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TRANSITING TO ONE-CHANNEL FINANCING OF HEALTHCARE IN THE COUNTRY

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The article provides the results of experiment on realizing pilot project of transiting healthcare in the country to one-channel financing in Penza region.

Keywords: one-channel financing, healthcare in the country, obligatory medical insurance, medical institutions

Methodological approaches towards policy in the area of providing medical care for villagers and planning medical services that are aimed to increase their availability and improve their quality in modern conditions of new inter-budget relations, including finance, define the necessity to search for new ways to make decisions on organization, management, and investment. (V.I. Starodubov, A.S. Ivanova 2009; A.A. Evsyukov, N.K. Sharafutdinova, 2009).

At the territory of Penza region a pilot project on modernization in healthcare is being carried out in two directions: transiting healthcare institutions to one-channel financing through the system of obligatory medical insurance (OMI); improving accounting of the provided medical care (introduction of the system of personalized accounting) within the system of OMI.

Three-side contracts have been concluded between Territorial fund of OMI, Ministry of finance of Penza region, Ministry of healthcare and social development on transferring budget money for healthcare into the system of OMI.

The transferred money are used to finance:

All structural departments of medical institutions (departments of ambulance, village first-aid stations, hospitals, etc.) that are included into the system of OMI;

All types of medical assistance, including social kinds of medical care (psychiatry, addicology, phthisiology, venereal diseases);

All costs, excluding expense to finance target programmes, capital building and reconstruction, and acquisition of expensive equipment.

Within one-channel financing of medical institutions, support of each single treatment-preventing institution is being carried out in accordance with the total amount of money that is transferred to the territorial fund of obligatory medical insurance from budgets of municipal units. The main disadvantage of the previous scheme of financing medical institutions was the dependence of tariff for a medical service on the amount of money that was given to a Territorial fund of obligatory medical insurance from municipal units.

Within the frame of one-channel financing, the formed norms of financing treatment-preventive institutions (TPI) were brought to a single standard considering a correction coefficient for each institution type: regional medical institutions, urban medical institutions, inter-regional centers (including TPI of the Kuznetsk), central regional hospitals, central regional hospitals that are located in country-side settlements.

Transiting to one-channel financing within the system of OMI is aimed to increase the efficiency of managing finance in a subject of RF. During the experiment a personalized accounting of medical services was carried out, new standards of providing medical care were introduced an differentiated according to the type of TPI.

The experiment allowed us to reveal the weak point in planning volumes of medical assistance that was earlier provided at budget expenses, and finance, needed for it.

Transition to the estimate system of financing towards financing for the actual provided medical care allows one to manage money more efficiently.

Personalized account of medical services within the system of OMI allows us to see actual provided volumes of medical assistance and its real value considering all costs. Now there is a possibility to correct medical-economic standards of medical care services considering real volumes of medical services.

The reformation of regional healthcare system, realized within the organization experiment, was aimed to decrease the resource-intensive bed fund and develop hospital-replacing technologies. As the result, numbers of bed fund of day-around hospitals decreased by 7,4%, and daytime hospitals – increased by 5,6%. All district hospitals received the state of regional central hospital (RCH) that allowed us to increase the efficiency of controlling the service. Bed fund of district hospitals was decreased due to their re-specialization into beds or hospitals of nurse care. The number of beds of nurse care increased by 84% in 6 years and reached 294 beds. A part of district hospitals was re-organized into outpatient clinics.

The developed and introduced functional-organization model of providing medical care to villagers included alteration in financing TPI and transition to one-channel system, change in structure and functions of healthcare institutions in the country at the basis of standardization of medical technologies, sorting volumes and types of activity and resource provision for each type of village TPI. The introduced system of stages in providing medical assistance allowed us to increase the availability of medical care for villagers. The efficiency of the approbated functional organization structure of healthcare in the country is proved by the decrease in overall death rate of the population during the 6 years

of analysis by 11,55% (from 20,9 to 18,5‰), perinatal – by 11,0% (from 13,6 to 12,1‰), infancy – by 13,4% (from 11,9 to 10,3‰), and mother's death rate – by 11,3% (from 30,1 to 26,7 per 100 thousand). Life span of villagers has increased to 67,2 years.

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**PECULIARITIES OF REGULATION OF A CARDIAC RHYTHM
AND ELECTROLYTIC COMPOSITION OF SALIVA
OF THE YOUNG ATHLETES FROM 11 TO 13 YEARS OLD,
ENGAGED IN VARIOUS KINDS OF SPORTS**

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The research of peculiarities of adaptation reorganizations of direction structures and functioning of the cardiovascular system of the organism is one of the most actual problems of the age physiology. In connection with it the studies were carried out in longitudinal regime, that allowed us to assess the adaptive abilities of the organism. During the past two years the young athletes were examined on the basis of the olympic reserve school on sambo-wrestling and cycling. The definition of electrolytes was conducted in mixed saliva after a meal. The study of the rhythm of the heart rate was carried out according to the R.M. Baevsky's methodology. The researches testify to the fact that the nature of the vegetative regulation and composition of the saliva change with the age and under the influence of sport. It is shown that the trained heart, in comparison with the untrained, has an influence on the sympathetic nervous system in the least degree and, in the greatest degree on the parasympathetic, that leads to the positive inotropic effect and increases the reserve opportunities of the heart. In terms of sports training young wrestlers have a voltage of adaptation mechanisms, that suggests a need for adjustment of the training regime. The voltage adaptation mechanisms develops as a consequence of failure of the functional reserves of the organism.

Keywords: cardiac rhythm, electrolytic composition, saliva, sport

The study of peculiarities of vegetative regulation of a cardiac rhythm (CR) of the organism, its adaptive reserves is one of the most actual problems of the age physiology. The high functional level should be considered as a prerequisite of the high physical capacity for work, the potential ability of the organism effectively to adapt to the requirements of competition and training loads [3].

The investigation of peculiarities of functional adaptation of the persons, systematically exposed to specific physical loads of the large volume and intensity, is of great importance for the formation of the knowledge concerning of the basic physiological mechanisms of adaptation to different kinds of sports [7].

The sports activity suggests a continuous and an intensive work of the whole organism, as a result of which the athletes have characteristic for each kind of sport neurohumoral mechanisms of urgent and long-term adaptation, providing fast switching functions, aimed at the achievement of the maximum useful result [1, 7].

The research of the structure of the cardiac rhythm is of special interest in the age physiology to determine the roles of regulatory mechanisms of functioning of the cardiovascular system in the formation of the general and special training. In addition, the reliability of functioning of the organism depends largely on the balance of the electrolytes and their concentration in the biological liquids [4, 6].

The purpose of our research was to investigate the peculiarities of the vegetative regulation of a cardiac rhythm and ionic composition of the teenagers' saliva from 11 to 13 years old, engaged in various kinds of sports.

Materials and methods of research

The contingent of the research consists of young sportsmen at the age of 11–13 years old, engaged in a cyclical kind of sports – highways cycle and carbon – the struggle of sambo-wrestling in the number of 17 and 25 people, respectively. Classes had been holding in the specialized children-youthful sports schools of the Olympic reserve of the town Maikop for two hours five times a week. All subjects are regularly trained not less than three years, took part in city, regional, all-russia competitions. The control group consisted of schoolboys at the age of 11–13 years old, trained in the traditional program of the traditional motoring (2 lessons per week). The research was conducted during the year.

We used the method of mathematical analysis of cardiac rhythm by R.M. Baevsky, according to which we evaluated a number of parameters such as: VS (variational scope), F (fashion), AF (the amplitude of fashion), IV (index voltage). The adaptive possibilities of athletes for the implementation of the dose of the physical activities (30 sit-ups for 30 s) are studied. It was conducted the study concentration of ions K^+ and Na^+ in saliva, defined photolorimetric method with the help of photolorimetr «KFK-3». For the research of the electrolytic composition of saliva we conducted the intake of the mouth fluid, which we received without stimulation, spitting out in the sterile Petri's dish. Then the saliva of the mixed secretion centrifuged with the addition of reagents for the separation of the heavy fraction of the protein macromolecules. The data were processed with the methods of the mathematical statistics using the «Microsoft Excel XP» and was determined by Student's t-criterion ($P \leq 0,05$).

Results of research and their discussion

According to the results of research it was established that during the research period of the athletes racing cyclists had an increase in heart rate during the year. This can be explained by the increase of training loads connected with the upcoming competitions. Such a response to the physical strain testifies to the

lack of the functional reserves. The athlete, after the batching of the measure load was observed short-term decrease of the heart rate below the initial values (from 67 beats/min up to 60 beats/min). This athlete regularly trained longer time (5 years), and showed higher sports results than others. Reduce heart rate leads to a decrease in oxygen consumption, change of biochemical processes in the myocardium. According to some literary data, it indicates the formation of bradycardia of this athlete [3, 7]. In our opinion, the mechanism of this phenom-

enon lies in the fact that in the process of long-term adaptation to stress of the dynamic nature is forming hypokinetic type of blood circulation, for which is typical small stroke volume in the presence bradycardia. This is fully consistent with the ideas about the field of economization of the functions, emerging as a «structural trace» in the process of long-term adaptation to the cyclical work of moderate power.

The Number of Na⁺ in the saliva of the athletes-racing cyclists to the end of the study increased (table).

Dynamics of indicators of cardiac rhythm and some biochemical indices of young athletes of 11–13 years old

Indicators	Sambo				Cycle racing				Control (tradit.)	
	in rest	after loading	in rest	after loading	in rest	after loading	in rest	after loading	in rest	
HR beats/min	79,93 ^x ± 11,24	105,64 ^x ± 13,93	76,96 ^x ± 9,46	91,73 ± 8,16	72,89 ^x ± 3,74	71,66 ± 1,88	82,00 ^y ± 5,13	78,14 ± 3,56	76,96 ± 2,08	74,35 ± 2,45
F, s	0,72 ^x ± 0,03	0,55 ± 0,02	0,79 ^y ± 0,03	0,64 ± 0,04	0,74 ^x ± 0,04	0,60 ± 0,03	0,92 ^y ± 0,09	0,58 ± 0,06	0,82 ± 0,02	0,86 ± 0,03
AF	26,84 ^x ± 3,84	42,9 ± 9,31	27,43 ± 2,54	24,92 ± 2,56	32,88 ± 3,35	27,28 ± 2,67	25,67 ± 7,49	30,37 ± 8,54	36,82 ± 1,77	34,99 ^w ± 3,27
VS, sec.	0,38 ^x ± 0,01	0,43 ± 0,02	0,39 ^y ± 0,01	0,55 ± 0,02	0,43 ± 0,08	0,47 ± 0,06	0,54 ± 0,17	0,48 ± 0,13	0,26 ^{zw} ± 0,02	0,37 ^w ± 0,04
IE, c.u.	56,18 ^x ± 12,81	90,73 ± 15,65	44,59 ± 10,36	31,95 ± 8,54	87,66 ± 28,09	66,48 ± 19,41	41,75 ± 24,94	54,73 ± 19,92	98,24 ^x ± 13,73	80,65 ^{zw} ± 25,64
Conc. Na, Mmol/l	15,99 ± 1,44	–	18,38 ± 2,07	–	11,44 ± 5,04	–	16,78 ± 2,53	–	–	–
Conc. K, Mmol/l	32,99 ± 3,56	–	36,59 ± 4,1	–	22,19 ^x ± 3,47	–	25,27 ^x ± 3,84	–	–	–

Notes: the significance of differences between the indicators of:
 y – before and after loading;
 x – the beginning and middle of the year;
 n – sambo and highways cycle racing;
 c – sambo – control group;
 w – cycling – control group.

We assume that there is a reaction to a significant stress exposure. When the pressure increases angiotensin II begins to produce in the organism. In turn it is connected with the formation atrisodiumretical factor (ASF), which increases the excretion of sodium, diuresis, reduces the volume of extracellular water and reduces the pressure. As excretion ASF is provided by the cells of the myocardium in response to mechanical stretching of the atria, it may indirectly speak about the positive inotropic effect on CR of the training load. Reaction of the organism with the participation of ASF can be considered as a protective, aimed not only at preventing a strong stress of raising arterial pressure, but also the weakening of the sympatho-adrenal activity [5]. Thus, cycling classes are a stress factor causing the reaction, containing specific (vasomotor) and non-specific (sympatho-adrenal) component. Apparently, the lack of the functional reserves of the growing organism of the young racing cyclists are compensated at the expense of an unspeci-

fied component, as evidenced by the dynamics of cations in the saliva.

The adolescents who are engaged in the fight of sambo, in the beginning of the year after the loading heart rate was significantly higher than in the rest, which is explained by their participation in the competitions of different level ($P \leq a 0,05$) (look table).

Competitions are a great stress for the organism, as far as they are associated with significant emotional load. By the end of the experiment, a number of athletes with reduced adaptation resources is increasing, that testifies that functional capabilities of the organism do not conform the training regime. In this age, the organism's reactions to stimuli of various kind are hyperactive [4]. Excessive training load can give rapid increase of the sporting results, but they will be too big «physiological price». The content of electrolytes in the saliva they have significantly higher than the young men engaged in cycling ($P \leq a 0,05$) (look table). The high content of K⁺ is marked on the

strengthening of the activity of the sympathetic nervous system and the central contour of the regulation. The concentration of ions of Na^+ is also increasing, that, apparently, says about the tension of the adaptation mechanisms, leading to the increase of the load on the heart muscle [6, 10]. This dynamics is the result not only of sports activity, but also the characteristics of the age stage. As it is known, in the 12–13 years of the age, the processes of puberty, leading to an increase in the activity of subcortical nerve centers of the hypothalamus and the pituitary gland, participating in the formation of a new hormonal status of the maturing of the organism.

No significant differences in the heart rate between the control group and groups of athletes have been identified. Analysis of other parameters of cardiac rhythm showed that, in comparison with the athletes racing cyclists the adolescents who are not engaged in sports sections, more pronounced sympathetic influence and reduced parasympathetic. This may be indicative of low functional reserves of the organism.

Conclusion

Thus, our research suggests that the nature of the vegetative regulation and the composition of the saliva change with the age and under the influence of sports.

A significant impact on the regulatory mechanisms have cycling classes. Changes of the physiological processes in connection with the execution of the training loads caused by the influence on the organism of the movements of a cyclical nature. Thus, in the first place, there are changes of the functional state of the locomotor system. The vegetative processes are being reconstructed under the influence of the irritations that indicate possible hypoxia, but mainly under the influence of the motor-visceral reflexes. As a result of physical loads in the process of long-term adaptation there are changes on different levels of hierarchy. The trained heart, in comparison with the untrained, has an influence on the sympathetic nervous system in the least degree and, in greatest degree the parasympathetic, which leads to the positive inotropic effect and increases the reserve opportunities of the heart. When planning the implementation of cyclic exercises

processes of the age of the development of the propulsion system deserve a special attention. Therefore, when planning it is important to consider not only metabolic processes, but also age-related peculiarities of the regulation of movements and development of technology of motor skills.

Due to external stress impacts there are strengthening of the intensification of the activity of the highest vegetative centers, leading to the transition of the management functions to the lowest, autonomous levels up to the highest, central, as a result of excitation of the cortical and subcortical structures. The presence of athletes with a voltage of adaptation mechanisms in the group of wrestlers indicates the need for adjustment of the training regime. It is obvious that the joint training of the athletes of the same seniority classes, but different age does not provide sufficiently differentiated selection of the training load. According to some scientists, the voltage is not always explained by impacting factors, it can develop as a consequence of the failure of the functional reserves of the organism.

Installed features of the functional adaptation of boys 11 to 13 years old dictate the need for development and implementation of science-based prevention and health promotion activities, aimed at the normalization of the disordered functions of the regulation.

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THE GENERAL MEDICAL PRACTICE AMOUNT AND NATURE UNDER THE VILLAGE CONDITIONS

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The general medical practitioners work's volume and nature, having worked in the Penzenskaya Region rural areas have been presented in the paper. The curative, preventive work amount, and also the specialized medical care volumes, provided by GPs have been given in this paper.

Keywords: the general physician, sick calls, general medical practice, rural area, service registration population to GMP

At the present stage, the public health care reform is aimed at the strengthening role of the primary medical and sanitary care (PMSC). And practically almost all of the world Community is developing PMSC on the general medical practice (GMP) principle (Kalininskaya A.A. et al., 2011).

So, the general practitioner (GP) is being become the central figure in the public health care delivery in the rural areas (Denisov E.N., Chernienko E.I., et al., 2008; Kalininskaya A.A., Dzugaev A.K., et al., 2012). At the same time, the general medical practice (GMP) is slowly being introduced in the village.

So, in the process of the study, the general medical practice certification had been performed by us, having worked in the Penzinskaya Region's rural areas, which allowed us to be determined the organizational structure, and the people's current number, having attached the GP. Thus, the rural population by the general practitioners provision in the Region has been made up 2,8 for 10 thousand of the people concerned.

So, the physicians' largest share has been made up the doctors, at the age from 40 to 49 years (e.g. 49,0%), 50–59 years (e.g. 33,3%), 30–39 years (e.g. 12,5%), 60 and more years (e.g. 3,1%). The least one – has been made the physicians, at the age up to 30 years (e.g. 2,1%). The women doctors proportion – has been made up – 72,0%. The population size, having served by the general practitioner (GP) is quite ambiguous, because the GP is constantly providing the necessary medical care to the population of the bonded medical assistant and obstetric centers (MAOC).

Further, in the development of the Public Health Ministry order of the Russian Federation № 350, dated from 20, November, 2002 «On the Ambulatory–Outpatient Care Improvement to the Russian Federation Population», RF MPH and SD № 584, the order, dated from 04.08.2006, has been issued «On the Public Health Medical Services Organization Order for the District Principle». The general practitioner's position (e.g. the family doctor) is being set at the rate of: the one position for

1 500 people of the adult population, and the one for 1 200 people of the adult and the children population. So, for the GP's each position, the two posts of the medical nurses in the general practice are being established.

So, the general practitioners (GP) and the medical nurses of the general medical practice (GMP) ratio in 2008 has been made up 1:1,7 in the Penzinskaya Region rural areas. The general practitioners (GP) stuffing has been made up 97,5%, the medical nurses of the general medical practice has been made up 96,1%.

The analysis has been shown, that 30,2% of GPs are working without of the bonded MAOC, 25,0% of GPs are serving the population of the one bonded MAOC, 15,6% – the two bonded MAOC, 7,3% – the three ones; 21,9% – the four ones and more.

