its correction (14).

Being one of the most common causes of the postponement of operations, arterial hypertension is not a strong independent risk factor for cardiovascular complications in a non-cardiac surgery (15). Changes in target organs is the event that translates arterial hypertension from the risk factor category into the category of cardiovascular complications (CCC). First, there are complications of the concomitant pathology, then there are complications of the postoperative period. The endothelial dysfunction is aggravated by a decrease in its ability to produce vasodilating substances; there are ischemic changes in the kidneys and the heart; blood rheology and tissue metabolism worsen (16).

The leading place in the normalisation of the endothelial function is the pharmacological correction. The positive effect on the endothelial function of most cardiological drugs – statins, calcium antagonists, angiotensinconverting enzyme inhibitors, diuretics,  $\beta$ -adrenoceptors, antiplatelet agents and so on (17), as well as antioxidants and NO donators (4) – has been proven. Attention is drawn to the fact that the recommendations of the pharmacological strategies for the management of cardiac patients in the perioperative period include drugs that directly or indirectly affect the total dilution potential. The vast majority of the medically induced influences also have a vasodilatory orientation.

## ENDOTHELIAL DYSFUNCTION UNDER OPERATIONAL STRESS

A high level of the neuroendocrinal tension, accompanied by a significant intensification of the metabolism, and pronounced shifts in hemodynamics – this is the essence of the body's reaction to the aggression during surgery (18). Under conditions of the operational stress, the endothelial response affects various systems.

The primary reaction of the peritoneum to the operating injury is a change in the functional state of its microcirculation (19). In this case, the greatest decrease in the rate of the local peritoneal blood flow to a standard operating injury is observed on the 2nd day of the postoperative period. The stress response of the *peritoneum* is associated with the development of the endothelial dysfunction of its vessels (20). The severity of the dysfunction directly depends on the volume of the operating injury and the timing of the recovery of the marker levels, which suggests their connection with the NO dynamics.

Surgical tissue damage with vegetative imbalance, deficiency in the volume of blood circulation, imbalance between prothrombotic and fibrinolytic factors and an increase in an intra-abdominal (pneumoperitoneum) and intrathoracic (Trendelenburg position) pressure are manifested by the neuroendocrine response of body systems (21). Stress and restriction of the functional capacity of the endothelium, without proper protection, are summarised in the hemodynamic and thrombotic changes.

### THE IMPACT OF ANAESTHESIA ON THE DEVELOPMENT AND SEVERITY OF THE ENDOTHELIAL DYSFUNCTION

One of the important tasks of an anesthesiologist is to create emotional comfort in a patient. It is emotional stress that can serve as the first and provoking episode of the endothelial dysfunction. It has been established that pronounced disturbances in the endothelial function and psychoemotional status are present in patients with a combination of arterial hypertension and coronary heart disease – a frequently occurring group of patients (22). With the development of a hypertensive reaction to the emotional load, the formation of the endothelial dysfunction was not different from that of the arterial hypertension (23).

Since arterial hypertension is the most common concomitant pathology, when choosing an anesthesia program, it is necessary to take into account the combination of anesthesia and arterial hypertension (15) – with high individual sensitivity to drugs (24).

Electrolyte and cellular confirmations of the endothelial dysfunction as a result of the operational stress have been obtained in (25), despite the use of preparations with pronounced vasopligic action in the structure of anesthesia. The use of an antioxidant significantly reduced the manifestation of the endothelial dysfunction. It is hard to escape the conclusion that the influence of the means of anesthesia on the NO homeostasis is insignificant. However, in experimental studies, propofol has a direct vasodilating effect on coronary rats with stabilisation of the endothelial structures (26), mediated by NO release by the endothelium. In the process of the ischemia-reperfusion, propofol exhibits organoprotective properties (27). It is interesting to note that the protective effect of propofol can be disturbed by the use of nitroglycerin, which is manifested in the stimulation of the release of the tumor necrosis factor (28).

Most clearly the components of the anesthetic benefit affect the endothelial dysfunction when they are manifested by vascular reactions. In this case, the hemodynamic potential of anesthesia-analgesia techniques is different and should be taken into account when choosing tactics.

Thus, endothelium, participating in the formation of hemodynamic reactions at various stages of the perioperative period, regulates the vascular tone which is associated with the homeostasis of the nitric oxide produced by the endothelium. In this sense, the endothelium of the vessels is not only responsible for operational risks and the course of the intraoperative period but also for the provocation of pathological conditions of the distant postoperative period. Taking into account the main and concomitant pathology and surgical intervention, the total endothelial potential has a destructive orientation. An adequate anesthesia approach that provides a *hemodynamic corridor* has a protective character.

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## NON-REMOVABLE ARCH ORTHODONTIC APPLIANCES FOR TREATING CHILDREN WITH CONGENITAL MAXILLOFACIAL PATHOLOGIES — EFFICIENCY EVALUATION

#### Vladimir Shkarin, Boris Davydov, Dmitry Domenyuk, Sergey Dmitrienko

Congenital malformations are viewed as the most relevant urgent medical and social issues, which is the due to their high prevalence and the severity of morphological and functional changes in newborns. One of the varieties of the cleft alveolar process is a unilateral cleft where the jaw bones fragments are displaced, which is reflected in the dental arches linear parameters [1]. Numerous research methods have been proposed for diagnosis and the choice of treatment, where the leading one is the biometry of jaw stone models [2, 3, 4, 5, 6]. Treating children with congenital pathologies, as a rule, is complex and long-term. When treating children, primary teeth are fixed with non-removable elements shaped as thin-walled metal crowns, which impedes biometric examination and interpretation. Rationally explained expansion of the indications for jaw models biometric examination through the stages of orthodontic treatment would allow not only objective evaluation of the effectiveness of instrumental treatment aimed at optimizing the shape, dental arches dimensions, and occlusal connection, yet would also increase significantly the diagnostic value of morphometric study of dental arches in orthodontic practice, producing meaningful outcome for dentistry.

AIM. To identify the dynamics of change in the biometric parameters of the primary occlu-sion dental arches through the treatment of children with unilateral cleft alveolar process.

MATERIALS AND METHODS. A biometric study of dental arches was carried out on 37 children with unilateral cleft upper lip and alveolar process at the stage of the completely developed occlusion (4–6 years). The measurements were performed before and during the retention period of orthodontic treatment, with the edgewise technique being employed through the treatment. The prescription of the braces as well as the size of the metal arches selection was done in view of the primary occlusion specifics. The braces were soldered to metal thin-walled crowns, which were fixed on the primary teeth. After that, impressions were taken to obtain stone models, on which the linear parameters were measured. In the retention period, impressions were also obtained with the crowns to further carry out the biometrics, which eliminated any potential measurement errors since the measurements were carried out under the same conditions. At the biometric measurements of the jaw models, the intermolar distance was taken as the conventional midline of the upper jaw dental arch, from the middle of which a midline was drawn, which served as the reference for measuring the sagittal dimensions and allowed identifying the position of the interincisal point. At the same time, the diagonal dimensions of the dental arch were measured from the interincisal point to the canines and second primary molars.

**RESULTS AND DISCUSSION.** The biometric measurement of the jaw stone models of the children with unilateral cleft alveolar process showed that after the treatment using non-removable orthodontic edgewise appliances there were significant changes in the major linear parameters of dental arches. The greatest changes were observed in the dental arches anterior section. On the intact side of the upper jaw dental arch, the difference in the transverse dimensions measured from the midline to the canines cusps was not significant  $(p \ge 0.05)$  and was, before the treatment,  $14.71 \pm 0.46$ mm, while after the treatment it was  $16.42 \pm 0.42$  mm. At the same time, at the cleft alveolar process side, the difference was significant  $(p \le 0.05) - 11.49 \pm 0.79 \text{ mm}$ and  $16.36 \pm 0.51$  mm before and after the treatment, respectively. In general, the width between the primary canines matched the age norm, since the arches dimensions used in the treatment were selected taking into account individual maxillofacial features. The changes in the anterior section revealed themselves in sagittal dimensions. The arch depth after the treatment increased significantly. There was a change in the interincisal point position observed, which coincided with the facial aesthetic center line. The dental arch depth was about 9.5 mm and there were no significant differences identified between the indices on each side. For the same reason, there was an increase in the overall dental arch depth and the diagonal dimensions on both sides. The dental arch depth on the intact side before the treatment was  $23.72 \pm 0.84$  mm, while after the treatment it went up to  $25.57 \pm 0.42$  mm. On the cleft side, the values were  $25.57 \pm 0.42$  mm and 25.44 $\pm 0.48$  mm, respectively. The greatest changes in the

diagonal dimensions of the arch anterior sec-tion and the entire dental arch significantly increased on the side of the cleft maxillary alveolar process. Before the treatment, the frontal canine diagonal was  $13.41 \pm$ 0.85 mm, and after treat-ment it was  $18.23 \pm 0.37$  mm. On the intact side, the values were  $16.52 \pm 0.73$  mm and  $18.31 \pm 0.39$  mm, respectively. The front-molar diagonal on both sides was an average of 35.5 mm and matched the average age indices.