It, moreover, should be noted, that 51% of GPs, having worked in the rural MP of the Penzenskaya Region, are serving as the adult, well as the children population, and 49,0% of the GPs – only the adult population.

The population served by the rural population number, the GPs have been distributed as follows: the GPs proportion in the rural areas, having served the adult and the children population from 1 500 up to 2 000 people, has been made up 70,2%; from 2,000 up to 2 500 people – 17%; from 2 500 up to 3 000 people – 6,4%, more 3 500 people – 2,1%. The GPs proportion in the rural areas are served only by the adult population from 1 500 up to 2 000 people has been made up 81,6%; from 2 000 up to 2 500 – 10,2%; from 2 500 up to 3 000 – 6,1%; from 3 000 up to 3 500 – 2,0%.

The bonded population largest share in the attached GPs, having served the adult and the children population, have been children from 0 up to 17 years – 29,4% (e.g. from them the children under one year (e.g. 1,7%), from 0 up to 14 (e.g. 19,6%), from 15 up to 17 (e.g. 8,1%), and the persons from 60 and older (e.g. 17,7%). So, the working – age population share from 18 up to 59 years has been made up 52,9%.

At the GPs, having served only the adult population, the largest proportion of the pop-

ulation have been made up the persons from 50 up to 59 years (e.g. 28,8%) and those ones from 60 and older (e.g. 25,6%), that is the population of the pre-retirement and the retirement age. So, the working – age population share from 30 up to 39 has been made up 13,4%, and from 40 up to 49 years – it has been made up 16,4%. The young people from 18 up to 19 years – have been made up 2,8%, and from 20 up to 29 years – it has been made up 13,0%.

So, the general practitioners (GPs), having worked in the rural areas, practically provide all the necessary medical care in 11 specialties. The GPs work volumes, under the current circumstances, have already been presented in the table. The sick calls frequency to GPs, having served, as the adult, well as the children population in the rural areas, with the medical treatment purpose, has been made up 3,888,1 people per 1,000 of the respective population. At GPs, having served only the adult population, the house calls frequency to GPs has been made up 2.979,0 people of the respective population.

The highest sick calls frequency, with the medical treatment purpose to GPs, having served, as the adult, well as the children population, it has been *the therapeutic profile* – 3 141,3 sick calls per 1 000 of the affected population, from which 46,5% in the pediat-

rics, in the internal medicine (e.g. 42,9%), in the cardiology (e.g. 9,5%), in the endocrinology (e.g. 1,1%). So, the house calls frequency of *the specialized profile* has been made up 688,5 sick calls per 1,000 of the population concerned (e.g. the neurology 58,0%, the otolaryngology 20,5%, the ophthalmology 10,1%, the dermatology 7,8%, the gynecology 3,6%), *the surgical profile* – 58,3% (e.g. the traumatology 53,2%, the surgery 46,8%).

For GPs, having served only the adult population, the sick calls frequency with the medical treatment purpose of *the therapeutic profile* has been made up 2 674,24 house calls per 1 000 people of the affected population, of which 86,4% in the internal medicine, the cardiology (e.g. 9,0%), the endocrinology (4,5%). So, the house calls frequency of *the specialized profile* has been made up 292,93 sick calls per 1 000 people of the affected population, from which 34,5% in the ophthalmology, the neurology (e.g. 32,7%), the otolaryngology (e.g. 29,2%), the dermatology (e.g. 3,2%), the gynecology (e.g. 0,4%). So, the sick calls frequency of *the surgical profile* to GPs has been made up 11,7 house calls per 1 000 people of the population concerned, of which 84,6% in the surgery, and the traumatology (e.g. 15,4%).

The Sick Calls to GPs Population in the Rural Areas of the Penza Region in Specialties with the Medical Treatment Purpose (per 1 000 people of the Relevant Population)

Specialty	The Sick Calls Number per 1 000 people of population			
	GP serves the adult and children population	%	GP serves only the adult population	%
The Therapeutic Profile, including:	3 141,3	80,8	2 674,24	89,8
Therapy	1 348,0	34,7	2 309,7	77,5
Pediatrics	1 460,3	37,5	–	–
Cardiology	299,5	7,7	239,04	8,0
Endocrinology	33,5	0,9	125,5	4,2
The Surgical Profile, including:	83,4	1,5	11,7	0,4
Surgery	27,3	0,7	9,9	0,3
Traumatology	31,0	0,8	1,8	0,06
The Specialized Profile, including:	688,5	17,7	292,93	9,8
Otolaryngology	141,0	3,6	85,4	3,0
Ophthalmology	69,5	1,8	101,03	3,4
Neurology	399,4	10,3	96,0	3,2
Gynecology	25,1	0,6	1,2	0,04
Dermatology	53,5	1,4	9,3	0,3
Total:	3 888,1	100,0	2 979,0	100,0

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THE MICROFLORA DIAGNOSTICS AT CHOLELITHIASIS

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The intestinal microflora and the hepatobiliary zone are played the significant role in the pathogenesis of the gallstone disease (GSD). However, the bacteriological studies results of the bile, in this pathology, are quite not always comparable. So, there are very few studies, having devoted to the anaerobic microorganisms and the anaerobic bacteria role study at the GSD, the significance of which the complicated forms of the cholelithiasis in the pathogenesis is large [2]. Moreover, there are no methods for the rapid diagnostics of the microbiological pathogens of the infectious process in the gall bladder. There are contradictory results of the bilicultures' susceptibility definition to the antimicrobial and the antibacterial chemotherapy drugs [1, 3].

Keywords: microflora, hepatobiliary, cholelithiasis, gallstone disease

The Study Objective: the medical treatment results improvement in the patients with the acute calculous cholecystitis (ACC).

Materials and methods of research

The 125 patients with the acute calculous cholecystitis (ACC), at the age from 25 up to 80 years old have already been examined. So, the 97 (e.g. 77,6%) woman and the 28 (e.g. 22,4%) men have already been involved in the medical examination study. So, the patients have already been divided into 2 main groups. The group 1 – these are the ACC patients, whom underwent the traditional conservative medical treatment before and after their surgery operations (e.g. 49 persons). The group 2 – these are the ACC patients, at whom underwent the etiotropic preoperative antibiotic prophylaxis, and the rational postoperative antibiotic prophylaxis (e.g. 76 persons).

The bacteriological examination of the gall bladder bile, the gall bladder wall biopsy, and the biliary stones has been undergone at the patients of the groups 1–2. The PCR-identification of the anaerobic microflora microorganisms and the bacteria in the blood, the gall bladder bile, and the gall bladder wall biopsy has been performed at the patients of the group 2.

The empirical antibacterial therapy has been prescribed by the cephalosporins of the III and IV generations of the aminoglycosides or the penicillin group agents for the patients of the group 1, depending on the time of illness onset and the severity of the clinical symptoms.

So, the preoperational antimicrobial prophylaxis has been administrated, with due regard for the PCR final results, having obtained during the first days just after admission to the hospital at the patients of the group 2. The patients of the group 2 have been received the rational antimicrobial therapy, having based on the PCR final results and the bacteriological study, in the postoperative period.

Thus, all the patients have already been operated, in connection with the ACC destructive forms, in the emergency or in the delayed manner, preferably using the video-laparoscopy and the mini – laparotomy access.

Results of research and their discussion

The ACC following forms have morphologically been diagnosed: the acute obstructive calculous cholecystitis (AOCC) – 31 (e.g. 24,8%), the phlegmonous calculous cholecystitis (PHCC) – 56 (e.g. 44,8%), and the gangre-

nous calculous cholecystitis (GCC) – 38 (e.g. 30,4%) cases.

So, the microbiological research has been shown, that a high percentage of the seedings' positive results has been obtained at the PHCC – 85,7%, and the GCC – 84,2%. When the AOCC, the microorganisms inoculation has been made up only 12,9%. This is indicated on the short duration of the inflammatory process of the gall bladder, and on the contamination absence of the given biotype and the bio-inhabitant.

When the PHCC, the representatives of the *Enterobacteriaceae* family have already been isolated from the bile in the monocultures; the microorganisms associations, having presented by the *E. faecium* and the *S. epidermidis*, the *Candida albicans* and the *S. epidermidis*, have been found just in the 5 samples.

When the AOCC, the bacteriocholia has already been revealed and only at 4 (e.g. 12,9%) patients, for all this, the *E. coli*, *E. faecium*, and *Actinomyces spp.* have been also found at them.

So, the GCC has been characterized by the *E. Coli* separation from the patients' bile, which is three times more, that the *Enterococcus spp.*

The microbial microflora of the biopsy materials and the tissue samplings by its qualitative and the quantitative compositions has not almost been differed from the bile's microflora.

The *Pseudomonas aeruginosa* has been often stood at the PHCC – 20%. Then, the microorganisms' spectrum at the patients with PHCC has also been included the staphylococci (e.g. 20%), in the quite equal shares – *E. coli* and *E. faecium* (e.g. 13,3%); *C. albicans*, *K. pneumoniae*, *Staphylococcus saprophyticus*, *Moraxella spp.*, and *P. constellatus* by 6,6%, respectively.

The Gram-positive cocci are much more frequently found on the surface of the gall stones concrements, the share of which has been made up 63,7% (including, the 36,4% staphylococci, 27,3% enterococci). By two

types of bacteria have already been found on the gall stones concretions, only at the PHCC, and they have already been presented by the *P. aeruginosa* and *S. epidermidis*, *C. albicans* and *S. epidermidis* the microorganisms associations.

So, the biomaterials study has already been shown a high degree of the total bacterial contamination (e.g. 10^7 – 10^8 CFU/g) of all the samples at the quite different ACC histological forms, but more often with the abscess and the gangrenous ones. This is etiological role evidence of the already identified microorganisms in the inflammation development of the gall bladder.

The most frequently the *P. aeruginosa* culture has been isolated at the patients with the PHCC. It has been managed to be isolated the asporogenous anaerobic microorganisms in the monoculture – *Peptococcus constellatus*, with the severe clinical picture, due to the empyema development of the gall bladder and the local purulent peritonitis, at this form of the GSD, from the gall bladder and its wall content. However, it should be noted, that the anaerobic microorganisms have not been identified yet in the similar clinical symptoms, having caused by not only the gall bladder empyema, but and also the peritonitis, the perivesical and the cervical infiltration, the perivesical abscess at the 48 (e.g. 85,7%) patients with the PHCC, and at the 38 (e.g. 100%) patients with the GCC.

Thus, the bacteriological research has been shown, that the representatives of the *Enterobacteriaceae* family (e.g. 61%) have been dominated in the studied samples. Then, the *E. faecium* – 14% are occupied the second place among all the isolated crops and the cultures. The Gram-positive cocci have been also presented by the *S. epidermidis* – 7,2%, and by the anaerobic cocci *P. constellatus* – 3,6%. The ГГОБ *Moraxella spp.* and the *Pseudomonas spp.* specific weight has been made up 14,4%.

The bile, the gall bladder's wall, and the gall stones concretions at the patients with the quite various ACC forms have already been predominantly infected by the intestinal microflora. For all this, it is quite clear, the obvious relationship between the histological form of the inflammatory process in the gall bladder, the spectrum, and the microflora microorganisms quantity.

So, it has been revealed at the microflora study of the gall bladder by the PCR method that at the destructive ACC forms in the blood, the biopsy material and the tissue sample of the gall bladder's wall, and in the bile, the anaerobic microorganisms DNA is found out.

The largest percentage of the identified monocrops and the monocultures of the anaerobic microorganisms has been obtained at the gall bladder study (e.g. 86,2%), and the biopsy material and the tissue sample of the gall bladder's wall (e.g. 92,1%). This is the proof of the obtained pathognomonic results, and it, moreover, is indicated the absence of the false – positive results of these microorganisms identification, with the possible presence of the concomitant inflammatory processes.

Thus, in the monocrop and the monoculture, the anaerobes have already been identified only in the 144 (e.g. 69,6%) samples.

So, the microbial associations have been presented in the 63 (e.g. 30,4%) cases in the 6 special combinations. It had been found out, in the comparison of the anaerobes identification obtained results with the ACC histological form, that at the 72 patients' examination, with the two groups at the 6 (e.g. 33,3%) patients with the catarrhal cholecystitis, the *Bacteroides fragilis*, the *Bacteroides spp.* and the *Fusobacterium spp.* cultures and the crops were identified. It has been found out the most diverse and the severe microbial microflora at the 26 (e.g. 76,4%) patients with the PHCC. Thus, the abscess or the phlegmonous cholecystitis is occupied the first place, in the anaerobic microorganisms variety, and the gangrenous cholecystitis – is on the second place.

It has been revealed the relationship between the number of the already identified anaerobes and the further development of the diverse and severe GSD complications at the analysis of the obtained results. The anaerobic microorganisms have already been revealed at the 47 (e.g. 81%) patients from the 58 patients with the PHCC and the GCC. That is, there have been the diverse and severe perivesical complications at all these patients.

There have been only the 76 patients in the group 2, from whom the AOCC (e.g. the catarrhal cholecystitis) has been diagnosed at the 18 (e.g. 23,7%) patients, the PHCC and the GCC with the diverse and severe complications – at the 58 (e.g. 76,3%) patients. So, in all the cases, the aerobic, the anaerobic – optionally, and the anaerobic microflora have been identified in the mini-crop and the mini-culture, and also in the associations (e.g. by means of the bacteriological method and the PCR method).

So, the aerobic microflora has already been diagnosed by the bacteriological method, and the anaerobic one – in the 5,2% cases in the group 2, in the 94,8% cases. Then, the anaerobes have already been identified by the PCR method at the 56,9% patients, which is quite significantly higher this indicator and its pa-

parameter, in comparison with the bacteriological method. The etiological role in the diverse, severe and complicated forms development of the gall stone disease (GSD) has been established in the 65,5% cases by the PCR method, which is higher the similar indicator and its parameter at the catarrhal cholecystitis.

Thus, it can be assumed, that in the large percentage of the cases, the ACC are being developed the destructive forms and its diverse and severe complications at the anaerobic infection presence, which is often not diagnosed by the bacteriological method (see, the table 1).

Table 1

The Microflora Identification at the ACC Complicated Forms

The microorganisms' cultures	The identification method of causative agent		AOCC	The GSD complicated forms
	The bacteriological method	PCR		
The aerobic microflora	55 (94,8%)	–	13 (72,2%)	20 (34,5%) ¹
The anaerobic microflora	3 (5,2%)	33 (56,9%)**	5 (27,8%)**	38 (65,5%)**

Notes: ¹ – the GSD complicated forms for the aerobic microflora: PHCC, the local peritonitis; GCC, the local peritonitis; GCC, the perivesical infiltrate. * – $p < 0,05$ (e.g. at $F > 1,64$), ** – $p < 0,01$ (e.g. at $F > 2,31$).

The susceptibility determination obtained results of the already separated crops and the cultures to the antimicrobial agents and the drugs have been shown, that the overwhelming majority of them are susceptible to the studied agents and the drugs. So, among the Enterobacteriaceae, the resistance to the antimicrobial agents and the drugs has been revealed only in the *E. coli* crops and the cultures. At the same time, the 9% of the strains have been resistant to the amikacin, and to the gentamicin, moreover, the 18% – to the sparfloxacin and to the ciproflaxacin.

So, the *Pseudomonas aeruginosa* strains have already been resistant only to the cefoperazone, and, moreover, they are susceptible to the ampicillin, the ceftazidime, the ciprofloxacin. Then, the *P. putrefaciens* strains have already been susceptible to the all antipseudomonal agents and the drugs.

In the *P. constellatus* susceptibility determination to the antimicrobial agents and the drugs, it has been revealed, that all the separated strains of this species are quite resistible to the metronidazole – the drug, which is often used in the clinical practice, and, moreover, they are susceptible to the other agents and the drugs already studied.

Thus, the overwhelming majority of the microorganisms' strains, having separated from the quite different ACC patients materials, are susceptible to the already studied antimicrobial agents and the drugs, which have already been included into the special form for the empirical antimicrobial chemotherapy, at this pathology condition.

So, in the group 2, having considered the already separated anaerobic microorganism's stability (e.g. *P. constellatus*) just to the frequently used metronidazole in the clinical practice, in the destructive forms of the acute cholecystitis, the following schemes of the antibacterial therapy have already been administrated: the cephalosporins of the III–IV generations with the aminoglycosides; the β – lactam antibiotics with the aminoglycosides or the fluoroquinolones and the aminoglycosides.

As it is seen from the table 2, at the patients of the group 2, on the background of the medical treatment of the antimicrobial chemotherapy, by the final results of the determination, which have been measured by the susceptibility of the isolated microorganisms, in comparison with the group 1 (e.g. 15 (30,6%)), it has been recorded significantly lower rate of the diverse and severe complications – 5 (e.g. 6,6%).

Conclusions

1. The microbiological study at the patients with the acute calculous cholecystitis (ACC) is allowed to be determined the whole spectrum of the microorganisms (e.g. the aerobic, the anaerobic – optionally, and the anaerobic ones), and to be administrated the efficient etiologic, rational antimicrobial chemotherapy.

2. The anaerobic microorganisms are one of the main etiological factors in the destructive forms development of the calculous cholecystitis (CC), that by the polymerase chain reaction (PCR) method are identified at the 38 (e.g. 65%) patients.

Table 2

The Postoperational Complications at the Patients of the Groups 1 and 2

The complications after CHE	The 1– st group	The 2 – nd group
The total number of patients	49 (100%)	76(100%)
<i>The opened CHE</i>		
The number of patients	5 (10,2%)	7 (9,2%)
P/o scar seroma	2 (40%)	1(14,3%)
P/o scar infiltrate	–	–
P/o scar abscess	1(20%)	–
GB bed seroma	–	–
GB bed abscess	–	–
The total % complications in opened CHE	3 (60%)	1 (14,3%)*
<i>CHE from mini – access</i>		
The number of patients	17 (34,7%)	23 (30,3%)
P/o scar seroma	3 (17,6%)	2 (8,7%)
P/o scar infiltrate	2 (11,7%)	1 (4,3%)
P/o scar abscess	–	–
GB bed seroma	2 (11,7%)	–
GB bed abscess	–	–
The total % complications at CHE from mini – access	7 (41%)	3(13%)*
<i>The laparoscopic CHE</i>		
The number of patients	27 (55,1%)	46 (60,5%)
P/o scar seroma	3 (11,1%)	1 (2,2%)
P/o scar infiltrate	–	–
P/o scar abscess	–	–
GB bed seroma	1 (3,7%)	–
GB bed abscess	1 (3,7%)	–
The total % complications at LCHE	5 (18,5%)	1 (2,2%)**
The total % complications	15 (30,6%)	5 (6,6%)**

Notes: * – $p < 0,05$ (e.g. at $F > 1,64$), ** – $p < 0,01$ (e.g. at $F > 2,31$).