**CONCLUSION.** The obtained outcomes showed that after the treatment with non-removable orthodontic edgewise technique, there were certain changes in the basic parameters of the dental arches in children during their primary teeth occlusion, which complied with the age norm. The use of non-removable orthodontic arch appliances is an effective treatment for children with congenital maxillofacial pathologies.

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## AN UNUSUAL CASE OF SCOLIOTIC CURVE OVERCORRECTION AS THE IMPACT OF GUIDED-GROWTH IMPLANT

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**KEYWORDS** — scoliosis, spinal surgery, EOS, AIS, guidedgrowth, overcorrection.

#### INTRODUCTION

Idiopathic scoliosis with onset in children before 10 years old and defined as early-onset scoliosis (EOS). EOS remains still to be a big burden for healthcare system in general and especially for pediatric spinal surgeons [1]. EOS surgery requires a list of principles to be applied: to stop scoliotic curve progression; to preserve spinal growth and to prevent thoracic insufficiency syndrome[2]. There are 2 groups of constructs in EOS surgery, all of them are growth-friendly. One of them requires several operations to prevent spontaneous spinal fusion and includes VEPTR and growing rods. Another one consist of constructs defined as guided-growth, which do not require additional lengthening procedures and usually preserve spinal growth but not always can be reliable causing sometimes serious complications including spontaneous spinal fusion or implant failure due to their mechanical properties [3]. We are presenting unusual case of changing thoracic scoliotic curve from right-sided to left-sided using operative correction of the curve using guided-growth implant type which leaded to growth modulation on both sides of scoliotic curve. This process took 4 years and then the implant was changed to transpedicular screw fixation according to guidelines for AIS surgery developed in our department [4].

## CASE PRESENTATION

12-year-old girl entered the Department of pediatric orthopaedics Filatov Children's City Hospital in 2012 year. She developed scoliotic curve first at 7 years and diagnosis was made on regular yearly examination by pediatric orthopaedician in the children's out-patient hospital (fig. 1). There was a right-sided scoliotic curve with Cobb angle 11°. Scoliotic curve progressed to Cobb angle 21° during 3 years of once-a-half-of-the-year observation and then bracing was started. Unfortunately, young patient didn't attend regular examinations till the age of 12 years old, so scoliotic curve progressed to 60° at 12-year-old follow-up (39° in 2 years) despite bracing. The girl had the history of back pain and complained about unsightly appearance. Prominent rib hump, positive Adams test, asymmetry of shoulders, scapulae and waist triangles were found during examination. There was an S-shaped double scoliotic curve with main structural right-sided curve Th8-L2 and additional non-structural Th1-Th7 curve with the apex at Th4-level, Lenke 1A-N (fig. 1). Th5-Th12 sagittal Cobb angle was 16° with stability index value of 0,87 and Risser 1. We used CT-scan and MRI to exclude any congenital etiology of the scoliotic curve. C5-C7 herniated intervertebral discs and L2-S1 protruded discs were identified with MRI. Moderate vital capacity of the lungs decrement was identified by pulmonary function test.

Special mobilization of the spine program was used firstly to reduce stability index of the structural curve from 0,87 to 0,75, the program included physical therapy, massage, scoliosis specific exercises and distraction of the trunk using special device. Operative strategy for use of dorsal spinal implants developed in our department have been applied to choose an appropriate implant [4]. According to preserved growth potential (Risser 1) guided-growth type of implants have been chosen with up-going laminar hooks freely connecting to two bars and allowing slippage of hooks over that bars («LSZ-10» construct). This slippage provides growth-guiding preserving spinal growth [5]. Standard spinal approach was used with precisely preparation of vertebral laminae. Hooks were placed at Th1–Th2, Th4, Th7–Th9, Th11, L2–L3 levels in a free way and Th7-Th9 levels were fixed in firm way without any movement of hooks over bars of the implant. Derotational maneuver applied, then contraction on convex side and distraction on concave side carried out with special instruments. Hook-bar connections were checked for firmness and wound was closed in layers. Post-operative Cobb angle was 9° with correction rate of 85%, Th5–Th12 kyphosis angle of 21° (+5°). The girl developed 7 cm growth increment both measuring standing height (158 cm) and sitting height (80 cm).

There were 4 follow-ups after operation: first two made twice a year during first year after surgery, then 2-year post op follow-up and finally 4-year post-op follow-up. There was found on final follow-up at the age of 16 years old (4 years after operation, year 2017) that

the main scoliotic curve (Th8–Th12) turn into leftsided 13° curve with summary correction rate value of 122% and additional upper-thoracic curve (Th1–Th6) moderately progressed to Cobb angle 23° (fig. 2). In our opinion an inversion of the curve took place in that case due to a growth-modulation properties of the implant. Height measurement identified standing height increment of 4 cm (162 cm) and sitting height of 2 cm (82 cm). Standard AP spine series identified caudal end of bar decrement of 18 mm (4,5 mm per year) — fig. 3. Thus, not only preservation of spinal growth was found but it's modulation in accordance to Hueter-Volkmann law resulted in left side of curve isolated overgrowth due to different pressure on convex-side and concave-side parts of vertebral growth plates. Second operation for implant changing to transpedicular fixation carried out in 2017 (16 years old) to prevent complications development (bar migration and instability of the implant). Surgical approach similar to previous one was used, the implant was dismantled. Pedicles of Th4–Th6 on left side, Th4 and Th8 on right side; Th11–Th12 on both sides were fixed by polyaxial transpedicular screws using Pediguard device for preparing screw channels and C-arm guidance used for navigation. Screws were then connected to two 5.5 mm titanium rods. Spinal fusion was made using autologous spinal processes. The wound was closed in layers. Post-operative spinal series revealed left sided Th7–L1 curve with Cobb angle 20°, Th2–Th6 curve with Cobb angle 25° (fig. 4). Total correction rate from 2012 till 2017 after second operation identified as 133% with auto-correction due to a growth modulation — 48%, kyphosis Th5–Th12 Cobb angle 280. SRS-24 used to assess patient's activity, well-being and treatment acceptance. The mean value drew up to 4,67 points and no complains about appearance was brought (fig. 4).

#### DISCUSSION

Idiopathic scoliosis with onset in children before the age of 10 years old defined as early-onset scoliosis [1]. Our patient developed scoliosis at the age of 7 years and had progression of the scoliotic curve during growth spurt from 10 till 12 years old. Despite fact that we decided to choose operative treatment at the age of 12, we carried that case to an early-onset scoliosis. The girl had Risser test 1 and still no menses so she was at risk for scoliotic curve progression. One of the challenging aspects of EOS surgery is to prevent crankshaft phenomenon formation which can lead to scoliotic curve relapse [6]. There are 3 main groups of growth-friendly implants nowadays: compression-based, distractionbased and guided-growth implants [7]. In its turn there are 3 types of guided-growth implants, which don't require several operations for implant elongation: Shilla, modern Luque-trolley [3] and implant with raising popularity — MAGEC [10]. The issue is that many modern guided-growth implants can cause serious complications. For example, Shilla implant can cause up to 73% adverse events [11], MAGEC — 44,5% complications including 33% unplanned revisions [12]. Relatively high complication rates and implant's elements' metallosis prompted NHS of the Great Britain to release warning article for orthopaedic surgeons to choose implant carefully [13]. We have chosen dorsal hook-type implant «LSZ-10» with free-type of hook-bar connection allowing spine to continue growing while fixing scoliotic curve dorsally. Hooks are sliding up and down relatively to bars preventing growth stopping and spontaneous dorsal fusion [5]. Complications rate after using this type of implant wasn't higher than 26% according to our previous study and almost all of them developed at the age of 13 years old and higher [4]. In the original study it was identified that the implant has positive influence not only on curve correction but also on wedge-shaped vertebrae making them turning into normal shape due to a growth modulation and sometimes curve overcorrection5, we collected the same data in our latest study [4]. This overcorrection phenomenon tightly related with Hueter-Volkmann growth modulation law [14] involved into the mechanism of curve progression. This case could be useful for pediatric orthopaedic surgeons and especially for that who practicing EOS surgery. In our opinion both mobilization program before surgery and initial high correction rate with contraction and distraction applied to corresponding sides of the curve could contribute to this unusual overcorrection phenomenon with self-correction of 48% after 1st implant placing. There are some cases of overcorrection which happened to 2 patients of 35 when stapling was used as a compression-based implant [15]. There is a consensus for use of transpedicular screw fixation devices for AIS surgery nowadays due to a relatively higher safety, lower complications rate and higher correction rate [16]. Especially relatively low complications rate was found to be at the age of 13–15 years old [4], so transpedicular screw fixation device was used in our department with spinal fusion for eventual curve correction retention.

#### CONCLUSIONS

It's recommended to use guided-growth dorsal spinal implants for effective correction of scoliotic curve in children with EOS and AIS with preserved growth potential, but there is a need for taking into account some possible predictive factors which may affect on curve overcorrection development. It's recommended to timely implant changing to transpedicular screw fixation device to prevent complications development rather then scoliotic curve relapse obtaining reliable bony block after spine stabilization and spinal fusion.

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Fig. 2. AP X-Ray before second operation



Fig. 1. Appearance and Cobb angle before operation



Fig. 4. Appearance and X-Ray 6 months after 2<sup>nd</sup> operation



*Fig. 3.* AP X-ray after operation (left) and before second operation (right) (4 years difference)

It's necessary to provide yearly post-operative follow-ups for timely assessment of curve pattern changes on spine X-Ray series to prevent possible overcorrection phenomenon. It's recommended to precisely dose contraction and distraction forces while correcting a curve intraoperatively.

## PATIENT'S PERSPECTIVE

At the moment of the latest follow-up (6 months after second operation) the girl has normal life with full school activities and even sports (except collision sports) according to the guidelines of scoliosis treatment work group [17]. There isn't any curve progression and curve pattern changes after transpedicular fixation apllied with spinal fusion. This patient is going to be regularly assessed on follow-ups once-a-year for 3 years and every 2 years further because of possible deferred adverse events like late implant-related infection [18].

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## ON THE ISSUE OF INJURIES OF THE CERVICAL SPINE IN CHILDREN

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**ABSTRACT** — The article presents data on the role of connective tissue dysplasia (CTD) as a predisposing factor of the complicated course of pregnancy and childbirth in women, birth trauma of the cervical spine in newborns. It was revealed that more than half of mothers (61.4%) and more than one third of fathers (34.1%) had external signs of connective tissue dysplasia in children with natal trauma of the cervical spine. The intranatal period is the shortest in ontogenesis, but very responsible not only for the mother, but also for the child being born, and the biochemical changes that occur in his body are able to change the ontogenetic adaptation.

## MATERIAL AND METHODS

82 newborns were examined. The main group of the study was the newborn with a soft tissue injury of the cervical spine — 44 children. Soft-tissue segmental lesion at the cervical level was diagnosed in the presence of clinical signs of birth trauma in newborn children in the absence of structural bone changes according to the X-ray examination of the cervical spine. The control group was represented by 38 relatively healthy, full-term newborns with no signs of dysplasia of the cervical spine.

#### **RESULTS AND DISCUSSION**

Evaluation of genealogical, biological and socioenvironmental factors determining health revealed their predominance in the main group along the mother's line (Fig. 1).

Among the children of the main group, the symptoms indicative of natal cervical inferiority were diagnosed: a short neck symptom in 34.1%, a torticollis in 11.4% of cases, and a protective tension of the cervical occipital muscles in 22.7% of children. The leading clinical syndrome among the examined main group was muscular hypotension, mainly of the upper humeral girdle, which was diagnosed in 100% of cases (15.8% in the control group).

With dynamic observation, muscle hypotension was replaced by physiological muscle tone in 3 months



Fig. 1. Frequency of occurrence of signs of CTD in parents of the surveyed children,%

of life in 34.1% of children in the main group, at 6 months in 56.8%, and at 1 year in 90.9%. In 9 children with soft-tissue dysplasia of the cervical spine in the 3<sup>rd</sup> month of life, hypertension of the leg muscles was revealed in the form of a support for "tiptoe", plantar flexion of the fingers, revival of tendon reflexes. By 1 year in 3 patients the syndrome of pyramidal insufficiency was diagnosed.

Muscular hypotension was replaced by a physiological muscle tone at 3 months of life in 34.1% of children in the main group, at 6 months in 56.8%, and at 1 year in 90.9%. In 9 children with soft-tissue dysplasia of the cervical spine at the age of 3 months, hypertension of the leg muscles was revealed in the form of a support for "tiptoe", plantar flexion of the fingers, revitalization of tendon reflexes. By 1 year in 3 patients the syndrome of pyramidal insufficiency was diagnosed.

According to the X-ray data, the children of the main group had signs of soft tissue swelling of the neck, C2–C3 compression, and "staircase" instability of the cervical vertebrae (at later times).

Almost all the newborns in the study group had signs of perinatal central nervous system damage (90.9%), the symptoms of which appeared at the end of the early neonatal period and dominated the clinical picture, thus masking traumatic lesions, which creates certain diagnostic difficulties. While the control group had a cerebral ischemia rate of only 15.8%.

The presented data testify to the role of connective tissue dysplasia in the formation of functional and structural disorders in the cervical spine in the intranatal and postnatal periods. As a rule, they have no tendency to self-correction, contributing to the early development of degenerative-dystrophic processes.

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## COMPARATIVE EVALUATION OF SOME METHODS OF SURGICAL TREATMENT OF VARIOUS FORMS OF HIRSCHSPRUNG'S DISEASE

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ABSTRACT — Hirschsprung's disease is a serious disease of childhood. In this paper we present the results of the surgical treatment of Hirschsprung's disease with the use of Soave-Lenyushkin and Duhamel-Bairov. In a comparative analysis we revealed the efficiency of operations Duhamel-Bairov in rectal and rectosigmoidal form.

**KEYWORDS** — Hirschsprung's disease, operation Duhamel-Bairov, operation Soave–Lenyushkin, children.

#### INTRODUCTION

Despite the sufficient study of Hirschsprung's disease, there are still problems of its diagnosis and treatment in children [4], which sometimes persist in adulthood [2-3]. Unfortunately, recently there has been an increase in cases of unsatisfactory results of treatment of this pathology, especially in some of its forms, such as subtotal [5]. Remote long-term comparative data on the functional state of the distal parts of the colon in children with Hirschsprung's disease, operated by various methods, not enough to assess the quality of life of patients[1].

#### The aim of the study

To optimize surgical treatment of various forms of Hirschsprung's disease.

#### Research problem

Compare the results of surgical treatment of various forms of Hirschsprung's disease.

#### Material and methods

In the period from 2012 to 2015 in in the children's surgery clinic have been operated on and are currently under the supervision of 26 patients with a diagnosis of Hirschsprung's disease. From the study was excluded 1 patient with total disease. All children underwent radical surgical intervention in a planned manner. The distribution according to the forms of Hirschsprung's disease among children is presented in the table.