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Materials of Conferences

**ANALYSIS OF INDICATORS THAT
REFLECT THE ACTIVITY OF THE SYSTEM
COAGULANT IN EFFECTS THE BODY
OF ELECTROMAGNETIC RADIATION
WITH THE POSITION
OF «GOLDEN MEAN»**

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«Golden Section», that is, division of the whole into parts 0,618 and 0,382, associated with the ideal norm, which should aim at providing a functional system homeostasis. An indicator of the steady state of the system over time is also her desire for «Generalized Golden Section» or «nodes» 0,500 0,500; 0,618 0,382; 0,682 0,318; 0,725 0,275; etc. In turn, the tendency of the system to the so-called «attractors repulsive» and «antinodes» 0,570 0,430; 0,654 0,346; 0,705 0,295; 0,741 0,259; 0,767 0,233; ..., indicates the presence of the unstable state of the functional system, as they are the characteristics of chaos.

The article analyzes the system coagulants exposed EHF EMR and magnetic fields of different modes, with the «golden section» and «of generalized golden sections». As indicators of a coagulant, the clotting time of blood and plasma recalcification time. Shown that the presence of «generalized golden sections» in the relationship between clotting time and recalcification time, indicates the desire of coagulants to the sustainable equilibrium in the case of EHF EMR exposure and the magnetic field with shielding schungite and irradiated EHF EMR with increasing exposure time (180 and 270 min).

The purpose of this study is to test with a «golden mean» and «generalized golden section» basic indicators of the coagulant activity of the system, when exposed to EHF EMR and magnetic fields of various regimes.

For experimental studies used Vistar rats of both sexes of the same age. The rats of the first experimental group were exposed to EMR UHF frequency 37 GHz and a power of less than 0,1 mW/cm² for exposure 30, 90 and 270 min. Second experimental group of rats exposed to a magnetic field frequency of 3, 5 and 8 Hz with an exposure 30, 90 and 270 min. At the same time some of the animals in the experimental groups was screened from the source of EHF EMR and magnetic fields extremadamente low-frequency layer shungite 5 cm to study the regulation of the activity of blood aggregation used the following parameters: clotting time and recalcification time. Performed comparison of these measures in health and disease, determine the pres-

ence or absence of the «golden ratio» and «generalized golden sections» in these parameters in the control and experimental groups.

An analysis of the influence of EHF EMR and magnetic fields on the parameters reflecting the activity of coagulants. The normal clotting time and recalcification time treated as 0,760 and 0,240, that is, do not form a «golden ratio» (0,618 and 0,382). The irradiation of laboratory animals EHF EMR and magnetic fields with schungite without schungite been some changes between these indicators.

All ratios clotting time and recalcification time obtained for the groups exposed EHF EMR and magnetic field with screening and without screening schungiteschungite differ from the classical «golden section», but some of them are close to the «Generalized Golden Section» or «nodes». Since the value of 0,688 obtained by irradiation with shielding EHF EMR schungite, close to the «node» 0,682, 0,730 and the value obtained by the irradiation of a magnetic field with shielding schungite, close to the «node» 0,725. The proximity to the «Generalized Golden Section» refers to the desire of coagulants to the sustainable equilibrium. In turn, the values obtained in the groups exposed to EHF EMR and magnetic field without shielding schungite (0,702 and 0,739, respectively) are close to the «attractor repulsion» and «antinodes» (0,705 and 0,741), indicating that the unstable state of the system and the deviation from the norm.

The irradiation of a magnetic field frequency of 3, 5 and 8 Hz, only the ratio 0,729, obtained for the group, exposed to a magnetic field with a frequency of 3 Hz, close to the «node» 0,725, which indicates a tendency of the system to a stable state of coagulants. All other values are far from the «generalized golden section», and the value of 0,739 obtained for the group exposed to the magnetic field of 8 Hz, indicates the proximity to the «antinode» 0,741, which characterizes the deviation from the norm and the existence of non-equilibrium state.

Changing attitudes clotting time and recalcification time were observed as a result of exposure to EHF EMR exposure time of 90, 180 and 270 min. This ratio is close to the «Generalized Golden Section» in the two cases. When exposed 180 minutes get 0,688, with an exposure of 270 min – 0,684. These values are close to the «node» 0,682, indicating that a steady state of coagulants. In turn, the exposure value obtained 90 min 0,704, which is close to the «antinode» 0,705 and pointing to the unstable state of the system. Values obtained by irradiation EHF EMR, much closer to the classical «golden section» than the values obtained when the magnetic field exposure.

The irradiation of magnetic field exposure time 90, 180 and 270 min relations clotting time and recalcification time not constitute a «Generalized Golden Section». Consequently, the system of coagulants in this case tends to a stable equilibrium state and is far from the norm. The value obtained for the exposure time 270 min, coincides with the «antinode» 0,741, which indicates the presence of active disease process.

Thus, the presence of «generalized golden sections» in the relationship between the clotting time of blood and recalcification time, points to the tendency of the system coagulants to sustainable equilibrium in the case of EHF EMR exposure and the magnetic field with shielding shungite and irradiated EHF EMR with increasing exposure time (180 and 270 min).

The work was submitted to International Scientific Conference «Innovative medical technologies», Russia (Moscow), November, 20-22, 2012, came to the editorial office on 14.11.2012.

**EFFECT OF CONCENTRATION
ULTRALOW 1,5-BENZODIAZEPINONA-2
ON THE PAIN THRESHOLD IN RATS
INTOXICATED WITH THEIR ORGANISM
CADMIUM CHLORIDE**

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Certain substances benzodiazepine are found to retain their specific effect in the range of ultralow concentrations (ULC) from 10–14 to 10–12 M without the side effects. Moreover, the magnitude and direction of their action depends from the dose of the substance as well as the functional state of the organism. For example, increasing the concentration of heavy metals in the body significantly alters its response to the effects of various pharmaceuticals. The aim of this work was to study the effect of 1,5-benzodiazepinon-2 (1,5-BDA) at the ULC on the pain threshold in rats against the background of cadmium chloride intoxication. The investigations were carried out on 70 white outbred male rats weighing between 230–250 grams. Control group of rats was injected with saline. Three groups of rats were injected during seven days intraperitoneally by cadmium chloride at a dose of 1 mg/kg, modulating accumulation of the metal in the organism tissues. Then these three groups and three groups of rats without intoxication were administered 0,2 ml of 1,5-BDA at concentrations 10–12, 10–13, 10–14 M. Analgesic effects were detected in the test «electrical stimulation», where the threshold of pain (TP) was determined. The results of the experiments were calculated statisti-

cally using Mann-Whitney U test. Under the action of 1,5-BDA at concentrations 10–12, 10–13, 10–14 M TP increased by 54, 48, 71 % ($p \leq 0,05$), respectively, compared with the control, that is evidence of the presence analgesic effect of 1,5-BDA at the ULC. The intoxication of the cadmium chloride resulted decreasing pain sensitivity (TP increased only by 45%), against the background of cadmium chloride intoxication the introduction 1,5-BDA increase even greater TP at all tested doses: by 169, 173 and 222% ($p \leq 0,01$) in comparison with the control. Also BP of these groups increased in comparison with the effect of the cadmium chloride by 124, 128 and 177% ($p \leq 0,01$) respectively. Thus, we have found that 1,5-BDA had analgesic effect at the ULC and dose-dependent analgesic effect was even more pronounced against the background of cadmium chloride intoxication.

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**HOW TO GIVE UP SMOKING ON YOUR
OWN PIECES OF ADVICE TO SMOKERS
AND SURROUNDING PEOPLE NEW
METHODS OF STRUGGLE AGAINST
SMOKING**

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Smoking is one of the major risk factors of cardiovascular and oncological diseases, it continues to cause irreparable harm to human health. The fact that smoking shortens life is undeniable, and it is now recognized by the majority of researchers.

Despite a lot of achievements in the fight against smoking, it is not so simple to overcome this habit. According to the data of the Institute of Cardiology of the Tomsk Scientific Centre of the Russian Academy of Medical Sciences, smoking prevalence for men constitutes 70% among women – 8%. These high figures point, on the one hand, to the cultural and social level and, on the other hand, the lack of effectiveness of existing ways to combat smoking.

This is partly due to the fact that anti-smoking techniques such as acupuncture and its varieties, psychotherapy, the use of drugs (unfortunately, not always accessible to the population) are not without side effects and often require a lot of time as well as repeated cumbersome courses of treatment.

The proposed way to combat smoking is addressed directly to a smoker; it is harmless and aimed at providing positive motivation, reinforcing the negative personal attitude of the person to smoking. It always clearly defines the position of the surrounding people.

Simplicity and availability of the method, its fundamental difference from other existing approaches allows us to recommend it for both the medical staff and patients themselves. The author hopes that his work could help beginners as well as experienced smokers to give up smoking. His task will be fulfilled, if this technique can add, at least, a small part of those who have read this brochure to «the galaxy» of non-smokers and therefore healthy people. To reach a larger audience, the author publishes it at once in the Russian and English languages. It should be noted that the higher the person's educational is, the better this technique works. At the present moment, during 25 years of its use hundreds of people managed to give up smoking on their own.

The author will be grateful for constructive comments of his readers and asks them to send letters and reviews as well as possible questions to the following address:

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THE INVESTIGATIONS OF THE INFLUENCE OF THE TWO TYPES OF THE MAGNETIC STORMS ON THE HUMAN ORGANISM

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The present work was carried out at the project of the International Geosphere-Biosphere Programm «Global changes». According to the resolution of the General Assamble of the International Council of the Science Unions in Bern in 1986 IGBP became by the continuation of the programm «International Geophysical Year» (1957) and «Human being and biosphere» (1980). A study of the problems of the sun-biological relationships was first begun by A.L. Tchizhjevsky [1]. The investigations of the influence of the sun activity on the human organism were undertaken later [2, 3] regardless to the concretic magnetic storm.

The present article reports statistical results of the treatment of the medical and geophysical data. The medical data were taken from the station of the first medical aid. The station of the first medical aid is located in Murom of the Vladimir region that corresponds to the middle geomagnetic latitude

around 53°. The geophysical data were taken from the middle latitude geophysical observation Borok in Yaroslavl region. The observation is located on the same geomagnetic latitude 53° and on the same geomagnetic meridian 111°, which crosses Karelia and Scandinavia. Murom and Borok may be found in the projection of the plasmasphere on the Earth's surface under the specific geophysical conditions. The plasmasphere is one of the regions in the structure of the Earth's magnetosphere. The plasmasphere is subject to dynamics depending on the geomagnetic activity. According to [4], the intensification of the high frequency oscillations of the magnetic field of the Earth (the high frequency geomagnetic pulsations) takes place in the plasmasphere. A systematic study of the geomagnetic pulsations in Russia was begun since International Geophysical Year [5].

The medical data given in the article contains the recordings of the call time of the first medical aid in connection with sudden attack cardio-vascular and neuros diseases. Analysis is made in each variety of the following cardio-vascular diseases: chronic ischemia diseases of heart, hypertonia diseases, hypertonia crisis, stenocardia, myocardial infarction and in the each variety of the following neuros diseases: vegetative-vascular dystonia, neuro-circulatory dystonia, bronchial astma, myoneurasthenia, mental affection, psychosis, schizophrenia, insult. The medical data were chosen in accordance with the concrete magnetic storm because of the each case of the magnetospheric substorm is individual and does not repeat, according to [6]. The medical data were analysed in three time intervals: before the magnetic storm, during the magnetic storm, after the magnetic storm.

The geophysical data contain the information on the magnetic storms: the time of beginning of the storm, duration of the storm, the types of the magnetic storms (recurrent or flash), their particulars. Moreover they contain the information on the index of the geomagnetic activity and also the recordings of the geomagnetic pulsations. Only the high frequency geomagnetic pulsations (1-10 Hz), whose rhythms have coincidence with the human biorhythms, were chosen from the number of the known geomagnetic pulsations originated in the magnetic storm (substorm). The geomagnetic pulsations to be distinguish among the others pulsations are continuous pulsations Pc1 (pearl). The generation of Pc1 may accompany the magnetic storm and also it may be observed after the magnetic storm on a third-seventh days-nights. It is possible that they have a different mechanisms of the generation. It is possible, the fact is a reason of the different reaction of the human organism on the generation of Pc1. The instantaneous reaction of the human organism, expressed in the sudden attack of the cardio-vascular diseases or neuros diseases are observed during of the flash

magnetic storm accompanied Pc1. If the magnetic storm have a recurrent character (without the chromospheric flash on the Sun), than the reactions of the human organism on the Pc1 have a certain delay for 1–1,5 days-nights in relation to the beginning of magnetic storm.

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Short Reports

**DRASTIC PREVENTION OF POSTPARTUM
HAEMORRHAGE IN A GOVERNMENT
DISTRICT HOSPITAL
IN THE REPUBLIC OF GHANA**

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Postpartum haemorrhage (PPH) has consistently been the leading cause of maternal mortality in the world. While in the USA and developed European countries maternal mortality has been reduced below 10 per 100,000 live births, many countries in Africa and South-East Asia still have maternal mortality rates above 50 per 100,000 live births and a developing country like Ghana is no exception. National concept of combating maternal mortality supported by WHO based on overcoming the «three delays»: adoption (woman and her family) of decision to seek medical care, admission to hospital and receiving adequate treatment after admission. [6]. Given the socio-economic, cultural and community features of Ghana as well as common problems with health organizations, this concept does not produce its expected results in this country [4].

There is no doubt that safe childbirth for women and newborns goes beyond the competence of practical obstetrics and gynecology. Realizing that the solution to socio-cultural and community aspects of this multi-disciplinary problems with regards to a specific obstetrics facility is not the real problem, we consider it necessary to improve the action protocols for women with obstetric risk of PPH being admitted directly into the facility since in Ghana this is between 25–40% of all patients.

Objective –to assess the effectiveness of drastic emergency prevention of PPH in a district hospital of the Republic of Ghana with drastic medical support in the second and third stage of labour.

Materials and methods of research. A comprehensive clinical, laboratory examination and active treatment study of 104 pregnant women with gestational age of 37 weeks or more admitted for delivery at the obstetrics unit of the Kwahu Gov-

ernment Hosital-Atibie (Kwahu South District) in the Republic of Ghana from 2007 to 2011. Inclusion criteria were the presence of at least one of the risk factors for PPH concept of the four «T» [5].

1. Abnormality in the contractile function of the uterus – «Tone»: over distension of the uterus as in the case of polyhydramnios, multiple pregnancy or macrosomic baby, abnormal myometrial contractility in rapid delivery, prolonged labour, parity «5+», chronic infections and fever during labour.

2. Functional and anatomical features of the uterus – «Tissue»: tumors of the uterus, placenta previa, abnormal separation and isolation of the placenta, placenta accreta or increta, hypotonic uterus.

3. Tears in the birth canal – «Trauma»: tears of the cervix, vagina or perineum during delivery, operative vaginal delivery, cesarean section, uterine rupture in the anomalous insertion of the head, clinically narrow pelvis, inversion of the uterus.

4. Coagulation disorders – «Thrombin»: hereditary and acquired coagulopathy, liver disease, thrombocytopenia and thrombocytopathy, DIC syndrome, pre-eclampsia, antenatal fetal death, severe infections, amniotic fluid embolism, antenatal hemorrhage.

All mothers were divided into two clinical groups with 52 patients in each. The comparison group consisted of pregnant women who received prophylaxis of bleeding according to the national standard of care in obstetrics of the Republic of Ghana [3].

The study group included 52 patients who underwent drastic prevention of PPH by the proposed method consisting of: Tranexam-1g (tranexamic acid – an inhibitor of fibrinolysis, transition inhibitor of plasminogen to plasmin) in the first stage of labour and ergometrine – 500 ug intramuscular in the second stage when the head erupts. Active management of third stage and the postpartum period was carried out in 50 cases (96%) by giving 10 IU of oxytocin infusion over 4 hours.

Patients in the medico-social aspects were identical since the distribution of patients was carried out by direct selection with balancing essential characteristics (table 1).

Table 1

Clinical characteristics of patients surveyed

Variables	Control group (n = 52)		Comparison group (n = 52)	
	Abs. number	%	Abs. number	%
1	2	3	4	5
Age in years				
Before 18	1	1,9	1	1,9
19-20	5	9,5	4	7,6
21-30	4	7,6	7	13,5
31-40	19	36,5	20	38,5
Older than 40	23	44,2	20	38,5

End of Table 1

1	2	3	4	5
Family status of women				
Unmarried	11	21,2	10	19,2
Civil marriage	29	55,8	31	59,6
Married	12	23,1	11	21,2
Education of women				
Below average and low	39	75,0	40	76,9
Average	11	21,2	10	19,2
Higher	2	3,8	2	3,8
The living conditions at home				
Unsatisfactory	38	73,1	37	71,1
Satisfactory	10	19,2	11	21,2
Good	4	7,6	4	7,6
The number of antenatal visits				
4 or more	18	34,6	16	30,7
1–3	26	50,0	28	53,8
None	8	15,3	8	15,3
Gestational age in weeks				
37–38	18	34,6	19	36,5
39–40	28	53,8	28	53,8
41 and more	6	11,5	5	9,6
Parity				
Primiparous	3	5,8	4	7,6
Multiparous 2–4	49	94,2	48	92,3
Abortion in history	36	69,2	38	73,1
Previous caesarean sections	1	1,9	1	1,9
Extra-genital diseases				
Respiratory	3	5,8	2	3,8
Gastrointestinal tract	4	7,6	4	7,6
Hypertension	7	13,5	7	13,5
Other cardiovascular conditions	1	1,9	0	0
Diabetes	0	0	0	0
Other endocrine conditions	2	3,8	2	3,8
Kidney and urinary tract	4	7,6	4	7,6
HIV	2	3,8	2	3,8
Other chronic infections	11	21,2	10	19,2
Genital pathology				
Diseases of the cervix	0	0	0	0
Inflammatory diseases of the internal genital organs	2	3,8	1	1,9
Ovarian dysfunction	0	0	0	0
Extrauterine pregnancy	0	0	0	0
Disease during pregnancy				
Anemia of pregnancy	6	11,5	5	9,6
Hyperthyroidism	4	7,6	2	3,8
Pyelonephritis	0	0	0	0
Immune conflict	0	0	0	0
Infection	3	5,8	3	5,8
Hospital admission				
Planned	8	15,4	7	13,5
Without losing liquor for < 2 hours	12	23,1	14	26,9
Without losing liquor for > 2 hours	32	61,5	31	59,6

In this manner, the main clinical indices were comparable between the groups themselves which indicates the reliability of the results.