After preoperative examination and the final stage of surgical treatment all patients were hospitalized three times every 3 months for examination and rehabilitation therapy. In the subsequent hospitalization was carried out annually if on clinical indications it wasn't required to do it more often. The minimum follow-up period was 3 months, maximum 12 months. Statistical study of the obtained material was carried out using simple and grouped variation series with the definition of the arithmetic mean of simple and weighted (M), the coefficient of variation (C), the mean square deviation (s), the evaluation of the reliability of individual indicators and their differences using the student's t-test for series with a normal distribution. All studies that required active conscious participation of the patient with the implementation of the commands were carried out in children older than 4 years. Upon admission to the Department, all children with Hirschsprung's disease underwent a comprehensive examination, which included anamnesis collection, General clinical and rectal examination, rectoromanoscopy, fibrocolonoscopy with colon biopsy, ultrasound (ultrasound) of the colon, irrigography, histological examination of remote areas of the colon, assessment of the quality of life.

## RESULTS

The basis of the surgical treatment of longer forms of Hirschsprung's disease lies etiological principle is the removal of the affected part of the colon (ganglionary zone, transition zone, suprastenotic extension) and the relegation of its normal place in the anatomical and functional relation to the area of the colon. All patients, depending on the surgical intervention, were divided into 2 groups (1 and 2). In group 1, surgical interventions were performed in an open manner using Duhamel-Bairov operations and its modifications (42%). In group 2, surgical interventions were performed in an open manner using Soave-Lenyushkin and its modifications (52%). In children with subtotal form of Hirschprung's disease, a modified Duhamel-Bairov operation was performed. The disadvantages include the technical complexity of the implementation.

	Age of children, years								
Hirschsprung's disease	0 – 1		2-4		5 – 7		8 – 17		Total
	boys	girls	boys	girls	boys	girls	boys	girls	
Subtotal form	1								1
Rectal form			2	1					3
Rectosigmoid form	5	2	4	2	7	2			22
Total	6	2	6	3	7	2			26

#### Table 1. Distribution of children with different forms of Hirschsprung's disease

Immediate and long-term results of surgical treatment were observed in 2 patients with rectal and 23 patients with rectosigmoid form, as well as in 1 patient with subtotal form of hirschprung's disease, previously divided into 2 groups depending on the type of operation (group 1 - surgical interventions were performed in an open way using operations of Duhamel–Bairov and its modifications group 2 surgical interventions were performed in an open way using operations of Soave–Lenyushkin and its modifications). In-depth examination was conducted in 3 and 12 months. During examination after 3 months in group 1, a good result was observed in 61.3 per cent, and satisfactory in 25,4%, poor — 13,3% of children. In group 2, the good result was 85,7%, satisfactory 14,3% of children; unsatisfactory result was absent. At inspection through 12 months. in group 1, good results were obtained in 74,9%, and satisfactory in accounting for 21,3%, unsatisfactory in 3,8% of children. In group 2, the good result was at 92,3% of the children, satisfactory to 7,7%, an unsatisfactory result was absent.

Over time, there has been a positive trend in both groups compared, but the best result was observed after surgery performed in an open manner using Soave–Lenyushkin operations and its modifications (group 2).

Objective research data also varied at different times. In the immediate postoperative period at endoscopic examination in group 1 in patients with good and satisfactory result of treatment mucosa did not differ from that in healthy children. In patients with unsatisfactory results, moderately expressed inflammatory changes in the mucosa of of colon were observed. No inflammatory changes were found in patients of group 2. In the remote postoperative period in group 1 inflammatory changes were absent. Pathological changes were not detected in biopsies of patients with good and satisfactory results. In colon biopsies taken from patients with unsatisfactory results at the level of +1 and +10 cm from the anus, changes characteristic of the sluggish inflammatory process were visualized. Endoscopic examination carried out after 12 months in group 2, showed no microscopic inflammatory changes on the part of the colon mucosa in all patients.

Through 3 months after radical surgical treatment, all patients underwent barium-based irrigation. In group 2, all patients after Soave–Lenyushkin had no major radiological signs of hirschprung's disease: aganglionic zone, transition zone and suprastenotic expansion.

On irrigography, performed in patients after the operation Duhamel-Bairov, also absent the main symptoms of Hirschsprung's disease, but were specific to this operation radiographic signs: extended the stump of the rectum, consisting of two parts (front — rectum, rear — relegated intestine) and colorectal septum. Features had a x-ray picture in patients operated on for Subtotal form of Hirschsprung's disease. On irrigography with barium was determined in a cropped, reduced colon extending at an angle of 90° from the cecum, i.e. the axis of the caecum was situated at a right angle relative to the axis of the reduced colon. Control irrigography carried out 12 months later during irrigography after surgery for the subtotal form, elongation of the lower intestine and the approach of the axis of the caecum to the direction of the axis of the lower colon were established, which improves the passage of intestinal contents.

In the early postoperative period after the surgery Soave–Lenyushkin complications occurred developed in 2 patients: distance of the mucous membrane of the rectum in 1, stenosis of colo-rectal anastomosis in 1. The distance of the mucous membrane of the rectum occurred due to excessively asymmetric fixation of the lower intestine in the anus. The latter was eliminated by means of wedge-shaped excision of the spaced mucous membrane of the rectum. Stenosis of colorectal anastomosis appeared as a result of inflammation at the site of fixation of the lower intestine in the anus. Attempts to underwent bougienage of stenosis of the rectum failed were unsuccessful. The effect was obtained only after the operation of transanal excision of stenosis. There were no early or late postoperative complications in group 1.

## CONCLUSION

- 1. The close relationship and compliance with clinical, functional and morphological criteria of various forms of Hirschsprung's disease in children.
- 2. A comprehensive examination of children with long-term forms of Hirschsprung's disease in the immediate and long-term postoperative period showed that the most effective method of sur-gical treatment in rectal and rectosigmoid form is the operation of Duhamel–Bairov and its modifications. Comprehensive examination of children with long-term forms of Hirschsprung's disease in the immediate and long-term postoperative period showed that the most effective way of surgical treatment in rectal and rectosigmoid form is the operation of Duhamel–Bairov and its modifications
- 3. Use transmesenteric downgrading of the colon in the left side channel with the subtotal form of Hirschsprung's disease allows to obtain results not less satisfactory in all patients.
- 4. After surgical treatment, the best indicators of quality of life in the Immediate and long-term postoperative period were achieved after surgery Duhamel–Bairov and its modifications. How-

ever, it should be noted that even in the remote postoperative period, the quality of life indicators have not reached normal parameters in any of the studied groups.

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## **ON TRAUMA SUSCEPTIBILITY IN GENERAL SURGERY**

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**ABSTRACT** — The review highlights some issues about the effect of the surgical injury degree on the development of the stress response of the organism and the possibility of reducing the impact of these factors on the development of postoperative complications.

**KEYWORDS** — risk factors, surgical injury, assessment of the stress response, inflammation, blood loss.

Surgical intervention occupies a special place in the formation of operational risks. Any operation, through the release of biologically active substances, leads to the strain of all body systems. The severity of these changes is proportional to the traumatic nature of a surgical intervention (1).

A surgical trauma is difficult to measure, and the processes caused by a surgical trauma are difficult to fix. H.H. Malinovsky and co-authors (1973), G.L. Ratner (1988) defined a surgical trauma as a combination of an intraoperative blood loss, duration of surgery and the size of a surgical wound.

In view of the complexity of the interpretation, the very concepts of a "high surgical trauma", "average", "small" differed significantly over time. An example of this is a total endoprosthesis operation of large joints. Some time ago, it was rated as an "surgery with a high degree of a surgical injury" (2). Today, the traumatic character of this surgery is assessed as average. Surgeries are performed much more often, the operative techniques have improved; surgeries have become practically "bloodless", and implants have changed. However, the degree of the tissue damage has not changed.

In view of the fact that a surgical injury is associated with the degree of the tissue damage, it is expected to be associated with blood loss, and, therefore, with a deficit of the circulating blood volume (CBV deficit) (3). However, being a risk factor in the preoperative analysis of the clinical situation, the CBV deficit is also difficult to predict because of the large number of "unaccounted" variables (experience and qualification of personnel, technical equipment of the operating



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theatre, etc.). Nevertheless, there is a generally accepted perception of the traumatic nature of surgery associated with an operative access, the risk of bleeding, the amount of "removed" tissue and the proximity of the surgeon's work to vital organs and systems.
The traumatic nature of a surgical intervention is the main factor determining the severity of the surgical stress response (4, 5) which is defined as the complex of general (nonspecific) and local (specific, depending on the zone of the surgery and its nature) pathophysiological reactions. The response is assessed not only by the level of blood plasma hormones, but also by the quantity and nature of analgesics necessary for an adequate analgesia in the postoperative period (6).