Results of research and their discussion. During the first phase of the study, the most common risk factors for postpartum hemorrhage (PPH) were identified. These include parity «5+» of uterine ab-

normalities (rapid and prolonged labour), abnormality of separation mechanisms of the placenta, hypotonic uterus, malaria and other severe infections. The results of this study can identify pregnant women at risk for the development of these conditions in order to conduct its adequate prophylaxis (table 2).

Table 2
Risk factors for PPH during admission and additional detection of pathogenetic groups during labour

Variables	Control group (n = 52)		Comparison group (n = 52)	
	Abs. number	%	Abs.number	%
Abnormality of the contractile function of the uterus – «Tone»:				
Polyhydramnios	5	9,6	4	7,6
Rapid delivery	11	21,2	12	23,1
Prolonged delivery	7	13,5	6	11,5
Parity «5+»	39	75,0	37	71,1
Infection and fever during labour	6	11,5	6	11,5
Functional and anatomical features of the uterus – «Tissue»				
Uterine fibroids	4	7,6	3	5,8
Placenta previa	4	7,6	4	7,6
Delay separation and isolation of the placenta	8		6	11,5
Hypotonic uterus	14		15	
Tears in the birth canal – «Trauma»:				
Vaginal tears	1	1,9	3	5,8
Perineal tear	2	3,8	3	5,8
Coagulation disorders – «Thrombin»				
liver disease	2	3,8	1	1,9
Antenatal fetal death	1	1,9	1	1,9
Malaria and other severe infections	4	7,6	3	5,8

In the second phase, we evaluated the efficacy in the prevention of bleeding using the proposed method with the following results (table 3).

In the study group there were no cases of massive blood loss but in the comparison group, this pathology was found in 8 women in labour which forms 15,2% indicating a high efficiency of the proposed method.

Table 3
The structure of blood loss in delivery

Variables	Control group (n = 52)		Control group (n = 52)	
	Abs. number	%	Abs.number	%
Volume of blood loss in natural childbirth in mls.				
Up to 250	23	44,2	18	34,6
250–449	25	48,1	21	40,4
500–799	4	7,6	5	9,6
800–999	0	0	5	9,6
1000 and more	0	0	3	5,8
Timing of the PPH occurrence				
Earlier, up to 24 hours	4	7,6	11	21,2 %
Later, after 24 hours	0	0	2	3,8
TOTAL	4	7,6	13	25 %

Conclusion

Thus, the isolation of group at risk together with timely and adequate prevention of postpartum hemorrhage has reduced this pathology 3 times and is now one of the possible ways to reduce maternal mortality in the Republic of Ghana.

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CONDITION OF PRO- AND ANTIOXIDANT SYSTEM OF ANIMALS UNDER SALMONELLA INFECTION

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Understanding of mechanisms of emergence and development of salmonella intoxication, one of the most terrible displays of salmonella infection, requires a comprehensive study of the condition of membrane structures in tissue. Disturbances in lipid, protein metabolism, neutralization of toxic junctions that take place in tissue of mucous membranes of stomach and bowel can be a reason of development of heavy irreversible alterations that can lead to chronic pathological processes and even death of patients with salmonella infection [6, 7]. Every year about 40000 precedents of salmonella are registered in the USA [9]. And considering the unregistered cases (a weaker strain or not-diagnosed intoxication) the index can be several times higher. Salmonella infection is registered in average of 15 to 18 precedents per 100000 of people a year in republic Uzbekistan [20]. Among factors that have unfavourable impact upon the development of salmonella infection in a patient's organism a significant part belongs to hypoxia [8]. Intensification of processes of peroxide oxidation of lipids (POL), disbalance in activity of ferments of antioxidant system (AOS) [3]. Disturbance in balance of ferments of POL-AOS leads to expressed damages in structural-functional organization of biologic membranes [4, 5]. An important factor of hypoxia development and intensification of POL is an emergence of surplus toxic products of interstitial metabolism, toxins, caused by infection in tissue. Markers of endogenous intoxication (EI) can be represented as peptides of low and average molecular mass (AMP) [1, 2]. A high biologic activity of AMP is expressed in increase and penetrability of cellular membranes, decrease in tone of vessels, disturbance in activity of heart, lungs, it has a direct toxic effect on liver, kidney, central nervous system, immune system, blood production. All that makes the disease course and recovery even more complicated.

Keywords: salmonella, intoxication, membrane structures, antioxidant system

As we know, malondialdehyde (MDA) is one of products of POL. According to the majority of authors [12, 13], increase in contents of MDA in tissue is a result of impact of hydrogen peroxide (H_2O_2) and other active forms of oxygen (AFO), such as O_2^- ; OH; NO; NO_2 ; NO_3 ; $ONOO^-$, etc.

AFO affect membrane lipids, proteins, ferments, cellular membranes, nucleic acids, etc., thus disturbing their structure, metabolic processes, and function of cells. Impact of AFO increases due to ineffective activity of antioxidant system [14]. Important ferments of AOS are superoxide dismutase (SOD) and catalase (CT). SOD takes part in dismutation of radical of superoxide O_2^- before hydrogen peroxide (H_2O_2) forms, and ferment CT metabolizes H_2O_2 to water and oxygen [10]. Besides, significance of processes POL-AOS in interaction with processes EI in pathogenesis of salmonella intoxication is not studied completely, and it defines the urgency of this problem and the necessity to carry out purposeful research on this topic.

The objective of this research is to study processes of POL-AOS in dynamics, expression of EI in tissue of mucous membrane of stomach and bowel, and blood serum among rats with salmonella infection.

Materials and methods of research

In this work we have used 60 white pedigreeless male rats of mass about 100–120 g. The animals were placed in terms of free movement, general ratio. All painful procedures were carried out according to Helsinki declaration of human attitude towards animals. In order to reproduce the model of salmonella infection, we have endogastrical-

ly introduced strain of *S. typhimurium* of 1 billion microbial bodies per 100 g of an animal mass. The animals were slain under Rausch narcosis via method of instantaneous decapitation after day 1, 4, 7, 10 after their infection. In 0,1 ml of blood serum, as well as homogenates of mucous membrane and thin bowel in solved 1:5 tissue (grams)/environment of discharge (HCl 0,05M, KCl 1/15 M, pH 7,4), we have defined contents of MDA (nmole/ml), activity of SOD (Units/min/ml), CT (mcat/min/l) according to the method of L.I. Andreeva and co-authors [18], E.E. Dubinnina and co-authors [15], M.A. Korolyuk and co-authors [19]. Accordingly, in blood serum and in 9000 g of over-sediment liquid, we have studied concentration of AMP spectrophotometrically on SF-46 (Russia) with waves length of 260 and 286 nm (17). The number of products of peptide metabolism was calculated with coefficients of re-calculating according to the formula of Kalkar for the indicated wave length – 1,45 and 0,74 [16]. AMP was calculated according to the formula:

$$AMP = (E_{286} 1,45 - E_{260} 10) / (g/l),$$

while AMP is a number average molecules in tissue (g/l), E_{286} and E_{260} are values of optical density of solution for the indicated wave length. The data was processed with variative-statistic method according to the programme Statistica V.6 with *t*-Student criterion and coefficient of linear correlation (*r*) of Pirson. Reliability of differences were calculated under $p < 0,05$.

Results of research and their discussion

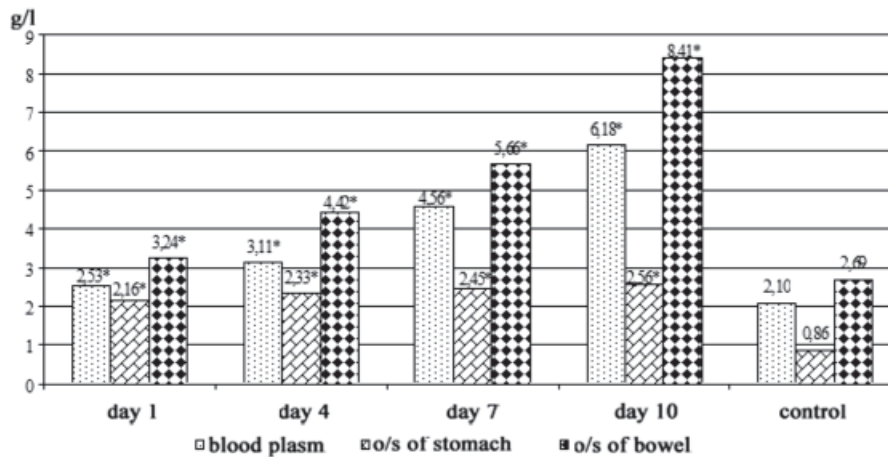
It has been established that in blood serum and in 9000 g of over-sediment liquid of homogenates of tissue of stomach mucous membrane among animals after a day of intoxication with salmonella infection high level of AMP, compared to the control, is registered (Figure). This index grows dynamically in the studied probes along with an increase in observation time. We can suppose that an in-

crease in AMP in blood serum is defined by destructive processes in mucous membranes of stomach and bowel due to the developed pathogenic processes. An important part in this process, obviously, is linked to the destruction of membranes, strengthen in their cellular metabolism. It is proved by the data of progressing increase in MDA concentration in blood serum and in 9000 g over-sediment liquid of stomach and bowel according to the dynamics of observation period (table). Besides, we should outline that in 1 and 4 days after the experiment we have registered a high activity of ferments AOS-SOD and CT along with expression of MDA level in blood serum and in mucous membranes of stomach and bowel. After 7 and days of the experiment in blood serum, and after 4, 7, and 10 days in mucous tissues of stomach and bowel activity of these ferments decreased significantly in comparison to the control. An increase in activity of ferments AOS-SOD and CT in blood serum after 1 and 4 days of the experiment we treat as a protective mechanism of the organism against the introduced infection and presence of MDA in the system blood flow from the damaged organs. Alongwith increase in the experiment period potential reserves of ferments AOS – SOD and CT wear out due to an increasing level of MDA against the development of endogenous toxic products in this tissue. In order to testify the suggested concept we have taken a correlation analysis between the indexes of AMP and levels of MDA, SOD, and CT in tissue, and also between indexes of MDA, SOD, and CT. The results have shown that there is a clear direct correlation between indexes of expression in tissue of AMP and MDA that grows along with the period of salmonella intoxication in animals' organisms. In blood serum index of correlation (r) between AMP and MDA equaled $r = 0,73$ ($P < 0,05$); $0,76$ ($P < 0,01$); $0,81$, and $0,88$ ($P < 0,001$) after 1, 4, 7, and 10 days of experiment, in 9000 g of over-sediment liquid, discharged from mucous membranes of stomach $r = 0,76$ ($P < 0,01$); $0,82$ ($P < 0,01$); $0,86$, and $0,90$ ($P < 0,001$), in 9000g of over-sediment liquid, discharged from mucous tissue of small bowel $r = 0,79$ ($P < 0,01$); $0,86$, $0,93$, and $0,97$ ($P < 0,001$) correspondingly to the terms of observation over animals. While estimating correlation between indexes of AMP and ferments AOS, we have established that increase in level of EI before 4 days of experiment was directly and statistically dependent on increase in activity of ferments SOD and CT. After 1 and 4 days of experiment in blood serum correlation equaled: between AMP and SOD $r = 0,77$ and $0,79$ ($P < 0,01$), between AMP and CT – $r = 0,73$ and $0,77$ ($P < 0,01$);

in 9000 g of over-sediment liquid of stomach $r = 0,70$ and $0,72 - 0,74$ and $0,76$ ($P < 0,05$); in 9000 g of over-sediment of small and large bowel $r = 0,76$ и $0,78 - 0,77 - 0,79$ ($P < 0,01$) correspondingly. After 7 and 10 days of salmonella intoxication increase in index of AMP correlated clearly with decrease in ferments of AOS-SOD and CT in studied tissues. However, this dependence had an indirect characteristic. After 7 and 10 days of experiment between high index of AMP and parameters if low activity of SOD in blood serum $r = -0,81$ and $0,89$ ($P < 0,001$), between AMP and CT $r = -0,88$ and $0,91$ ($P < 0,001$), in 9000 g of over-sediment liquid of stomach $r = -0,83$ и $0,92-0,87$ и $0,95$ ($P < 0,001$), in 900 g of over-sediment liquid of bowel $r = -0,87$ и $0,96-0,91$ и $0,95$ ($P < 0,001$) correspondingly. Results, similar in values and direction, were received while studying this index between parameters MDA, SOT, CT. In blood serum, 9000 g of over-sediment liquid of stomach and bowel it had a direct dependence, and after 7 and 10 days of experiment a strong indirect dependence ($P < 0,001$). The significance of the relations between indexes of EI and processes of POL intensification in mechanisms of decrease in potential capacity of AOS ferments is testified by data of alteration in coefficient (C) for correlation EI + POL/AOS. With a steady balance of this index it equaled $1,43 \pm 0,047$ in blood serum of the control animals. After 1, 4, 7, and 10 day of salmonella intoxication this index equaled $1,38 \pm 0,061$ ($P < 0,001$), $2,14 \pm 0,081$ ($P < 0,001$), $9,36 \pm 0,440$ ($P < 0,001$) and $12,61 \pm 0,366$ ($P < 0,001$). In 9000 g of over-sediment liquid of stomach mucous membrane (for control – $0,65 \pm 0,023$) after 1, 4, 7, and 10 days of experiment it equaled $0,82 \pm 0,025$; $1,38 \pm 0,057$; $2,0 \pm 0,078$ and $2,74 \pm 0,081$ ($P < 0,001$) correspondingly. At the same time in over-sediment liquid of mucous membrane of small and large bowel index C equaled $0,61 \pm 0,021$, and after 1, 4, 7, and 10 days correspondingly – $0,57 \pm 0,018$ ($P < 0,05$), $1,40 \pm 0,053$; $2,53 \pm 0,074$ and $4,58 \pm 0,188$ ($P < 0,001$) among control animals. Therefore, development of salmonella intoxication is characterized by a significant disturbance in dynamic balance between systems EI and POL, and also an intensity of EI, POL, and activity of ferments of AOS. Before days 1 and 4 of experiment a suppressive factor of development of EI and intensification of POL is represented by activation of AOS ferments – SOD and CT. It is testified by the data of decrease in homogenates of mucous membranes of stomach and bowel in blood serum and over-sediment liquid. However, expression of EI and POL show the tension of these

processes against a high activity of ferments of AOS-SOD and CT in response to an increasing salmonella intoxication. Further, in blood serum and in tissue of stomach and bowel decrease in index C after 7 and 10 days of experiment testify the prevalence of EI and POL over activity of AOS ferments that leads to the

destruction of membrane structures in mucous membranes of stomach and bowel, penetration of toxic products into system blood flow. These factors define the degree of increasing EI and complication of clinic disease, disturbance of mucous membranes of stomach and bowel, development of pathologic process in them.



Note: * – $P < 0,05$ compared to the control.

Dynamics in AMP contents in blood plasm and 9000 g of over-sediment liquid of homogenates in mucous membranes of stomach and bowel among rats under salmonella intoxication

Dynamics of indexes of system AOS-POL in blood serum, 9000 g of over-sediment liquid (n/o) of homogenates in stomach and bowel among animals with salmonella intoxication, $M \pm m$

Group and terms	Blood serum			9000 g in the stomach			9000 g in the intestine		
	MDA, Nmole/ml	SOD, Units/min/ml	CT, Mcat/ml	MDA, Nmole/ml	SOD, Units/min/ml	CT, Mcat/ml	MDA, Nmole/ml	SOD, Units/min/ml	CT, Mcat/ml
Control (intact)	0,87 ± 0,051	2,21 ± 0,120	19,45 ± 0,841	2,08 ± 0,062	5,20 ± 0,213	35,74 ± 1,501	1,07 ± 0,034	7,23 ± 0,297	44,03 ± 1,564
Day 1	1,41 ± 0,072*	3,28 ± 0,161*	32,73 ± 1,276*	2,46 ± 0,085*	6,43 ± 0,226*	43,59 ± 1,775*	1,51 ± 0,108*	9,56 ± 0,249*	58,15 ± 2,022*
Day 4	1,88 ± 0,112*	2,60 ± 0,144*	22,84 ± 0,798*	3,41 ± 0,092*	4,37 ± 0,214*	39,61 ± 1,657*	2,45 ± 0,179*	5,69 ± 0,295*	36,43 ± 2,539*
Day 7	3,29 ± 0,151*	0,91 ± 0,043*	10,87 ± 0,442*	4,23 ± 0,101*	3,76 ± 0,205*	30,27 ± 0,926*	3,81 ± 0,178*	4,25 ± 0,180*	31,24 ± 1,56*
Day 10	3,77 ± 0,142*	0,86 ± 0,051*	9,83 ± 0,491*	5,15 ± 0,113*	3,13 ± 0,174*	27,49 ± 1,209*	4,34 ± 0,149*	3,11 ± 0,208*	26,24 ± 1,077*

Note: * – $P < 0,05$ compared to the control.

Thus, we can claim that clinical significance of EI in mechanisms of disturbance in balance between POL and AOS and importance of evaluating these systems to predict development of salmonella infection is obvious. We suppose that pathogenetic impact of EI and POL is mainly expressed in cell membranes and mucous membranes of stomach and bowel, and their impact of suppressing activity of AOS ferments aggravates the severity

of endogenous intoxication and provides for a progress of salmonella intoxication. According to the received correlation analysis and index of correlation between EI + POL/AOS that alter in dynamics of salmonella intoxication, we can conclude that these processes are interrelated, mutually-dependent and are important links in development of pathogenesis of salmonella infection in a patient's organism.

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*Materials of Conferences***INDICATORS OF MECHANICAL POWER OF CROSS-COUNTRY SKIERS IN CLASSIC AND SKATE SKIING**

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To estimate the total outer power (Pto) of racing skiers when they go skiing is of primary importance

as it enables to study principles of metabolic energy transformation into speed, therefore, to study its effectiveness.

In our research we compared Pto indicators covering energy provision for skiing over flat ground with simultaneous strideless and simultaneous one-step classic gliding and simultaneous one-step and simultaneous two-step uphill freestyle gliding. Data from 10 racing skiers was used in the research.