The bodily reaction to damage is stereotyped and plastic, and the forecast of its severity is difficult. Even for insignificant aggression, we can observe a wide range of response cascade processes. On the other hand, a significant, in our opinion, aggressive influence, is met with a rather restrained response. An example of the latter clinical situation can be surgical interventions for tumors of the laryngopharynx. The region with reflex-active organs has complex reflex interactions — conditions for realising an expressed stress response to damage. However, it is often possible to observe a minor pain syndrome with normal blood circulation, absence of manifestations of inflammatory reactions and assessment of pain by means of Verbal Rating Scale shows no more than 2–3 points.

Any trauma is accompanied by the development of a local inflammation. Restriction and elimination of damaged tissue is the basis of the recovery process, and the severity of the systemic inflammatory reaction directly depends on the traumatic nature of the surgical intervention (7).

The formation of insulin resistance, which is not only considered as one of the markers (8) of stress, but also as a factor increasing the risks of continued growth and metastasis of malignant neoplasms, relates to the characteristics of surgical stress (9), in addition to systemic inflammatory and immunological changes.

Strategies for reducing a surgical injury. Perhaps, endoscopic surgeries can be regarded as low-traumatic. When they are performed, the expected effects of limiting a surgical injury are achieved: the operative access time is reduced, there is less tissue damage, a good cosmetic effect, a reduced pain syndrome, a reduced hospital stay and patient disability, and their early labor and social rehabilitation (6). However, when these surgeries are performed, there are some risk factors. For example, with the application of the pneumoperitoneum and thoracoscopy, there are, not infrequently, large changes in the ventilation and circulation (10). We must not forget, as it is the case with many endoscopic interventions, the necessity of a long pathological intraoperative position of the body.

Conservative methods can limit the stress reaction of a body to a surgical trauma by controlling glycemia with insulin and a glucose-potassium mixture (reducing the severity of the systemic inflammatory reaction, the concentrations of pro-inflammatory cytokines, C-reactive protein, serum amyloid A), early initiation of enteral nutrition,  $\beta$ -adrenoceptor blocking agents (13), xanthine derivatives (inhibition of tumor necrosis factor synthesis) (14), glucocorticoids (limitation of the inflammatory reaction) (15).

Modern methods of general anesthesia, having their own potential of a surgical injury, have only a minimal stress-limiting effect which extends only to the intraoperative period (16), while changes in homeostasis persist for several days and even weeks after surgery (5).

#### CONCLUSION

Thus, the traumatic nature of the operation with the development of the stress response of the body is responsible for the development of postoperative complications. Having assessed these risks, it is necessary to determine the choice of the strategy of reduction, and, therefore, the prevention of complications.

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# FROM NARRATIVE MEDICINE TO APPRECIATIVE MEDICINE

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ABSTRACT — Narrative medicine is a way of addressing the doctor-patient relationship, considered to be conducive to increasing empathy through the patient's narrative of the disease and its associated symptoms [1]. The physician's role in narrative medical practice is to listen to the patient, who tells him about the symptoms of the disease he suffers of, their stories being loaded with meaning for the patients. The patient experiences the disease as a series of sufferings, whose story encodes the symptoms that contribute to the diagnosis. The narrative of the disease itself has therapeutic valences. The experience of the disease, especially of the chronic one, is an existential condition for the patient, an experience of his own bodily uniqueness. The present paper presents a series of possible correlations between narrative and appreciative therapy, brought together in the sphere of narrative medicine.

**KEYWORDS** — medicine, narrative medicine, therapy, appreciative medicine, stories, patient.

### INTRODUCTION

Narrative medicine is a way of addressing the doctor-patient relationship, considered to be conducive to increasing empathy through the patient's narrative of the disease and its associated symptoms [1]. The physician's role in narrative medical practice is to listen to the patient, who tells him the symptoms of the disease he suffers of, their stories being loaded with meaning for the patients. The patient experiences the disease as a series of sufferings whose story encodes the symptoms that contribute to the diagnosis. The experience of the disease is denominated in the scientific literature as wounded humanity [2] by the loss, in various proportions, of the freedom of bodily limitations generated by the illness, the autonomy of a greater dependence on caregivers and the lack of knowledge necessary for proper management of self-care, as well as a change in self-image, including self-esteem in some situations [3]. The experience of the disease, especially of the chronic one, is an existential condition for



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the patient, an experience of his own bodily uniqueness. The narrative of the *disease* itself has therapeutic valences. Narrative medicine is an integrative approach that emphasizes the importance of anthropological, philosophical and literary studies in medicine practice. The practice of narrative medicine starts from the idea of honoring *stories of illness* [1], being an approach to patient-centered medicine. By increasing the empathic abilities of physicians, one pursues a *humanization* of the practice, and a personalization of it.

### NARRATIVE PRACTICE

Narrative knowledge [4], [5] is the understanding of the meanings of messages embedded in the discourse, in the form of narratives filled with particular meaning for the narrator, and doubled by a specific emotional charge. The narrative approach to communication emphasizes the significance - often unconscious - with which the subject invests stories about their own experiences, or that of others, but which affects them significantly.

The narrative perspective focuses on the *narrative relationship* between the storyteller (emitter) and the listener (receiver). It is this relationship that *semantically invests* the story, the narrative context generating a phenomenon of *social construction* [6] and establishing meaning on narrated social reality. The experience of chronic illness, for example, becomes a narrated experience [7] when the subject describes the symptoms in an explanatory manner, *how they feel the symptoms*, what *associations* the subject makes with different events in his life, what sense he attributes them - the exhatological role of suffering, or rather the punishment for various sins, the pedagogical dimension of suffering, etc.

The social-constructionist perspective emphasizes the construction of the way in which the subjects of the various social interactions build their meaning on the *social reality*. Based on these, individuals organize their own action, taking note of events and explaining them, in the context of social interaction, and within the interpretative communities - groups of individuals who participate in *processes of negotiating the meaning* of a social event. The narrative perspective emphasizes the *subject* of the social interaction as a key character in constructing the meanings that it gives to its own significant stories. The two perspectives are complementary, both aiming to capture how the community, namely the individual, makes sense to social reality. Disease as a social reality is different depending on its definition by the patients themselves, by doctors and the society in general.

Narrative knowledge involves the subject's emotions and feelings, as such he is less susceptible to generalization [4] in the manner of classical epistemology. The narrative perspective, in complementarity with the socio-constructivist one, emphasizing the intersubjective side and the expressed identity, is inductively built, the universality being the result of an integrative process and not of one's own omission. The experience of patient-centered medicine [8] becomes convergent with the narrative one, as long as the experimental uniqueness of each pathology is admitted [9].

The narrative experience involves the existence of multiple perceptual positions. One and the same story, for example, the classic fairy tale, the same symbolic reality can be seen from radically different narrative perspectives, the experience narrated by the princess will radically differ from that of the Dragon and that of the Prince. The story permits the unification of perceptual positions, in a unique synthesis, that makes up the story. In medical practice, the perspective of the chronic patient can be combined with that of caregivers, be they family, care institutions, etc. Chronic conditions can be experienced starting from discomfort and pain, from the extent of disability and social dysfunctions in patient's life, from social pressure to and from caregivers, from care resources, and so on.

The narrative perspective allows the transformation of experiences into characters, facilitating the therapeutic process and mobilizing the motivational resources of the person. Pediatric practice can benefit from the narrative content, transforming the experience of the disease into a fairy tale, in which the child invested as a fairytale character faces the disease, but also the therapeutic discontent in the sense of initiatory attempts. Narrative medicine places the patient in the role of narrator — of his experiences in the actual life of the disease — and of a physician in the quality of co-constructing the narrative experience [10]. The construction of a narrative identity of the disease and the patient requires the fragmentation of the roles of the Capersian patient that assumes the different perceptual perspectives of their own story on the cornice condition.