Energy provision indicators of Mechanical Power of cross-country skiers in classic and skate skiing

Style	Classic Skiing		Skate Skiing	
	simultaneous stepless (SS)	simultaneous one-step (SOS1)	simultaneous one-step (SOS2)	simultaneous two-step uphill (STU)
M ± m	413,27 ± 30,42	461,66 ± 88,22	704,04 ± 69,66	480,90 ± 123,12

In classic simultaneous stepless skiing the least number of muscles are used: arm muscles, shoulder and upper body muscles, so Pto indicators are minimal. In simultaneous one-step skiing (Classic Skiing) and simultaneous two-step uphill (Freestyle Skiing) pushing with one leg is involved too, so Pto is higher than in simultaneous stepless skiing. We explain high Pto indicators in simultaneous one-step skiing by active work of all muscle groups and by higher frequency of moves possible.

Thus, we see that indicators of mechanical power are different and depend on the number of involved muscle groups. Judging by subjective observations, we can say that the described gliding types are ranked differently in speed. First comes skate simultaneous one-step skiing, then classic simultaneous stepless skiing, then the other two. It is obvious that metabolic energy is transformed differently in each type. The following research will enable us to identify the pattern and to provide recommendations for training programmes and competitions.

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$$B = \sum_{j=s,t} \{ (B_p - B_n) + B_m + \ln[\alpha_{ab}(B)/\alpha_{ab}(B_m)] / [C(1/\lambda - 1/\lambda_0)] \} g_j + A;$$

$$\sum_{j=s,t} (g_j) = 1; \lambda_0 = \lambda_0(j);$$

$$B_p = B_p(B); B_n = B_n(B_m); s \leq t, s = \min\{j\}; t = \max\{j\}; B_m = B_m(j); \alpha_x = \alpha(\lambda, B)/\alpha(\lambda_0, B), (1)$$

$$a(s, t) = |A|/B; A(s, t) = \sum_{j=s,t} \{ \ln[\alpha_x(B)/\alpha_x(B_m)] / \{ \alpha_{ab}(B)/\alpha_{ab}(B_m) \} / [C(1/\lambda - 1/\lambda_0)] \} g_j,$$

PYROMETRY TECHNIQUE OF MEASURING RADIOMETRIC TEMPERATURE

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The pyrometry technique development with use of multi-tier of thermal ratios is offered. A dependence of a relative module of methodical error from multi-tier values specifies relative decrease at general example.

Here is developed quite actual pyrometry technique of the real-valued temperature measurements.

The radiometric methods at registration of thermal radiation and temperature measurements can be applied as at comparatively middle temperatures (here less the chromium melting temperature) so at high temperatures. The technique of radiometric temperature measuring, at the purpose of diminishing the error and increasing the accuracy of noncontact measuring is develops.

The temperature unit is one of basic natural units at measurement of physical quantities [1].

The pyrometer here is comprehended as the radiometric thermometer of the spectral or thermal ratio for which computing formulas are lower stated [2-4].

Let's convert the Planck formula to the following equation for the gauged temperature [2]:

where $1/B = T$ – a temperature; B – a real-valued inverse temperature; B^p – an inverse real temperature measurement; B_m^p – the inverse «agentive» temperature; B_n^p – an inverse agentive temperature measurement; λ – a wave length; λ_0 – a «reckoning» wave length; α_{α} – the spectral ratio; $\alpha_{\alpha}(B)/\alpha_{\alpha}(B_m)$ – the thermal ratio of spectral ratios; Σ_j – summation sign of series on natural numbers; g_j – weight coefficients; j – natural number; s, t – minimum and maximum of released natural numbers; $\{B_m(j), \lambda_0(j)\}$ – the set of inverse agentive temperatures with reckonings waves lengths; $a(s, t)$ – a relative module of methodical error; $A(s, t)$ – an error of inverse temperature; α – conversion coefficient («radiomaterial» factor) for the gauged radiation, defined by the object radiation blackness factor multiplying in observation medium with a transfer coefficient

$$B = \sum_{j=s,t} \{(B_p - B_n) + B_m\}; \quad \sum_{j=s,t} \{\ln[\alpha_{\alpha b}(B)/\alpha_{\alpha b}(B_m)]/[C(1/\lambda - 1/\lambda_0)]\} \cdot g_j \ll B; \quad a \ll 1. \quad (2)$$

Necessary ' g_j ' – weight coefficients can be received with use of averaging and interpolation.

For example, we will theoretically investigate estimation's methodical error of temperature measurement at heating with temperature 1100 K and measurement of a spectrum of thermal radiation in a perpendicular direction from out surface of iridium over the range lengths of waves 900–1700 nanometers. One reckoning wave length equal to 900 nanometers. Two agentive temperatures are equal to 1500 and 2000 K. The given sampling of temperatures is caused by the iridium radiation factor reference data, represented in the article [5]. Also we will assume that relative error of simplified reference radiation factor is negligible.

$$\{t = 2\}; \quad a = 0,0038; \quad g_2 = 1; \quad \{t = 3\}; \quad a \approx 0; \quad g_2 = -0,26; \quad g_3 = 1,26. \quad (3)$$

The two-tiered approach with $\{t = 2\}$ gains a quite good methodical relative error (3) at the given simplified example. More difficult three-tiered approach with $\{t = 3\}$ gains an appropriate excellent methodical relative error at ideal conditions. The one-tier confluent approach gains an adequate moderate methodical relative error [2, 3], which depends on the sample real model.

The result of pyrometric temperature measurement depends on how much the temperature dependences of optical properties are studied for a given object and a given optical path and how the measuring scale can be calibrated directly in experiments. Also the emissivity and the absorptivity of microparticles and/or nanoparticles (MNPs) should be taken into account. Along with thermal radiation, characteristic radiation (atomic radiation lines) can also be excited. The latter should however be ignored to obtain reliable pyrometric data for the temperature.

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of a gauged electromagnetic radiation; α_b – more explicit modeling approximate value is at factor α . Measurement of the approximate «radiometric» temperature admits using some modeling value α_b at «radiomaterial» factor α and some averaging on a logarithmic coordinates.

A multi-tier measurement (1) will be matching to a collection-set radiometric temperature.

Such a method is called multi-tier technique carried out in operations with preliminary or additional detection of a system's state. The averaging on a spectrum and on sample of values of agentive temperatures with some weight coefficients here is supposed. The real-valued inverse temperature is being defined by weight interpolation on inverse agentive temperature's samples.

Let's admit that the relative module of methodical error in (1) is negligible and next we gain.

For problem simplification we will assume that absorption of electromagnetic radiation in an optical medium of measurement is negligible. Besides we will assume that the statistical error of measurements is negligible. Also we will assume that the measurement installation has exact demanded apparatus dependence of output signal from light intensity.

For example, after the simplified calculations we gain the relative methodical error of iridium temperature measurement on 1100 K ($j = 1$) in dependence from multitier values $\{s, t\}$, which is noted in formula (1). Methodical error of a collection-set radiometric temperature (2), with ($s = 2, T_2 = 1500$ K) at dependence from multitier counts $\{t = 2, 3\}$ is in next approximate quantities.

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VISCERAL LYMPH NODES IN ABDOMINAL CAVITY OF THE GUINEA-PIG. TOPOGRAPHY AND CLASSIFICATION

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I studied 10 guinea-pigs of 2-3 months old and found such visceral lymph nodes (LN) in the abdominal cavity:

- 1) coeliac LN (1-2), small, about beginning of son a me artery;

2) hepatic LN (1-2) with shape as bean or coffee-bean, on the left side from hepatic portal vein;

3) gastric, sub pyloric LN (1);

4) pancreatic LN (2), the left (gastropancreatic), about gastric branches of splenic artery, and the right, near bases of cranial and right caudal branches of tail of pancreas;

5) splenic LN (1-2), the most small among all visceral LN in the abdominal cavity, lie near hilus of spleen and right dorsal branch of tail of pancreas;

6) paraaortic LN (1-2), near beginning of cranial mesenteric artery;

7) pancreaticoduodenal LN (2-3), compact conjunction between caudal part of duodenum and head of pancreas, near duodenojejunal flexure;

8) paracolic or distal central cranial mesenteric LN (3-4), in short common root of mesentery and mesocolon, the most large among these and all visceral LN of abdominal cavity – the proximal LN (about duodenojejunal flexure, more ventrally, with shape as coffee-bean) or offer the distal LN (about apex of caecum with shape as horseshoe, which is segmented probably in result of fusion of few LN or incomplete division of their anlage);

9) ileocolic LN (2) with bean's shape and different sizes, lie on both sides of ileocolic blood vessels, in the bend of terminal segment of ileum, between ileum and place of division of ileocolic artery on the end branches, one of them passes under the large LN to the bend of ileum;

10) ileocecalis LN (1) with bean's shape, more wide than large ileocolic LN, lies on the base of caecum, more distal, than ending of ileum;

11) caudal mesenteric LN (1-2), in short descending mesocolon, on dorsal side from beginning of descending colon and from caudal mesenteric artery.

The cranial mesenteric LN (9-12) I divide on 2 groups:

1) the central (6-9), proximal and distal;

2) the peripheral (3).

The coeliac LN may be consider as the central among LN in basin of coeliac artery.

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PECULIARITIES OF THE PHYSICOCHEMICAL PROPERTIES OF CHITOSAN SOLUTIONS

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The rheological, electrochemical, and surface properties of chitosan solutions in acetic acid were studied for several molecular masses and polymer and acetic acid concentrations. Changes in the viscosity, degree of structuring, and flow curve character of the solutions were observed when these were stored. The stability of the viscous properties was essentially influenced by the concentration and molecular mass of the polymer and by the ionic strength of the solution. The surface tension and conductivity of the solutions did not change in time. It is speculated that the kinetic instability of the rheological properties of chitosan is not associated with the occurrence of any destructive processes.

Keywords: chitosan solutions, rheology, surface tension, conductivity, kinetics

It is known that the operating performance of a ready polymeric product is defined in many respects by the physical–chemical properties of a forming solution. For large-capacity synthetic and also some natural and artificial polymers (e.g., cellulose and its derivatives), such regularities have been studied and generalized well enough [1, 2]. However, for chitosan (CT), a derivative of the natural polysaccharide chitin, this problem still remains topical, as the obtainment of quantitative data on the interrelation between the physical–chemical characteristics of a solution and those of a ready material is complicated by the compositional heterogeneity of samples of the polymer [3, P. 112–118], the kinetic instability of the viscous properties of solutions based on it [4–7], the absence of certified techniques to estimate the quality of the initial raw material, and so on.

Traditionally, CT has been used for manufacturing solutions, gels, and films, the preparation methods for which have been covered fully enough in the scientific and patent literature [3, 8, 9]. Recently, reports have appeared describing the obtainment of CT-based novel film composites [10, 11]; capsules [12]; fibrous biocatalysts [13]; nanofibers and nonwoven cloths [14, 15]; micro- and nanoparticles, with the use of carbon dioxide in the supercritical

state [16]; and so on. The general stage in the preparation of all these materials from CT is polymer dissolution in organic or mineral acids of differing concentrations. Therefore, research on the peculiarities of the physical-chemical parameters of CT solutions is of interest from both scientific and practical points of view.

The purpose of this work was to study the peculiarities of the rheological, electrochemical, and surface properties of acetic CT solutions, depending on the concentration and molecular weight of the polymer, the concentration of acetic acid, and the time for which a solution is stored under static conditions.

Materials and methods of research

In this work, we used industrial acid-soluble samples of CT with different molecular weights (\overline{M}_η) and with similar deacetylation degrees. The samples are characterized in table. As a solvent, we used aqueous solutions of acetic acid (concentration $C(\text{Ac}) = 2\text{--}70\%$), which were prepared by using chemically pure glacial acetic acid and distilled water. Acetic CT solutions with concentrations C of 0, 1–5 g/dl were used for study. Solutions were prepared by dissolving a sample of air-dry CT in water–acid medium at room temperature and normal atmospheric pressure for 1 day; moderately concentrated ($C = 2\text{--}5$ g/dl) solutions were additionally stirred on a magnetic stirrer. All systems were stored under static conditions at a temperature T of $22 \pm 2^\circ\text{C}$. Measurements of the physical and chemical parameters were made at intervals during several years.

Properties of the chitosan samples

Sample	Viscosity-averaged molecular mass \overline{M}_η (kDa)	Deacetylation degree (mol%)	Manufacturer
CT-87	87	83,6	CJSC «Bioprogress» (Shchelkovo, Russia)
CT-180	180	82,0	CJSC «Bioprogress»
CT-200	200	82,0	CJSC «Bioprogress»
CT-275	275	80,8	CJSC «Sonat» (Moscow, Russia)
CT-640	640	82,6	CJSC «Bioprogress»

Rheograms of viscosity (η , Pa·s) were read with a Rheotest RN-4.1 and, in some cases, a Rheotest-1 rotary viscometer, with cylinder–cylinder working units, at temperatures T of 20–50°C and shear stresses $\lg \tau$ of 1,2–3,5 [Pa·10⁻¹]. The degree of solution structurization was defined as

$$S = \frac{\eta_{\max} - \eta_{\min}}{\eta_{\min}} \cdot 100\%,$$

where η_{\max} is the greatest Newtonian viscosity (for classical flow curves) or the maximal value of viscosity on the rheological curve $\lg \eta = f(\lg \tau)$ (for systems with plastic flow curves); η_{\min} is the value of viscosity at the values of $\lg \tau$ beginning with which a sharp decrease in $\lg \eta$ (i.e. corresponding to the origin of the structural viscosity area) is observed. The apparent energy of activation of the viscous flow (ΔE_a , kJ/mol) was estimated by the Arrhenius–Frenkel–Eyring equation:

$$\eta = A \exp\left(\frac{\Delta E_a}{RT}\right),$$

where A is the constant, R is the universal gas constant (J/mol·K), T is the temperature (K), and $\eta = \eta_{\max}$.

The surface tension coefficient (σ , N/m) was determined stalagmometrically at $T = 20^\circ\text{C}$. The error did not exceed $\pm 5\%$. We used a stalagmometer with an arched (L-type) capillary with a diameter d of

0,6 mm. The surface tension coefficient was found with the formula

$$\sigma = \sigma_0 \frac{n_0}{n},$$

where n and n_0 are the numbers of solution and solvent drops being formed and σ_0 is the surface tension coefficient for the solvent (acetic acid), which in preliminary experiments had been found to be $\sigma_0 = 6,9 \cdot 10^{-2}$ N/m for 2% acetic acid and $3,2 \cdot 10^{-2}$ N/m for 70% acetic acid. In parallel, we determined the time of formation and separation of solution (t, s) and solvent (t_0, s) drops from the stalagmometer's capillary.

The conductivity (γ , S/cm) was measured with an Anion 4120 conductometer (error, $\pm 4\%$).

Results of research and their discussion

Fig. 1, a and 1, b (curves 1) shows viscosity rheograms for fresh moderately concentrated CT solutions in 2% acetic acid. It can be seen that both dependences $\lg \eta = f(\lg \tau)$ are similar and are classic for polymer solutions: on the flow curves, it is possible to single out areas of the greatest Newtonian viscosity and the origin of structural viscosity. The viscosity increased with increasing concentration of CT in the solution ($C(\text{Ac}) = \text{const}$).

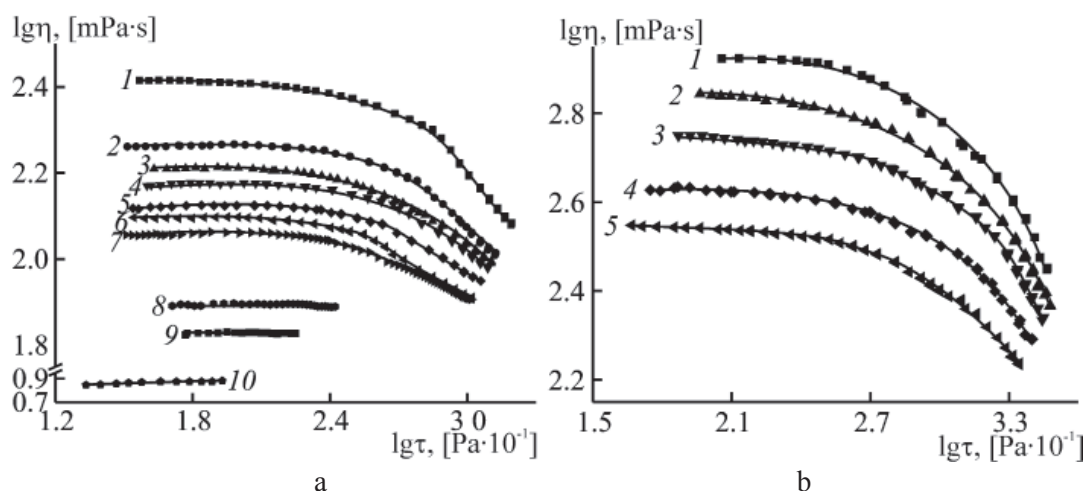


Fig. 1. Flow curves for CT-87 solutions in 2% acetic acid: (a) a solution ($C = 2$ g/dL) stored under static conditions ($T = 22 \pm 2^\circ\text{C}$) for 0 (1), 7 (2), 14 (3), 21 (4), 28 (5), 35 (6), 42 (7), 77 (8), 87 (9), and 800 days (10); (b) $C = 3$ g/dL, storage times of 0 (1), 2 (2), 5 (3), 9 (4), and 13 days (5)

With a simultaneous increase in the CT concentration in solution and in the concentration of acetic acid (solution ionic force I) and/or the molecular weight (\overline{M}_n) of the polymer, the character of the rheological curves underwent a change (Fig. 2 and 3, a and 3, b, curves 1). For example, CT solutions in acetic acid $C(\text{Ac}) \geq 4\%$, even at comparatively low

polymer concentrations (2 g/dl), were non-Newtonian liquids, for which a viscosity decrease was observed in the entire shear stress area studied. In the area of comparatively high $\lg \tau$ values, the viscosity decreased to a greater degree than it did in the area of low values, which is peculiar to the flow of pseudoplastic systems.