The narrative perspective allows the transformation of experiences into characters, facilitating the therapeutic process and mobilizing the motivational resources of the person. Pediatric practice can benefit from narrative content, transforming the experience of the disease into a fairytale, in which the child, invested as a fairy tale character, faces the disease, but also the therapeutic discontent in the sense of initiatory attempts. Narrative medicine places the patient in the role of a narrator - of his experiences in the actual life of the disease - and the physician as a co-constructor of narrative experience [10]. The construction of a narrative identity of the illness and the patient requires the fragmentation of the patient's roles as a person who assumes the different perceptual perspectives of his own story on the chronic condition.

# DEFINITIONAL CEREMONIES IN NARRATIVE THERAPY

A first perspective of narrative medicine is that *the stories of the patient are the ones that matter* [10], this approach being distanced by diagnostic protocols, which in the name of evidence-based standardization of medicine have sent the patient's experience to a peripheral position, incompatible with adequate management of self-care and real autonomy. The principles of narrative medicine, explained by Rita Charon et al. [11], are: (1) action towards social justice; (2) disciplinary rigor; (3) inclusiveness; (4) tolerance of ambiguity; (5) participatory and nonhierarchical methods; and (6) relational and intersubjective processes.

The term *definitive ceremony* was introduced by Barbara Myerhoff [12], [13], and implies providing self-expression possibilities for the individual to be seen and understood in his own terms, others being witnesses to his being. Michael White introduces the term in therapeutic practice, emphasizing the role of the outsider witnesses in authenticating the subject's experiences and constructions. The subject is invited to present significant stories about their own existence, an audience usually made up of subjects with whom they share similar experiences, and who play the role of external witnesses [14], [15].

Narrative therapy through the narrative definition ceremonies includes a series of stages:

*Stage 1:* The therapist or facilitator of narrative intervention requires the subject to respond to an interview that emphasizes the story of significant experiences. The other participant assists in the role of external witness.

*Stage 2:* External witnesses tell their own perception of the subject's story,

*Stage 3:* The subject is invited to express his/her own feelings, impressions, ideas etc. to the ones out-lined by the external witness,

*Stage 4:* Participants discuss their own experiences, aiming to understand why they made a particular statement or put a particular question [14].

#### APPRECIATIVE MEDICINE

A particular form of narrative medicine is proposed by Tel Fanklin [16] as *appreciative medicine*. The origin of this technique can be identified in a method of organizational development called the appreciative survey proposed by Bushe and Coperrider in 1980 and then taken up in areas such as psychology, theology, sociology.

Cooperrider proposes the following operational definition of the appreciative survey: a co-transforming research of the positive from individuals and organizations. The appreciative survey is a transformation discovery of life-generating sources of living systems in their moments of maximum efficiency and maximum creative capacity in the economic, ecological, human field. The appraisal survey involves mobilizing interrogative capacity based on the principle of unconditionally positive questions. The extent of research is correlated with that of intervention by unleashing the innovative potential of creative imagination instead of denial and criticism [17].

Appreciative intelligence is defined as the ability to reflect and perceive generative potential in difficult situations and engage in intentional actions to turn potential into positive outcomes [18]. The three components of appreciative intelligence are: redefinition of the frame or "reframing"; appreciation of positive elements; how to evolve the future from the present [19]. Reframing is the change of perspective through which things are perceived. Positive appreciation is the ability to sense the positives in events, situations, obstacles, focusing from all the elements of an object on positive (affirmative) elements.

Providing unconditionally positive trust and appreciation of the achieved performance translates the subject's experience as a successful story, or one appreciated by the researchers as being successful in other areas of the subject's conduct, unlocking its creativity [20]. Example: A person's quality of perseverance can be appreciated and gradually transformed into a winning mentality, since in essence, the winning mentality implies perseverance and tenacity doubled by a fair view of the development of events.

The principles of appreciative medicine aim at identifying the patient own well-being, perfect health that includes self-satisfaction regarding his/her own quality of life. Patient relationship is transformed from a care relationship into a partnership for health. Tel Franklin [16] considers that alternative medicine, as well as allopathic medicine, are both tributaries and limited in a problem-centered paradigm, that is, on illness and suffering. In the face of the therapist, another paradigm, namely health-centered, should be opened as a positive and natural state of the living system, much more adapted to us, in our opinion, of the idea of holistic, transmodern medicine. The fundamental transformation proposed by Tel Franklin's appreciative therapy is to shift attention from the disease to a state of disorder of the living system, to the implicit order called perfect health [21].

### IMPLEMENTING APPRECIATIVE MEDICINE AS A FORM OF NARRATIVE MEDICINE

Describing a narrative medicine program with patients, Robert Slocum [22], PhD, the narrative medicine facilitator at UK HealthCare, presents a narrative medicine program based on the appreciative specificity of the practice. Within this program, questions that facilitate practice are "What is your source of hope?" "Where do you get your strength?" Of course, patients are free to focus on other experiences, including concerns, memories, etc.

### DEVELOPING NARRATIVE AND APPRECIATIVE THERAPY IN ROMANIA

Narrative therapy and narrative medicine began to develop in Romania starting from narrative practice programs developed through the Psytera Association under the coordination of Associate Professor PhD Ovidiu Gavrilovici and his collaborators [23]. The appreciative inquiry was promoted by Professor PhD Ștefan Cojocaru, being mainly implemented in the sphere of social assistance. Starting from the appreciative inquiry, Professor PhD Antonio Sandu develops a series of appreciative practices, including appreciative counseling and appreciative therapy, combined under the appreciative ethics of care.

#### NARRATIVE AND APPRECIATIVE PERSPECTIVES IN PRACTICE

We present a series of possible questions that facilitate the narrative-appreciative dialogue with diabetic patients.

*Interviewing:* The operator informs the subject about the scientific-clinical purpose of his participation to the interview.

1. Can you please tell me how did you find out that you suffer from this disease?

*Instructions for the operator* — add clarifying questions about: *How long does he/she suffer from diabetes? The context in which diabetes was diagnosed. How did he/she get diagnosed? Who and how did tell him/her the diagnosis? How did he/she feel when he/she got the diagnosis of diabetes? What was the first reaction?* It insists on the significance of communicating the diagnosis, the subject and how it has changed the universe of values (the anticipated change at the time of diagnosis — he/ she will not be able to consume certain dishes, he/she will be dependent on insulin injection, he/she will be stigmatized and marginalized, will have to take care of own person and health).

# 2. Tell us about a day in your life that you think have had a great success in your health state.

*Instructions for the operator* — add clarifying questions about: what it means for the subject to keep his/her health under control. *What does he/she consider to be a successful adaptation to life with diabetes. Success in other areas of professional, social, family life.* How can the successful strategy be transferred to the adaptation to the chronically ill condition. How can a successful strategy be used to increase the individual's social autonomy.

3. Tell us how you adapted yourself to the life of a person with diabetes?

*Instructions for the operator* — add clarifying questions about: *What lifetime activities he / she believes he had to give up. If, how and by whom was the decision to give up those activities influenced? If, how and from who was informed about the disease. He/she considers that*  special attention needs to be paid by others and additional rights are required, due to the health condition? If he/she considers themselves as being a disabled person. If he/she is viewed as a person with disabilities. How does he/she feel about it? Give freedom to the subject to describe any experience that he/she considers to be an adaptation to the situation of a person with diabetes.

# SIGNIFICANT STORIES TAKEN FROM PATIENTS' DISCOURSE

In the following, we will exemplify a series of significant stories from patient speeches, occasioned by research into the social construction of chronic diabetic disease.

"I tell you that, I do not know, either there should be more diabetologists, or more doctors. Because I tell you, that's why I did not agree with it at all. I'm going there at 6 o'clock in the morning to take some exams, after I take the exams, then I go to the trio, I get an order number at 10:40, and I get to go to the doctor only at noon. So I'm losing a day or two to go to the diabetes specialist, and that's why I'm rarely going, because I do not ... It's a lot of people there, it's busy, I do not know what should be done, and the diabetes clinics... they are private and us pensioners cannot afford it." (*Diabetic Patient Interview*)

The patient expresses his/her dissatisfaction regarding the difficult access to a specialist, effectively telling the difficulties encountered when he or she needs to get to the doctor for a specialist consultation.