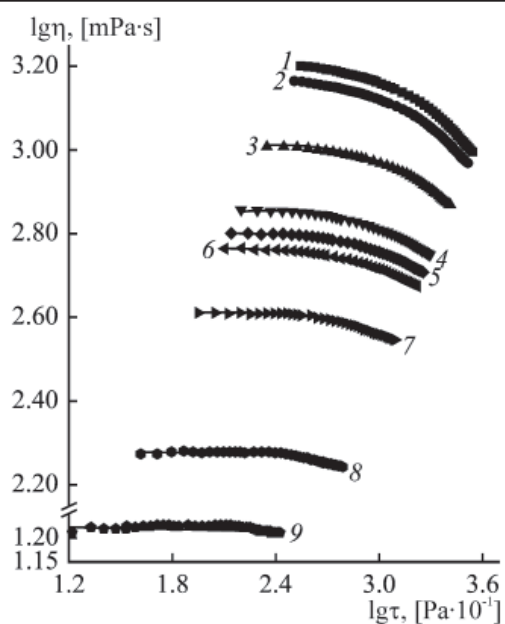


Fig. 2. Flow curves for a CT-200 solution ($C = 5$ g/dL) in 70% acetic acid after storage under static conditions for 0 (1), 2 (2), 7 (3), 21 (4), 28 (5), 35 (6), 49 (7), 92 (8), and 363 days (9)

A study of the temperature dependence of viscosity of CT solutions showed that with increasing temperature, η decreased (Fig. 3). The shape of the rheological curves did not change essentially. From the obtained dependences $\ln \eta = f(RT)^{-1}$, the apparent activation energy for the viscous flow of CT solutions was calculated (Fig. 4,a, a point on the ΔE_a axis). The obtained value ≈ 28 – 30 kJ/mol is typical of solutions of semirigid chain polymers, of which CT is one.

The comparatively high durability of the structure of the systems being studied was also confirmed by the high values of the structurization degree (Fig. 4,b, a point on the S axis). Similar S values were found by Nud'ga et al. [17] for moderately concentrated CT solutions in acetic acid. With increases in C , \bar{M}_n , and I , the degree of the solution's structural organization (the ability of the structure to withstand the application of a mechanical field) increased.

It is known that the viscosimetric properties of CT solutions are unstable in time [4–7]. In this connection, we examined the rheological properties of solutions stored in the absence of an external field.

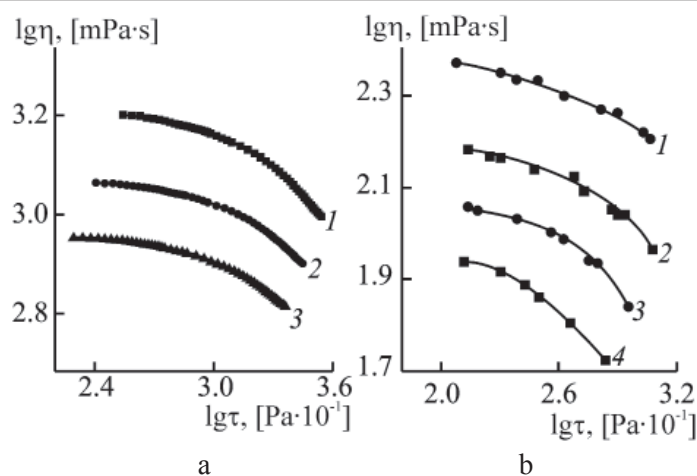


Fig. 3. Viscosity rheograms: (a) CT-200 ($C = 5$ g/dL) in 70% acetic acid at a temperature $T = 20$ (1), 25 (2), and 30°C (3); (b) CT-275 ($C = 2$ g/dL) in 4% acetic acid (Rheotest-1) at $T = 20$ (1), 30 (2), 40 (3), and 50°C (4)

When CT solutions were stored under static conditions, their viscosity declined essentially (Fig. 4). The higher was the solution polymer concentration (curves 3 and 4), the larger was the decline in the system's viscosity (η/η_0 , where η_0 is the initial viscosity of the solution) in time, in agreement with the data of Sklyar et al. [7]. However, for a system with a higher polymer concentration and a higher solution

ionic force (curve 2), the viscosity decrease was somewhat smaller in comparison with that observed in a solution with lower C and I values. Thus, the lower is the acid concentration in the solvent, the larger is the decrease in η with time. An increase in the molecular weight of CT, with other things being equal, probably makes the decline in the solution η larger (curve 1).

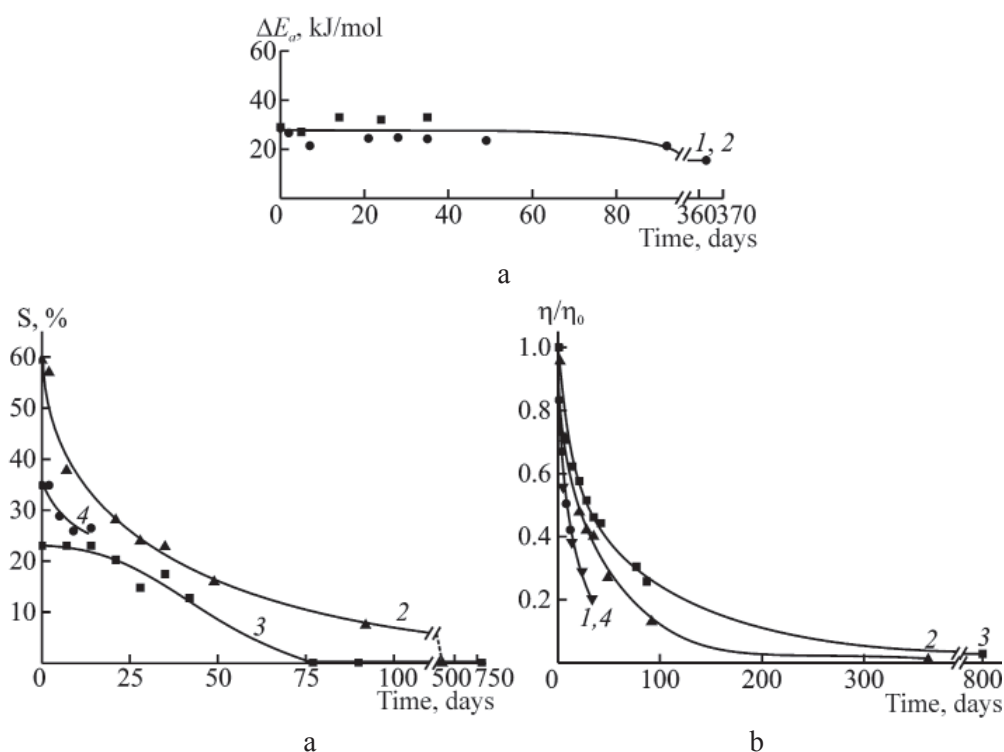


Fig. 4. Kinetics of the activation energy of the viscous flow (a), the degree of structurization (b), and the relative viscosity (c) for solutions of CT-275 ($C = 2$ g/dL) in 4% acetic acid (1), CT-200 ($C = 5$ g/dL) in 70% acetic acid (2), and CT-87 ($C = 2$ and 3 g/dL) in 2% acetic acid (3, 4)

With time, changes were observed not only in η but also in the character of the viscosity rheograms. Specifically, for the flow curves of CT solutions in 2% acetic acid that had been stored for a period of time, in comparison with fresh solutions, the shear stress range in which viscosity is constant was observed to expand (Fig. 1, curves 2–7) to the point of realization of the dependence $\lg \eta = f(\lg \tau)$ for Newtonian liquids (Fig. 1, a, curves 8–10). For pseudo-plastic systems, the non-Newtonian character of the flow was retained for up to ~ 21 days of storage of CT solutions under static conditions (Fig. 2, curves 2–4). At a longer storage time, the realization of classic flow curves (curves 5–7) was observed. At a storage time of more than ~ 75 days, the dependence of viscosity on shear stress was already linear ($\lg \eta \sim \lg \tau$; curves 8–10).

The degree of structurization of the solutions also decreased during their storage (Fig. 4). The zero value of S , characteristic of Newtonian liquids with $\lg \eta \sim \lg \tau$, was realized for less concentrated solutions at a much smaller time of their storage under static conditions. The viscous flow activation energy for the solutions remained almost unchanged (Fig. 4), except after 363 and more days of storage.

Apparently, the described regularities of temporal change in the character of the flow curves, viscosity, and the degree of structurization of CT solutions are not a consequence of destructive processes, as all these changes occurred most intensively in solutions with lower acetic acid concentrations.

Because there has been no unequivocal explanation for what causes the decrease in viscosity of CT solutions in time [4–7], it was of interest to also follow the kinetic stability of other physical–chemical parameters of the systems under study, in particular surface tension and conductivity. The totality of these parameters, together with the value of viscosity, essentially determines the fiber-forming ability of polymer solutions during fiber electroformation [18].

We first consider the surface properties of CT solutions. In special experiments, we explored the concentration dependence of the surface tension coefficient for CT solutions in 2 and 70% acetic acid. In aqueous acetic acid, this polymer displayed the property of a surfactant: with increasing solution concentration of the polymer, σ decreased, reaching a constant value at $C \geq 0.2$ g/dl. With increasing acetic acid concentration, σ decreased substantially (Fig. 5, a, points on the ordinate); the character of the $\sigma = f(C)$ dependence was similar.

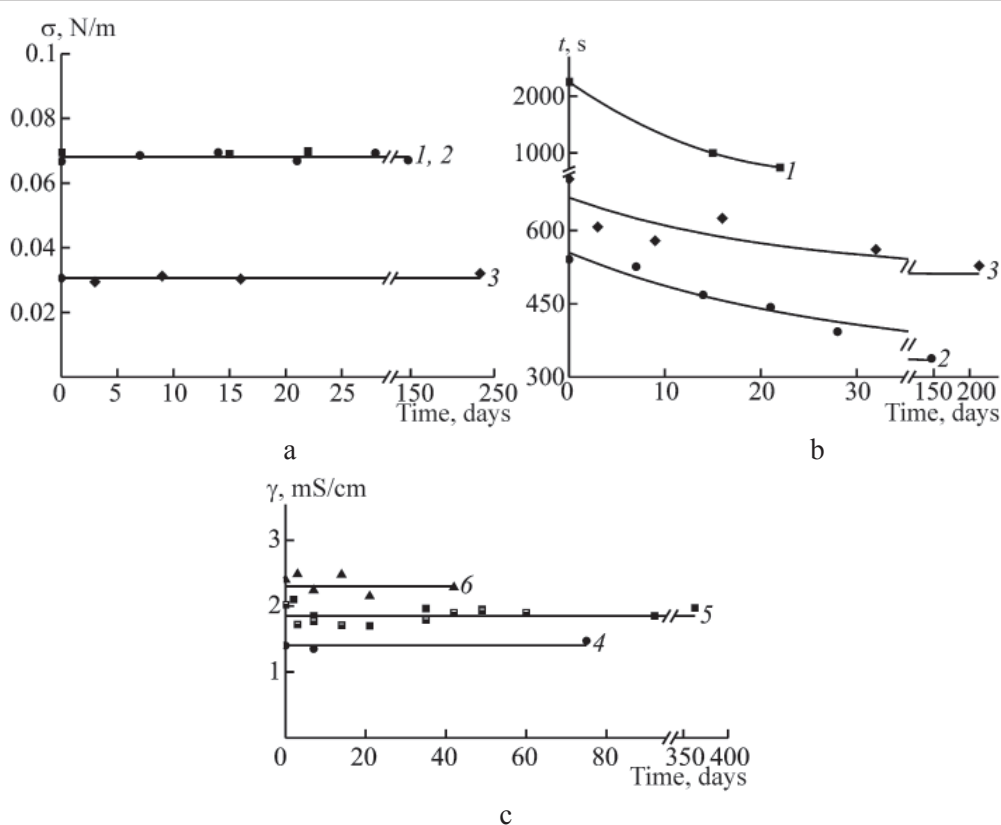


Fig. 5. Kinetics of the surface tension (a), the time of outflow of a fixed volume of liquid from the stalagmometer's capillary (b), and the conductivity (c) for solutions of CT-640 (1), CT-200 (2–5), and CT-180 (6). Concentrations: $C = 0.25$ (2) and 0.5 g/dl (1) in 2% acetic acid; $C = 0.25$ (3), 3 (4), and 5 g/dL (5, 6) in 70% acetic acid

For estimating the influence of the kinetic factor on the surface tension coefficient, we used CT solutions with concentrations for which the condition $\sigma(C) = \text{const}$ was met. Observations on the kinetics of σ allowed the conclusion that the surface tension of water–acid solutions of CT does not change in time (Fig. 5,a).

The stalagmometer method is based on the determination of the weight of a drop of liquid that comes off the capillary under the action of gravity. Traditionally, in the determination of the solution σ , this method is used to experimentally find the number of solution and solvent drops coming off the capillary when a liquid is slowly flowing out of the stalagmometer. The time of formation and separation of the liquid drops is usually left uncontrolled. We established that for fresh systems, the drop outflow time depends on the solution concentration of CT, the of the polymer, and the ionic force of the solution (Fig. 5,b, points on the ordinate).

From a study of the surface tension kinetics for water–acid solutions of CT, an interesting fact emerged. For stored solutions, the time

(t) of the formation and separation of drops of the liquid flowing out of the stalagmometer decreased essentially (Fig. 5,b). Because this supervision is nontrivial, similar experiments were run that used the binary system water–acid. It was found that the time of formation and separation of drops was the same for both freshly made acetic acid (t_0) and that stored for different periods.

A large decline in t occurred during ~ 28 – 30 days of storage (Fig. 5,b). At a longer time of solution storage, the change in t was not so essential. The rate of the decrease in t increased with increasing molecular weight of CT.

Traditional views hold that the time of outflow of a liquid from a capillary is proportional to the viscosity of that liquid. In view of this and by comparing Fig. 4,c and 5,b, it is easy to see a correlation between the temporal change in viscosity of moderately concentrated solutions, measured with a rotary viscometer, and the time of outflow of dilute CT solutions through the capillary of the stalagmometer. Indeed, in either case, a quantity is being measured that characterizes, to one degree or another,

er, the coefficient of friction of the liquid layers moving during the flow process.

Because these effects were observed when the solution was in a steady state, we believe that the decrease in η and t is connected with a change in the structure of the systems under study – possibly with a change in macromolecular shape in solution, giving rise to such conformations whose resistance to the flow is less than that in the initial freshly made system.

However, not all authors share this assumption. For example, in the works [4, 6], the decrease in the viscosity of CT solutions was explained by a hydrolytic breakdown of glycosidic linkages in the macromolecules. The dissolution of CT in water–acid medium is caused by the protonation of the polymer's amino groups, owing to which the macromolecule takes on the properties of a macrocation. If it is true that there are destructive processes occurring in CT solutions, the quantity of macroions in stored CT solutions should increase.

To elucidate this question, we investigated the conductivity of CT solutions, because this parameter is proportional to the number of charged particles present in a system. A typical dependence of γ kinetics is given in Fig. 5, c by using the example of CT solutions in 70% acetic acid. It can be seen that the conductivity of CT solutions stored for a long time under static conditions did not change (Fig. 5). The temporal variation in the γ values was within the measurement error.

Conclusions

The obtained result has allowed us to ascertain that the above-considered regularities of decrease in the viscosity, structurization degree, and outflow time of stored CT solutions do not stem from destructive processes. This is also in agreement with the fact of the less significant decrease in the viscosity of solutions with higher concentrations of acetic acid, found both in this work and by Sklyar et al. [7]. A possible cause for such behavior is as follows: An increase in the ionic force of a moderately concentrated solution increases the probability of interchain contacts between macromolecular coils and promotes the structural stabilization of the system. As noted by Sklyar et al. [7], it is difficult to imagine a breakdown of the glycosidic linkage taking place in dilute acetic acid (2 or 4%) and this process being absent in 70% acetic acid. It is more natural to associate all these changes with structural reorganizations.

Thus, our research has established the kinetic stability of the surface tension and conductivity of acetic CT solutions and the instability of their rheological properties. The stability of the viscous properties of solutions

is largely affected by the concentration and molecular weight of the polymer and also by the ionic force of the solution (acetic acid concentration). In the systems studied, no destruction of macromolecular chains occurs.

Acknowledgements

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ABOUT SIZES OF THE HYDRATED SALT IONS – THE COMPONENTS OF SEA WATER

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Facing severe and increasing shortage of fresh water on the planet that can even lead to local conflicts, methods of seawater desalination for industrial and municipal purposes become urgent. The article gives a model of estimation of the size of hydrated ions, the components of seawater.

Keywords: seawater desalination, hydrated ions, size of hydrated ions

Distillation desalination method leads to huge electricity consumption and therefore alternative, less expensive ways are being searched for. Construction and operation methods of desalination with the help of various membranes (e.g., the method of reverse osmosis) involve large energy and economic costs. In particular, for desalination of 1 cubic meter seawater not less than 400 kilowatts of electricity and the pressure to 6,5 MPa (65 atm) are required. When the mesh size has a radius of 0,1 nm, the costs are much more than the production of the membrane with a radius of 0,2 nm. Since the radii of hydrated ions are significantly (almost twice) larger than the radius of a water molecule (0,138 nm) passed through the membrane, then the estimation of the size of hydrated ions, the components of sea water

(mainly: Na⁺, K⁺, Mg²⁺, Ca²⁺, Cl⁻, SO₄²⁻) for the manufacture of membranes with optimal size becomes meaningful because of lowering operating pressures and reducing costs of manufacturing devices for desalination.

As a rule available information on individual n_s ions, benchmarks for assessing the size of hydrated ions, determined by Russian and foreign researchers differ by several units. For example, the hydration number of K⁺ ion is 16 by Remy and 1,9 – by Robinson-Stokes equations. The high value of the hydrated potassium ion by Remy can be explained by the fact that the model of ionic hydration involving all water molecules in the formation of hydration shells, which, of course, could not be possible.

For some ions these numbers are given in table 1.

Table 1

Values of ions hydration according to various authors

Author	Method	Hydration numbers					
		Na ⁺	K ⁺	Mg ²⁺	Ca ²⁺	Cl ⁻	SO ₄ ²⁻
I	a	–	16	–	–	–	–
II	b	8,4	5,4	–	–	–	–
III	b	–	22	–	–	–	–
IV	b	16,9	9,6	–	–	–	–
V	c	3	4	–	–	–	–
VI	d	3,5	1,9	–	–	–	–
VII	e	4,03	2,69	5,33	3,64	1,70	2,34

Notes: I – Remy; II – Washbourne; III – Rosenfeld; IV – Smith; V – Brinttsmiger; VI – Robinson and Stokes; VII – Baldanov and Tanganov. Methods: *a* – ion mobility; *b* – coefficient of diffusion; *c* – speed of diffusion through the membrane; *d* – dependence of activity coefficients on concentration; *e* – plasma-like theory of electrolyte solutions.

A non-empirical method for calculating hydration numbers of ions in solutions [1, 2] is elaborated, according to which the ion charge $q_i = ze$ in liquid, incompressible polar dielectric is screened by the nearest environment of solvent molecules forming the hydration shell.