Another element narrated by the patient is the importance of spirituality and family support in the process of copying with his own chronic condition. In the process of telling exceptional events that make sense of their own existence, the patient has the opportunity to reflect on the significance attributed to the events, and facilitates the construction of a narrative identity of the subject, which allows him to assert his autonomy and responsibility towards his own health condition.

"I was, for example, once at the grave of Father Cleopa (the tomb of a hierarch considered holy, place which has become a place for pilgrimage nn) with a nephew who is a priest there, and he told me to go there that he knew I had the Father Cleopa, to go tell him what I have to say, and of course ... back then I was a little bit nervous about my girl's smoking, I did not know much about diabetes. That's a long time ago. As long as I stayed at Mihai, for about two days or so, Ioana kept calling me and tells me to come home, because Mirela no longer smokes. "Yeah, right, Mirela doesn't smoke. How can she not smoke? I left home yesterday and now Mirela no longer smokes". She says, "Well, if I tell you she no more smokes. George offered her a cigarette and she threw it out of sight". I said she was crazy, they were lying to me to come home, I did not think it was true. When I came home, Mirela did not smoke anymore, and then I said, "See, the help is great". And I asked Mihai if he did some more substantial prayers, and he said not to blame it on him. Father Cleopa did it. And I felt very much support, help, spiritually. When I go to church, when I return home, I feel as if I'm more unloaded." (*Diabetic Patient Interview*)

#### A NARRATIVE COMPETENCY TRAINING PROJECT IN THE FIELD OF NURSING

The training of narrative skills of doctors is generally pursued in some narrative medicine training programs [24]. The first such program was put into practice by Rita Charon, her being considered in fact the initiator of the idea of narrative medicine.

We continue to present a narrative training program of nursing training. The objectives of the research — intervention project based on narrative practice are:

The objective of the research is to identify the particularities of the social construction of the professional identity of nursing assistants in training. The research focuses on the role of social discourse that refers to the need for a certain emotional control over the patient and the real impact of stories that contribute to the formation of the professional identity of nurses. Among the objectives of the research are:

- 1. Identifying the main themes that influence the professional identity of nurses in training.
- 2. Identifying the social discourse of emotional neutrality that requires the separation of professional and personal identity from the work of health professionals that can influence the emotional management ability of the stories encountered in the clinical practice of future nurses.
- Identifying stories as a way of social construction of reality in the medical field and professional skills developed implicitly.

The narrative medicine program is implemented in a post-highschool private health school as early as 2011, being adapted according to the model proposed by O. Gavrilovici [25] using techniques from the narrative approach, including the technique of the outsider witness and the technique of re-membering conversations. The narrative medicine program, as it is applied, creates a context that makes meaningful stories of the clinical practice of nurses in training, tales that are governed by certain speeches, dominant themes that can describe how the social context outlines the professional identity of nurses in training [26].

The narrative medicine program starts from the methodology proposed by Rita Charon (2006) that students complete some parallels charts in which they can write what they are not allowed to write in the official medical records, patients' accusations, the patient's consultation, his or her physician's concerns, personal situations that the patient's sight wakes up in the minds of doctors. Participating training nurses are invited to elevate such parallel cards during clinical practice, and then present them to co-researchers in informal meetings. The people in the audience will then note and express their ideas, the feelings, the perceptions, the expressions that have attracted their attention, the personal experience it has been evoked, the direction of action that has been suggested to it, etc. [26].

#### CONCLUSIONS

The use of the narrative perspective in medicine allows the medical staff to be sensitized to the patient's experience of their own health condition. The narrative approach also allows for a better reflection on their own medical practice, and can help reduce the burnout of medical professionals. These techniques can facilitate the identity construction of healthcare professionals, improve their relationships with patients, and implement patient-centered medicine. Appreciative medicine, as a particular form of narrative medicine, emphasizes the strengths of the subject, whether patient or professional, identifying strategies to extend positive experiences to other aspects of personal or professional life, including patients, to self-care management.

#### ACKNOWLEDGMENT

- The interview guide presented was adapted according to the interview guide created by Sandu Antonio and used in the Postdoctoral Program Ethics of Health Policies, implemented by Gr. T. Popa University of Medicine and Pharmacy from Iasi, with funding from the European Social Fund POSDRU. The result was a case study on the development of autonomy in young people with diabetes. The use of the methodology was approved by the Ethics Committee of the Gr. T. Popa University of Medicine and Pharmacy from Iasi.
- 2. The program for the training of narrative skills of nurses in training mentioned in the paper is under implementation, being conducted by PhD Candidate Catalina Neculau in the NE area of Romania, and included as an applicative part in her doctoral research entitled "The Social Construction of the Professional Identity at Medical Assistants in Training", being elaborated at the University of Oradea under the coordination of Professor PhD Antonio Sandu.

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# A METHAETHICAL PERSPECTIVE ON NON-VOLUNTARY PSYCHIATRIC HOSPITALIZATION

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ABSTRACT — This paper aims at emphasizing some analysis frameworks from (bio)ethical perspective on the non-voluntary hospitalization of the psychiatric patients which was not decided based on a court decision and / or a forensic report. The case study concerns a case in which the Romanian state was condemned by the ECHR for failing to follow the procedures agreed at European level on non-voluntary hospitalization nor was obtained a credible informed consent from the patient. In reasoning the decision for this case, the ECHR pointed out the seriousness of the fact that, in fact, it has been a cooperation of several state institutions, including a psychiatric hospital, the Police and the Prosecution. The case has considered limiting freedom of movement of persons — by non-voluntary hospitalization — at the same time endangering the health of patients by prescribing a medication specific to particularly aggressive disease that may have serious psychiatric side effects. ECHR considers that to perform such treatment would have been necessary to guarantee the possibility of a medical counter expertise. The case can be considered as a limitation of freedom of conscience, as the alleged reason of using of non-voluntary hospitalization by the parents of patient - major patient at the date of hospitalization - was the patient's appurtenance to a group — legally composed in Romania, but very disputed in terms of social, political and religious beliefs, a group who was dealing with an extremely negative public image in that period, and also with a very supported negative media campaign. This group was promoting a series of eastern spiritual practices of yoga.

**KEYWORDS** — Non-voluntary hospitalization; ethical perspective; ECHR; informed consent; psychiatric patients. human rights, human dignity, ethics, CEDO.

### INTRODUCTION

This paper aims at emphasizing some analysis frameworks from bioethical perspective on the nonvoluntary hospitalization of the psychiatric patients



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which was not decided based on a court decision and/or a forensic report. The case study concerns a case in which the Romanian state was condemned by the ECHR for failing to follow the procedures agreed at European level on non-voluntary hospitalization nor was obtained a credible informed consent from the patient [1], [2]. In reasoning the decision for this case, the ECHR pointed out the seriousness of the fact that, in fact, it has been a cooperation of several state institutions, including a psychiatric hospital, the Police and the Prosecution. The case has considered limiting freedom of movement of persons — by non-voluntary hospitalization — at the same time endangering the health of patients by prescribing a medication specific to particularly aggressive disease that may have serious psychiatric side effects [3]. ECHR considers that to perform such treatment would have been necessary to guarantee the possibility of a medical counter expertise. The case can be considered as a limitation of freedom of conscience, as the alleged reason of using of non-voluntary hospitalization by the parents of patient — major patient at the date of hospitalization — was the patient's belonging to a group — legally composed in Romania, but very disputed in terms of social, political and religious beliefs, a group who was dealing with an extremely negative public image in that period, and also with a very supported negative media campaign. This group was promoting a series of eastern spiritual practices of yoga.

This article is not limited to the specific remarks for medical ethics, but we are interested in the deontic ethical perspective, compared to the utilitarian ethics and that specific to the ethics of care. We see that all parties involved can have a number of moral reasons to justify their conduct [4]. Our position is that non-voluntary hospitalization cannot be justified as a means of social control, except if an expert committee considers its necessity, and a court decides irrevocably the hospitalization. It also proposes that the pursuit, from the community perspective enforcement of non-voluntary hospitalization, to be made jointly by the probation services — by Community psychiatry specialized staff to be hired in as probation counselor.

### THE DECONSTRUCTION OF THE IDEA OF NON-VOLUNTARY HOSPITALIZATION

Roberts and Reich distinguish three public health analysis frameworks, referring to the restriction or limitation of the individual's autonomy in order to achieve the public good — or at least limit the occurrence of situations that negatively affect individuals or communities [5]. The three proposed frameworks emerge from the following models: utilitarian (centered on results and effects), libertarian (centered on rights of individuals and opportunities) and communitarianism (based on the virtues of individuals as moral actors) [6]. In our view, the three directions can be considered as major ethical paradigms that build the meta-ethic substrate of the discourse on non-voluntary hospitalization as a public health issue on the one hand, and legal protection of human rights on the other.

Erina White [7] deconstructs the theories of non-voluntary hospitalization based on the ethical framework of public health formulated by Roberts & Reich [6]. The authors deconstruct claims of legitimation on libertarian or liberal egalitarian basis of nonvoluntary hospitalization of psychiatric patients (with suicide attempts) [8]. The assessed ethical dilemma is to choose between the advantages of involuntary admission — the prevention of any self-healing action — and the risks of patient vulnerability through the long-term effects of non-voluntary hospitalization. In the case of European Court of Human Rights' judgment, non-voluntary hospitalization is supposed to have been based on the possible autolytic manifestations of belonging to the controversial group of yoga practitioners. Although the patient was major, nonvoluntary hospitalization was based on the opinion of the caregivers (the mother), according to which she is suffering from psychiatric disorders — previously not diagnosed and uncertified by a forensic expertise board, which may have been caused by yoga practice.

The *consequential* (utilitarian) *perspective* supports non-voluntary hospitalization [9] when the risks associated with not taking this measure, either for the patient or for the society, are estimated to be major, exceeding the benefits of maintaining the patient in the normal care system. It is generally a paternalist approach, which emphasizes the decision of the expert against the IC (informed consent) of the patient [10], [11]. The consequential paradigm takes into account the effects of an action — or the lack of it, thereof — that can be assumed from the most plausible scenarios of patient evolution in the present case. To justify non-voluntary hospitalization, there should be reasonable suspicion that the patient is dangerous to himself or others.

The *libertarian perspective* based on rights (and centered on the idea of autonomy) generally rejects non-voluntary hospitalization, admitting it only on the basis of a legal decision that limits the patient's right of decision [12]. Even in this situation, emphasis is placed on informing the patient, communicating with him, on his right to challenge the measure taken. This is an anti-paternalist approach [13]. In the above-mentioned case, the restriction of rights was made without the appeal of an expert commission to establish a possible lack of discernment and a potential imminence of aggressive behavior towards himself or others.

The egalitarian libertarian perspective emphasizes the equality of access to resources (hospitalization being a resource made available by the community). Non-voluntary hospitalization is acceptable because of the state's obligation to equally protect the life and integrity of all citizens, even against their own decisions taken in the inability of a voluntary consent [14]. The right to health is a priority, as it makes it possible to exercise the other rights and freedoms. The egalitarian liberal outlook calls for non-voluntary hospitalization exclusively to ensure equal treatment. This perspective requires that the decision of hospitalization be taken excluding the criteria of the person's random determination, social apprehension, estimated value of the person, level of income, social utility etc. From this perspective, a decision of non-voluntary hospitalization can be considered ethical when by restricting the patient's choices (eg suicide), it creates the possibility of subsequent equal access to decisions about one's own health [7], [15]. In our opinion, this latter argument belongs to the consequential perspective, referring to the future consequences of the medical decision, limiting the right of decision on the patient's own condition.

The *perspective for ethics of care* requires that the ethical decision on non-voluntary hospitalization be made by applying the level of maximum empathy: *as if it were a member of one's own family* [7].

All decisions on non-voluntary hospitalization (in the present case) were made on the basis of the delegated consent of the caregivers (the mother).

The communitarian perspective requires that the decision on non-voluntary hospitalization be made after a reflection such as: I will feel ok with the decision taken, regardless of the consequences [7]. In our opinion, this is basically a deontological Kantian perspective, a direct reference to the categorical imperative. We consider the *communitarian perspective* as referring rather to the *acceptability of the decision* in accordance with the moral standards that apply in that community. In the case at issue, the non-voluntary hospitalization was used as a means of social control in order to prevent the person from attending the courses of that yoga school, against which various accusations of human trafficking for the purpose of practicing prostitution were heard on the news, but also other possible anti-social facts. None of the accusations against the students of the yoga school have so far been proven in court. However, the media pressure has generated an extremely unfavorable trend towards that yoga school, which has led, in the defendant's opinion, to the need to resort to imprisonment by non-voluntary hospitalization to prevent further participation in the courses of that yoga school. A series of stereotypes such as the

incestuous yogic movement conducts a number of practices considered to be *brainwashing*, with dissocializing or counter-social effects, have reinforced the belief that the hospitalization is justified.

The *postmodern perspective* focuses on the *social* and communicative construction of ethics. An ethical value is privileged depending on the existing power positioning situations in the society. Postmodern ethics are transparent in different values. The Foucauldian perspective tends to resist non-voluntary hospitalization because it introduces an unlawful space to exercise power: the power to restrict a person's freedom, starting from the social construction of mental illness. Psychological illness, like psychiatric normality, is a social construct, and the justification for restricting a person's freedom based on an interpretative agreement reached among psychiatrists is unlawful, as long as a unique definition of mental illness cannot be accurately established. Non-voluntary hospitalization can be accepted as a result of a consensus of specialists, but only with the maintenance of the patient's rights to a second opinion and the appeal to an extra-medical (judicial) entity. The postmodern — developmental perspective — asks the questioner about the benefits deriving from a person's involuntary admission [7].

# THE PERSPECTIVE OF MEDICAL DEONTOLOGY

Non-voluntary hospitalization applies to patients who are incapable of IC in accordance with Law 487/2002. Criteria for non-voluntary hospitalization are generally correlated with the risk of potentially harmful behaviors for themselves or for others. The legitimacy of non-voluntary hospitalization is often disputed, going to the establishment of associations that militate for the complete abolition of non-voluntary hospitalizations.

#### FRAMEWORKS

# World Medical Association (WMA) — principles (I)

The World Medical Association (WMA) established in 1995, in the framework of the 47<sup>th</sup> General Assembly held in Bali Indonesia, a series of mandatory ethical principles for member countries:

- non-discrimination of psychiatric patients on social or medical criteria.
- establishing the patient's psychiatric therapeutic relationship based on mutual trust, with concrete and accurate information given to the patient on the treatment and the whole therapeutic process, including its consequences.
- treatment including non-voluntary hospitalization — is an exceptional situation and can only be

applied in acute situations when the patient's condition constitutes a danger to himself or to the society.

 mandatory treatment and hospitalization can only be imposed for a fixed period of time.

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Appropriate community support is not invasive to the private life of the subject, making it easier to then accept long-term non-voluntary hospitalization. The ethical approach of the psychiatric patient calls for respect for his inherent dignity. Refusing to stigmatize psychiatric patients makes them adherent to therapy, especially if the hospital is no longer seen as a prison (restriction of liberty) for an unlimited period, and without the possibility of a call or conditional release [16]. The role of community psychiatry [17] is not a complete remission of psychiatric illness, but rather the development of the subject's abilities for maximum social integration [18]. The most important dimensions of the community care model are socialization, rehabilitation, empowerment, reintegration.

### CONCLUSION

The ethical decision on non-voluntary hospitalization (in the case discussed) should be based on a threefold reflection on:

—the real possibility of an IC — even limited — of the subject and a decisional/relational autonomy.

—the consequences of non-voluntary hospitalization vs. community care

-respecting individual freedom and dignity of the subject.

Our position is that non-voluntary hospitalization cannot be justified as a means of social control, unless an expert commission appreciates its necessity, and a court of law irrevocably decides for hospitalization.

We also propose that Community follow-up of non-voluntary hospitalization be carried out jointly by probation services — through community psychiatric staff who will be employed as probation counselors.

#### ACKNOWLEDGEMENT

A previous version of the article has been presented as a poster in the World Congress of Bioethics, organized by World Bioethic Association in 2016, in Edinburgh, United Kingdom.

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