The interaction of ion is dipole. The relevant potentials are equal:

$$\varphi_i = z_i e / \varepsilon r_i; \quad \varphi_d = p / \varepsilon R_s^2, \quad (1)$$

where ε is dielectric constant, R_s is radius of the solvent molecule.

The potential of the central ion in a dielectric medium is neutralized by the dipole potentials φ_d of solvent molecule (by the number of n_s):

$$\varphi_i - n_s \varphi_d = \varphi_p, \quad (2)$$

where φ_p is the resulting potential.

If equation (1) transform into the finite-difference equation of ion-dipole energy, then from the obtained equation (2), the boundary

of the hydrated complex is cut by energy of thermal motion $5k_B T/2$, in the form of evident condition $e\varphi_p = 5k_B T/2$, which means that the obtained difference between the energies of ions and water molecules is compensated at the boundary of the thermal energy of the medium itself $5k_B T/2$:

$$z_i e^2 / \epsilon r_i - n_s p e / \epsilon R_s^2 = 5k_B T / 2. \quad (3)$$

Here n_s is the number of solvent molecules in the hydration complex and k_B is Boltzmann constant. Thus, the hydration number n_s will be determined by the relation:

$$n_s = z_i e R_s^2 / r_i p - 5k_B T \epsilon R_s^2 / 2 p e, \quad (4)$$

where z_i and r_i are charge and ionic radius.

Now let's consider the size of nanoparticles, the radii of hydrated ions. According to our concept [3, 4, 5], they can be calculated basically on the model of oscillating with a plasma-like frequency of particles in electrolyte solutions using the dispersion of the Vlasov's equation:

$$\omega = \omega_L \cdot (1 + (3/2) \cdot k^2 r_D^2). \quad (6)$$

Here $\omega_L = (4\pi z_D e^2 n_o / m)$ – Langmuir's plasma frequency; $z_i e$, $z_D e$ are ion charge and dipole of the solvent; $n_o = n_s / V = n_s / (4/3) \cdot \pi r_s^3$ is – density of charges, in this case the number of solvent molecules in the hydrate complex, n_s is hydration number, M is mass of the solvent molecules, r_s is the radius of hydrated ion.

The dipole charge is $z_D e = p/l$, where p is the dipole moment and l is dipole distance for the solvent.

Damping parameter kr_D , where k is a wave number, r_D is Debye radius, has limits of changing $0 \leq kr_D \leq 1$. In considering the ions of electrolyte in the solution as a system of charges, $kr_D = 1$ takes place, i.e. spatial dispersion is at maximum, oscillations are damping, but they are maintained at a frequency of external perturbation.

$$\omega = 5/2 \omega_L = (5/2) \cdot (4\pi z_D e^2 n_o / m)^{1/2}. \quad (7)$$

If you multiply the expression (7) on the Planck constant \hbar , and bear in mind that the total energy $\hbar\omega$ is $(3/2)k_B T$ (for spherically – symmetric distribution all three degrees of freedom are taken into account), then we obtain formula (8), in which values n_o и $z_D e$, given earlier, are introduced:

$$r_s = (25 z_i p e n_s \hbar^2 / 3 m k_B^2 T^2)^{1/2}. \quad (8)$$

The values of the radii of solvated ions in water, calculated according to equation (8), are also listed in table 2.

As it seen from table 1 and 2, the estimated hydration numbers and the radii of hydrated ions (the size of nanoparticles) are in satisfactory agreement with scientific literature data. The given model estimates the size of hydrated ions of seawater and the obtained values r_s can be recommended for the development of more energy- and resource-saving technologies of seawater desalination not only for the regions with a harsh shortage of drinking water.

Table 2

Characteristics of hydrated ions

Ion	Ion radius, r_i , nm	Hydrate number, n_s	The radius of hydrated ion, r_s , nm [4]	The radius of hydrated ion, r_s , nm [6]
Na ⁺	0,098	4,03	0,360	0,330; 0,386
K ⁺	0,133	2,69	0,315	0,301
Mg ²⁺	0,078	5,33	0,395	–
Ca ²⁺	0,106	3,64	0,348	–
Cl ⁻	0,181	1,70	0,270	0,291
SO ₄ ²⁻	0,147	2,34	0,300	–

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DETECTING MICROORGANISMS IN SEWAGE VIA METHOD OF GAS CHROMATOGRAPHY (GC) WITH MASS SPECTROMETRY (MS)

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The article presents the results of studying sewage before mechanic cleaning and silt from silting grounds of Govsaninskaya station of Baku with bacterial flora. A spectre of aerobic and anaerobic microorganisms has been received. It has been established via express method of detection – chromatography with mass spectrometry. Expression, sensitivity, and informativity of the method, and it can be utilized for monitoring infections from various positions.

Keywords: sewage, silt, detection, bacterial flora, chromatography with mass spectrometry

The main purpose of sanitary-microbiological research of sewage is a supervision over an efficiency of cleaning and disinfection of sewage and their sediments before introducing them into pools, seas, and irrigation fields.

According to the existing regulative documents, in a number of cases uncleaned water or water at the stage of cleaning before chloration is studied for presence of lactose-positive bacterias, and after chloration bacterias of Enterobacteriaceae family are defined for a control of operation of cleaning facilities [1, 2].

But, considering the fact that in terms of Azerbaijan sewage are introduced into the sea after cleaning and it is also used in irrigation, and silt deposits are used as fertilizers, there is a necessity for a new, accelerated and broadened control over water cleaning.

Our claims are based on previous researches on studying viral and bacterial content of sewage that have revealed a wide spectre of viral and bacterial population of microorganisms [3, 4, 5, 6].

The research has been carried out via classic general bacteriological and virological methods of indication and identification that, as known, are informative, but labourious, expensive, and long.

Considering the mentioned information, target objective of this research is to reveal a spectre of bacterial flora in sewage and active silt at silting grounds of Govsaninskaya cleaning station of Baku, with processing and utilizing gas chromatography with mass spectrometry for detecting microorganisms.

Materials and methods of research

Probes of sewage, selected before mechanic cleaning and probes of active silt from silting grounds of Govsaninskaya cleaning station were selected as materials of the research.

Detection of bacterial microorganisms was carried out via method of gas chromatography with mass spectrometry [7, 8, 9].

Method of gas chromatography is one of the modern analytic instrumental methods.

Data bank of chemical components of clinically-significant microorganisms (NIST) served as a basis for defining kinds of microorganisms.

Using chemical composition of microorganism cells to identify kinds of microorganisms for their medical diagnostics lies in a basis of this method.

An analysis is preceded by processing probes of sewage – its centrifugation under 2500 rpm during 30 minutes in order to sediment large disperse fractions. Then comes a period of probe preparation – discharge of fractions of lipid acids and their transition into compositions, suitable for chromatographic analysis.

After biopreparation, 0,4 ml of probe is dried with addition of small amounts of methanol (0,2 ml).

Then, 0,2 ml of 1,7 M HCl is added into metanol and methanolysis under 80 degrees of celcium is carried out during an hour.

As a result of reaction of methanolysis, LA (lipid acids) are freed as methylic ethers of lipid acids. These components are extracted two times with hexane – 200 mcl (microliters).

Reaction solution in quantity of 2 mcl is introduced into an injector of chromate mass spectrometer GCMS-QP-2010S (Shimadzu, Japan).

Chromatographic division has been carried out on a capillary column 50 m long, 0,32 mm in diameter, with film thickness of 0,53 micron.

Chromatography regime: 120 degrees, 2 minutes, 15 degrees/minute up to 230 degrees. Mass spectrometer – quadrupole, with ionization and electric impact (70 eq).

Interpretation of data of mass fragmento grammes consists in defining peaks' belonging to corresponding substances according to their mass and time of chromatographic hold (Ret. Time). It is defined according to chromatogram me in scanning regime, when it is possible to define a nature of chemical component of a cell.

Comparison was carried out according to NIST library.

Results of research and their discussion

The result of chromatographic analysis of sewage probes has established a presence of markers of bacterial flora of wide spectre (Fig. 1) that corresponds to a certain type of microorganisms (table 1).

As you can see in Fig. 1, each component of a solution corresponds to a separate peak on chromatogramme. Time period from the begin-

ning of chromatogramme to peaks is called retention time (*tR*).

Defining qualitative composition of a solution is carried out via comparing *tR* of a given component and a standard – a substance of a known culture. Coincidence in standard *tR* and

tR of a defined component indicate their identity. A standard is often added to a utilized composition (marking method). Besides, a number of peaks in chromatogramme does not change, and an intensity of a peak of a component increases.

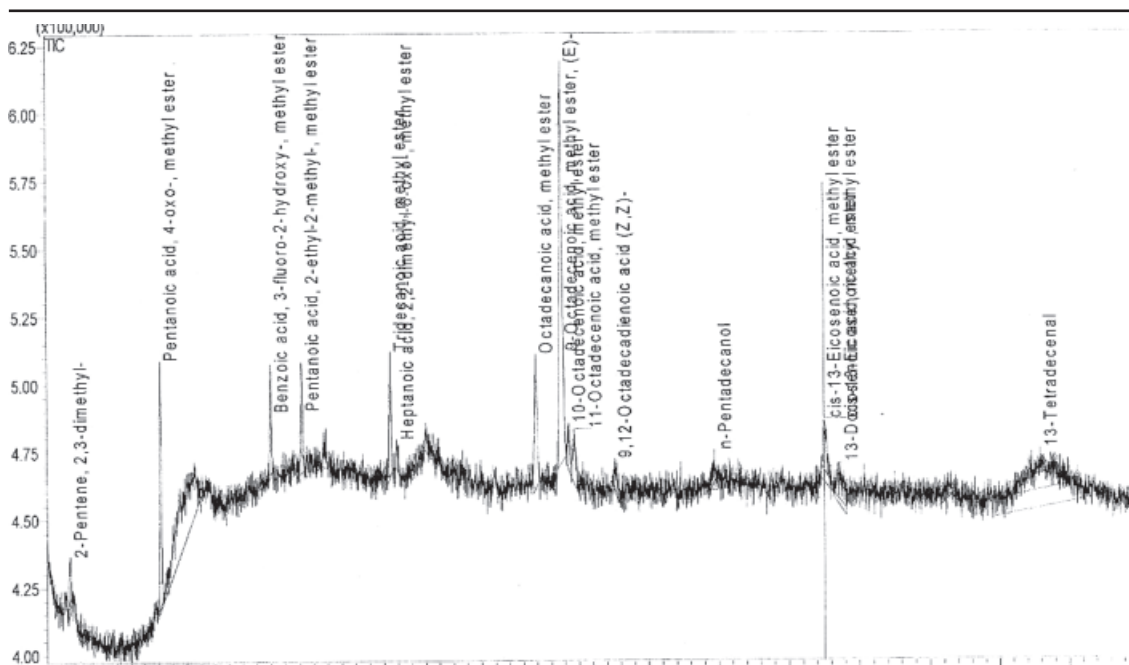


Fig. 1. General chromatogramme of revealed markers of microorganisms in sewage

Table 1

Spectre of bacterial microorganisms that have been detected in waters of Govsaninsjaya cleaning station before mechanic cleaning according to markers of NIST

Peak name	Ret. time min	Area $\mu S'$ min	Rel. Area %	Types of microorganisms
2,3 dymethyl -2 Pentene	6,825	5321	1,48	All microorganisms
Pentanoic acid, 4- oxo methyl, ester	10,073	128352	29,13	Общие колиформы
2,4 Hexadienedioic acid demethyl ester	14,003	56783	11,61	E. coli
Pentanoic acid 2- ethyl-2 methyl. Methyl ester $C_5H_{10}O_2$	15,096	21578	5/995	General coliforms
Dodecanoic acid methyl ester $C_{10}H_{19}O_2$	18,248	40388	11,22	Streptococcus faecalis
2,2 dimethyl ester 6 oxo- Heptadecanoic $C_{17}H_{36}O_2$	18,469	7759	2,16	Enterobacteriaceae, Pseudomonas aeruginosa
Octadecanoic acid methyl- ester $C_{19}H_{38}O_2$	23,452	86170	17,157	All microorganisms
11 Octadecanoic acid methyl- ester $C_{18}H_{38}O_2$	24,385	145768	29,024	Bacillus subtilis
9 Octadecanoic acid methyl- ester	24,636	4358	1,208	General coliforms
10 Octadecanoic acid methyl- ester $C_{18}H_{38}O_2$	24,822	4858	0,968	Clostridium perfringens
9.12 Octadecanoic acid methyl- ester	26,290	4923	1,368	Peptostreptococcus, Bifidobacterium
Cis 11 eicosenoic acid methyl ester	33,741	3912	1,087	Staphylococcus aureus, Actinomyces Propionibacterium

Defining quantitative composition of a solution is based on an assumption that an intensity of a peak of each component is proportional to its content in the solution.

Peak area S (Area $\mu S'$ min) is used as a measure of intensity.

Normally, a height of a peak h is multiplied by its width W , measured at the middle of a peak's height: $S = hw$.

Utilizing mass spectrometer as a detector of gas chromatograph allows us not only to register presence of a divided component in it, but also establish its structure.

A wide usage of chromat mass spectrometers has actualized a necessity to create giant libraries, databases of mass spectres of various solutions.

Speaking of advantages of mass spectrometry we first of all should outline a sensitivity,

expressivity, informativity, and reliability of the method.

This method is a universal method of indication that is equally effective for aerobic and anaerobic microorganisms (G.A. Osipov, 1996) [9].

Thus, the following microorganisms' markers have been revealed in sewage: general coliforms, *Streptococcus faecalis*, *Pseudomonas aeruginosae*, *Bacillus subtilis*, *Clostridium perfringens*, *Peptostreptococcus*, *Bifidobacterium*, *Staphylococcus*, *Actinomyces*, *Propionibacterium*. A similar spectre of markers has been revealed while studying active silt that is used for inactivating microorganisms in sewage according to phenomenon of interference of saprophytic factor μ (table 2, Fig. 2)

Table 2

Spectre of bacterial microorganisms that have been detected in active silt of Govsaninsjaya cleaning station according to markers of NIST

Peak name	Ret. time min	Area $\mu S'$ min	Ret area%	Types of microorganisms
2 Pentene, 2,3 dimethyl	6,825	4425	0,881	All microorganisms
Pentanoic acid, 4- oxo methyl, ester	10,073	104865	25,556	General coliforms
2,4 Hexadienedioic acid demethyl ester $C_8H_{12}O_2$	14,003	41807	9,316	<i>E. coli</i>
Hexadienedioic acid methyl ester	15,096	63265	12,597	General coliforms
Octadecanoic acid methyl- ester $C_{19}H_{38}O_2$	23,452	58532	16,261	All microorganisms
11 octadecanoic acid methyl- ester $C_{18}H_{38}O_2$	24,385	51995	14,445	<i>Bacillus subtilis</i>
10 octadecanoic acid methyl- ester $C_{18}H_{38}O_2$	24,636	2246	0,624	<i>Clostridium perfringens</i>
13 octadecanoic acid methyl- ester	24,822	5095	0,514	<i>Peptastreptococcus faecalis</i>
9.12 Octadecanoic acid methyl- ester	26,290	2564	0,986	<i>Peptostreptococcus</i> , <i>Bifidobacterium</i>
Cis 11 eicosenoic acid methyl ester	33,741	2307	0,432	<i>Staphylococcus aureus</i> , <i>Actinomyces</i> <i>Propionibacterium</i>

To conclude, we should say that results of our research in field of hygiene and microbiology of environment give us ground to claim that utilizing methods of chromatography with mass

spectrometry as an express method of detecting microorganisms in an environment is purposeful for control over cleaning sewage at cleaning stations and in specific epidemic situations.

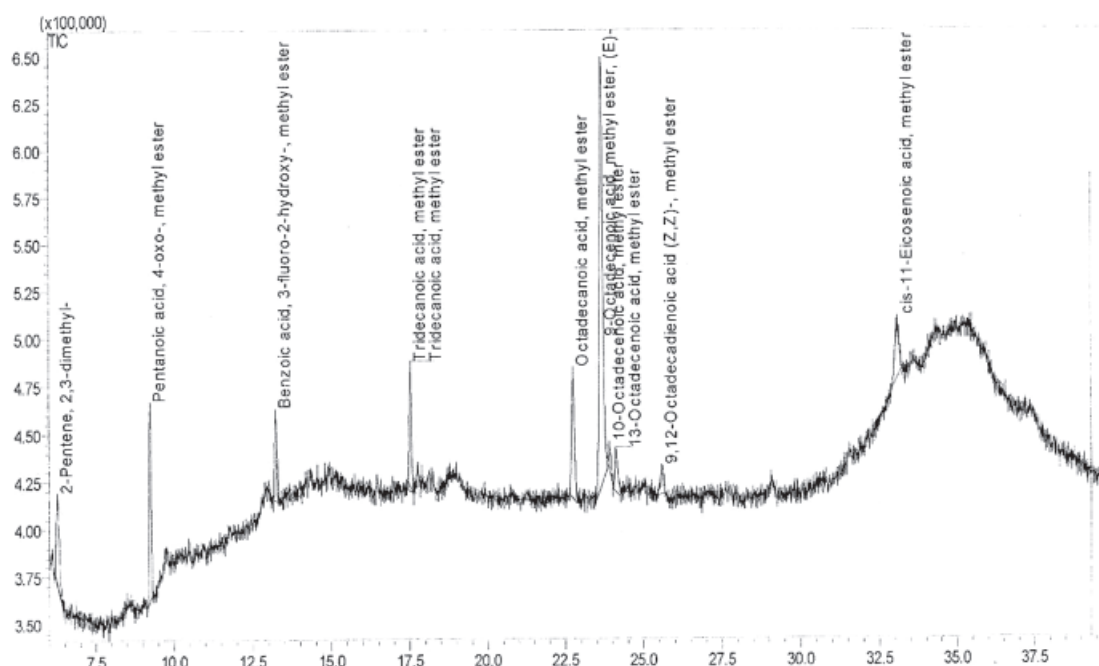


Fig. 2. Chromatogramme of active silt probes

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*Materials of Conferences***INNOVATIVE HEALTHY FOODSTUFF
FOR POPULATION
OF THE FAR-EASTERN REGION**

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The problem of health preservation and human proper nutrition has always been and remains one of the most important and vital problems in order to provide favorable demographic situation. Modern science devoted to the problems of healthy nutrition represents dynamically developing field of human activity, which combines the great number of fundamental and applied biological and medical disciplines. It gets especially obvious if to the example of the special-purpose foodstuff production based on vegetable raw materials, targeted to different age groups.

By special-purpose foodstuff we imply products intended for regular use by all groups as a part of food ration, preserving and improving health and reducing the risk of food-caused diseases, what is achieved though including special-aimed food ingredients, possessing capability of producing favorable effects on vital physiological functions and metabolic reactions of human body.

In the scientific researches conducted by the Far-Eastern Federal University (FEFU) the priority position is occupied by the researches in food technology, including development of special-purpose, healthful and dietary meals products. On the University base there was established the Educational-Scientific-Technical Complex, which allows introduction the results of the scientific researches into education process and certifying new technologies in structural innovative departments of FEFU: small tonnage production of fish products, innovative technology centre and students canteens network.

Recently Far-East regional food producers have started expressing an intense interest in new technologies, developed in the University. Unique character of new foodstuff lies in the fact that the most part of the them is produced on the basic of local raw materials (wild-growing herbs, seafood), having wide range of physiological effects. The technologies applied are resource-saving, what in turn allows producing foodstuff considering the raw materials natural biochemical features while preserving all native properties with minimum waste and losses. These help to increase the number of orders for new original technology development of traditional food production technologies.

FEFU has a certification department which draws up the applications for patents. The main topic of applications is a development of new food technologies. In most cases the authors of patents are the scientists, professors and senior lecturers of the Uni-

versity. The University experts annually receive up to twenty Russian patents for their inventors.

FEFU successfully cooperates with the scientific regional institutions – Pacific Institute of Bioorganics, Pacific Scientific and Research Fishery Centre (TINRO-Centre), FEBRAS Pacific Marine Scientific Institute, FEBRAS Chemistry Institute, Vladivostok State Medical Institute. The joint projects are devoted to the researches in chemical composition, biological properties, food nutrition of the developed products line and bioactivity of food raw materials; study of the methods of food expiry date enhancement during the storage.

Taste and quality of the products, being developed here. The foodstuff have been recognized not only by consumers, but also by the representatives of leading producers of food industry in the Far-Eastern Region. FEFU is a participant and multiple winner of exhibitions and contests. The achievements of the scientific-research stuff had been recognized and awarded with medals, diplomas and patents of regional, all-Russian and international exhibitions. Participating in seminars, conferences, symposiums, degustation-exhibitions, which are held in different scientific-research institutions of the Far-East, FEFU shares it's achievements and researches results in food technology and calls all interested organizations for cooperation.

Here is the list of not all but a few foodstuff produced by us:

1. Food for people of all age groups oriented to compensative the effect of raised loads (physical, psychogenic, mental, stress): tea compositions, syrups of healthful and dietary prescription, syrup for diabetics, beverages, blended juices made of wild-growing herbs).

2. Food for people who live in unfavorable ecologic and climate conditions (high radiation, different technogenic pollution and other bad environmental factors): mayonnaises and creams based on vegetable emulgators, bread and pasty with modifilanium and soybean flour, pro-biotic products, vegetable deserts, dry beverages based on natural juices with iodine additive.

3. Food for people meeting the modern requirements of appropriate nutrition: fish and seafood preserves, textured concentrates of soya protein. Meat and cereal products with different functional additives.

4. Food for people suffering proteometabolism disorder: low protein confectionary.

5. Herodietary products made on the basic of local raw material: sour milk drink, soya sour milk drinks with fish protein concentrate.

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INCREASE OF ECOLOGICAL SAFETY AND RESOURCE-SAVING IN NONFERROUS METALLURGY

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In work the schematic diagram of technologo-ecological model of management by process of mine melting of the lead production providing the solution of problems of greening of process, improvement of working conditions and safety of the working personnel is submitted. The structure of the new block of the analysis of concentration of harmful substances (copper, lead, arsenic, etc.), allowing to carry out the account and an appraisal of influence of harmful substances on working conditions and safety of the working personnel is offered. It is shown that in a working zone of the founder and in the shop atmosphere as a whole, corresponding to admissible limiting concentration, it is possible to reach stabilization of concentration of harmful substances by control, regulation in technological parameters and optimization of structure of initial and received products of melting.

Keywords: model, mine contractile melting, control, regulation, concentration, harmful substances.

At the modern stage of lead production the existing old processes do not meet the requirements of technology and safety of labour and staff. LLP «Kazzinc» (Ust'-Kamenogorsk, Kazakhstan) is referred to the most hazardous enterprises of the republic according to its effect over the environmental pollution. The process of mine retraction melting that is used on LLP «Kazzinc» for processing non-condition industrial products, turnover materials, and converter slag is the most low-technologic and ecologically hazardous object in the general scheme of lead production due to increased contents of harmful substances in the initial and received melting products. Increased contents of hazardous substances that concentrate in melting products have a significant impact upon conditions of labour and health of personnel. Solving problems of normalizing air in work area according to the conditions of mine retraction melting proves to be urgent.

The objective of this work is to develop an effective technologic-ecological model of managing the process of mine retraction melting that would establish a control, regulation, distribution of copper, lead, arsenic, and antimony between melting products.

Materials and methods of research

While solving the set goal, we have been grounding on the developed information-analytic environment (IAE) and operative system of control and regulation over technologic parameters of the process of mine retraction melting, composition, structure and action principle of which are described in detail in works [1–3]. Development of an effective technologic-ecological model was narrowed to a logical construction of interrelated blocks, each of them had its own functional peculiarities and was aimed to solve a specific problem.

In order to account and evaluate an impact of hazardous substances over the labour conditions and personnel safety, an additional block of the developed model that would analyze concentration of hazardous substances (copper, lead, arsenic, etc.) in the atmosphere of a melter's work area has been introduced.

The new developed block includes: *database of the initial statistic information* and parameters of labour conditions and safety; *database of the comparative analysis* of results that has been equipped with enquiry module.

Database of the initial statistic information and parameters of labour conditions includes accumulation of data, carrying out analysis and initial processing of statistic information. The base is equipped with a special storage that contains data on labour conditions parameters according to the mining refraction melting (temperature of a melter's work area, concentration of hazardous substances, humidity, speed of air movement, etc).

Database of comparative analysis is supposed to carry out comparative evaluation of the received results on concentration of copper, lead, arsenic, antimony in the atmosphere of workshop and melting products with their normative values according to MPC and sanitary norms of microclimate. The base was additionally equipped with an enquiry module that stores reference data on physical-chemical characteristics of hazardous substances and their solutions, and also data on MPC of MPC of hazardous substances and their solutions that are typical for lead production. The reference module also keeps the legal information that has been grouped by the importance and holds:

- existing and accepted laws, legislative acts, regulations of the Government of RK, linked to protection of labour;
- regional programmes and resolutions that are aimed to provide improvements in labour conditions;
- programmes of nature-preserving activity of enterprises, rules of production safety techniques, and workshop instructions.

Compilation of the developed structural components of IAE and operative scheme of control and regulation of technologic parameters of the process with new block of analyzing concentrations of hazardous substances allows us to imagine a composition, structure of an effective model of managing mine refraction melting as a principal scheme that is provided in the picture.

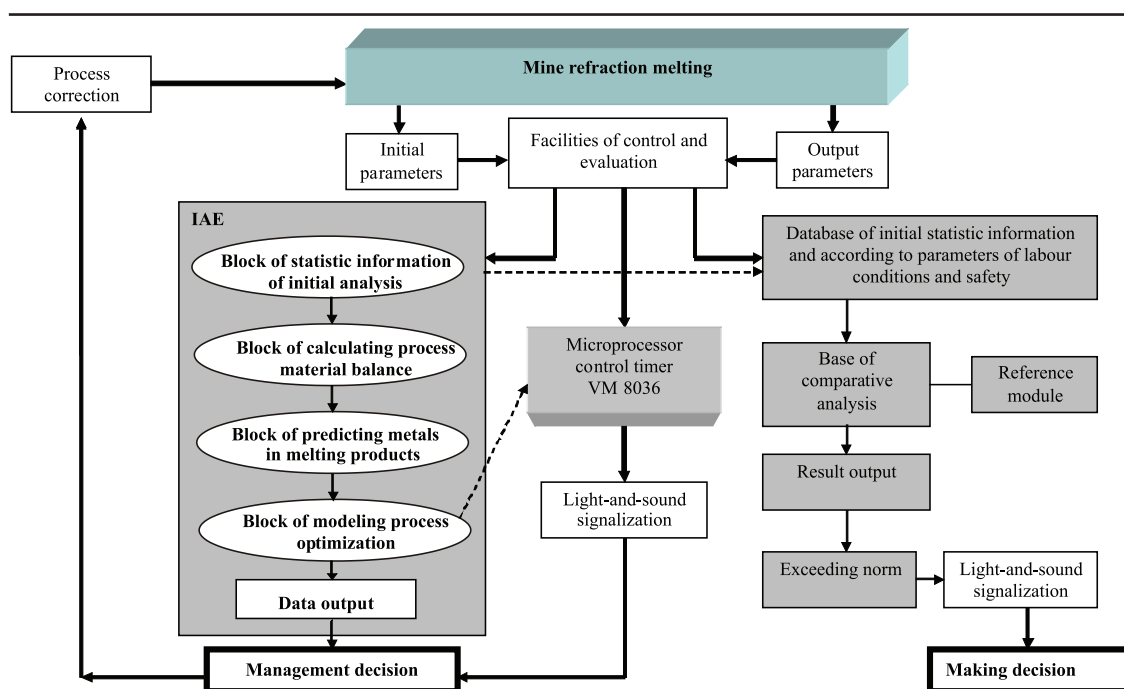
Results of research and their discussion

Information on the initial charge, received melting products, values of temperature and partial oxygen pressure is included into the database of initial statistic information directly from the research object, in our case – from the mine of refraction melting. Unlike the block

of statistic information and initial processing of statistic data that is included into IAE, in this area, initial processing of a massive is carried out without its selection (sorting). Such approach allowed us to make evaluations of an impact upon labor conditions and personnel safety of those critical parameters that come out of regulated values and do not take part in further analysis and calculations

aimed to defined optimal technological process parameters.

In metallurgical practice critical parameters (oscillations) can form as the result of unrecovered volley emission during a charge unload, in disturbance of technological process regime, due to oscillations of technological parameters of process, such as oxygen pressure, temperature from their optimal values.



Principle scheme of technologic-ecological model of mine fraction melting process

The analysis of discharge has a basic significance for practice, from the point of technology and defining the degree of impact of copper, lead, arsenic, and their compositions over labour conditions and personnel health. Providing control over concentration of hazardous substances in the atmosphere of a melter's work area (with standard known facilities) under discharge of liquid products from a mine in dynamics allows us define their dependence on the contents of the received melting products via operative calculations. Besides, stabilizing concentration of hazardous substances in a melter's work area and an atmosphere of a whole workshop in accordance with maximum permitted concentrations, we can achieve optimization in the composition of melting products.

Making operative calculations has a basic significance while defining concentration of hazardous substances and their solutions in cases of accident in a furnace operation, when discharges into a workshop atmosphere can be described with significant concentrations. Ac-

ording to calculations we can accurately define a class of hazard of the discharged substances, evaluate level of their load over the personnel in dynamics, take necessary measures, aimed to neutralize negative consequences. Thus, in the developed model, when the studied indexes oscillate from the set normal concentrations of hazardous substances, we foresee an operative activation of light-and-sound signalization that informs on a violation of labour conditions and safety of the process. When the system signals, it is necessary to take actions, aimed to correct technological parameters of the process and create favourable conditions in order to improve ventilation in a workshop, for example, due to a supply of fresh air.

Realizing this model in practice allows us to define optimal indexes of not only output parameters, but also carry out operative correction of the content of initial charge of a mine of refraction melting. Thus, in order to achieve optimal values of output parameters, it is necessary to assure that contents of copper, lead,

arsenic in the initial charge equal 26,37; 33,07 and 2,51 % correspondingly [1]. Correction of the contents of initial charge can be carried out via either cutting down a part of added converter slag into the initial charge, or its complete exclusion from the composition. Besides, we can foresee separate processing of converter slag with known hydro- or pyrometallurgic methods [4–6].

Exclusion of converter slag from the contents of initial charge can have a significant influence in cutting down the output of slag, create premises for decrease in temperature of slag melting and achieving optimal values of partial oxygen pressure. Further optimization of slag composition can be realized via selecting its main components. Thus, in practice, due to corrections in slag composition, after increase in contents of CaO from 18 to 21 %, SiO₂ from 26 to 30% and decrease in contents of Fe^{gen} from 28 to 24% in it, we managed to decrease the temperature of the process from 1579 to 1528 K. Optimizing slag composition and decrease in process temperature has created favourable conditions for melting in terms of recovery atmosphere. The described measures allowed us to decrease concentration of copper in slag by more than 20%, and lead – by 31% (from 1,38 to 0,95%). Copper contents in matte, with a simultaneous decrease in lead from 26 to 20%, grew from 38 to 44%. Increase in slag and matte quality had a significant influence over final technological values of the process: copper output into matte grew from 83 to 97%, and lead and rough lead – from 45 to 60%.

Favourable conditions for optimizing technological parameters are also created to assure an equal distribution of arsenic and antimony between melting products. While correcting technological parameters of the process using the developed model, distribution of arsenic and antimony into dust grew from 76 to 67% correspondingly, against 43 and 41 %, received with the existing scheme.

Stabilization in output of melting products and contents of copper, lead, arsenic, antimony, and their solutions allow us to maintain their constant concentrations in the atmosphere of the workshop working area. Decrease in temperature of slag melt, and, therefore, temperature of matte and rough lead decrease the level exhalation of copper, lead, and arsenic from the described products. As a result, concentration of metals that impact a person's health decrease in the workshop area. Thus, improvements insanitary-hygiene labour conditions are achieved, microclimate in the workshop is established, operation of venting systems is stabilized.

Permanent control over contents of copper, lead, arsenic in initial and output melting products, and also the data on their distribution between melting products allow us to define their maximum permitted concentrations in the received products. The received data allow us to carry out calculations on specifying hazard class for initial components of charge and received products, define total index of their toxicity [7], and also predict penetrations of copper, lead, arsenic into different components of the environment under mine refraction melting. In case the calculations show that some of the materials that are included into initial charge of mine refraction melting correspond to an increased hazard class or high toxicity level, such materials should not be exposed to processing according to the existing technology. Exclusion of materials that have a significant impact upon stabilization of optimal contents of the received melting products from the composition of initial charge, will allow us to improve labour conditions significantly due to decrease in concentration of hazardous substances in a workshop atmosphere.

The developed model is constructed in way when each of its key systems (IAE, operative control and regulation scheme, block of accounting hazardous substances) has its own divided chain for broadening its limits. This complex approach can widen functional abilities of the whole model.

Limits of abilities of this model can be expanded through developing and adding new additional data banks and bases that have a direct relation with the process of mine refraction melting. For example, the content of the developed model can be enriched with a database that would control and prevent negative actions that lead to accidents. We also consider inclusion of database that would contain information on composition of initial materials, output melting products, temperature regimes, etc. with a further development of client application, aimed to solve specific problems with a purposeful usage of the necessary information.

The structure of technologic-ecological model is quite universal and it can be utilized for control, regulation, and optimization of technologic parameters, improvements in labour conditions, and increase in safety of any metallurgic process. The only requirement is a change in contents of information-analytic system, considering specific technological parameters of the studied risk objects.

Resume

1. The work contains scientifically-grounded and suggested methods to improve labour

conditions within the process of mine refraction melting as one of the objects that represent the highest degree of risk.

2. An effective technologic-ecological model is developed, it provides for an improvement in labour conditions and increase in technologic-ecological indexes of the process of mine refraction melting through control, regulation, and stabilization of technological parameters.

3. The suggested structure and functional abilities of the model allow us to apply it to other hazardous processes of lead and copper production considering their specifics.

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METHOD OF FORECASTING THE PROBABILITIES OF FUTURE CONSEQUENCES WHILE MAKING DECISIONS

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The article suggests a method of forecasting the probabilities of actualization of future events that are consequences of decisions, made by a subject. The method is based on combining the objective forecast of events that uses forecast data of former periods and subjective forecast that is received via subjective expert evaluations with sage of new relevant information. It has been shown that having statistic data on former expert forecasts on a relevant problem can help one define probabilities of future events, values of which do not depend on initial a priori probabilities and have objective character. Besides, a vector of objective probabilities is a eigenvector of an expert's forecast reliability matrix and corresponds to its unit eigenvalue. The method allows us to decrease a forecast's subjectivity greatly and increase its efficiency simultaneously.

Keywords: making decisions, forecasting, probabilities, future events, eigenvector and eigenvalue

Within the process of making decisions we face a necessity to predict future results and consequences that can be caused by a variant of decision. A subject that makes a decision considers a set of possible consequences and results, and each of them can actualize in future, however, one doesn't know a priori which exact one and its probability. At the same time, adequacy of forecasting decisions' consequences by a subject defines achieving goals completely. Besides, it is necessary to consider limited abilities of a subject to adequately predict both future events and estimating of their probabilities [1].

In order to make the best and the most effective decisions it is necessary to possess scientific methods of forecasting. At the same time, there are no at present scientific methods of reliable and adequate prediction of future events and their probabilities. Most of the existing methods of forecasting are based on processing data of former predictions and on a baseless assumption that the past and the future are similar, therefore trends that were observed yesterday will preserve tomorrow and the day after. These methods can be used for short-term forecasts only with a condition that the environment, subject activity and their interaction do not suffer significant changes during the period. Of course, it can't be guaranteed. We cannot entrust to these methods when we require medium- and long-term forecast. In such cases possibilities of future events are absolutely indefinite and Bayesian correcting procedure of a priori probability to a posteriori probability is used to predict them [2, 3, 4]. Bayesian approach contains a set of arbitrary interpretations, and the received a posteriori probability still carries subjective nature.

In order to carry out scientific forecast at any time horizon it is necessary to possess methods that allow us to decrease subjectivity of forecasts and increase their objectivity level. These methods must combine both unavoidable subjective opinions, and objective

information and statistic data that are known from former similar forecasts and relevant to the studied problem [5].

This article suggests a method that increases accurateness and reliability of prediction probabilities of future events, essentially. The method includes both subjective estimates and objective data of former periods if such exists. It has been shown that possession of data on reliability of the expert's former predictions can help us determinate objective probabilities of the predicted events that do not depend on a priori subjective probabilities estimates. We have received equations, solving which one can find objective probabilities of the forecasted events that are used to define the studied precise probabilities of the forecasted events.

A priori subjective probabilities of predicted events

Let us suppose that a subject or an expert are forecasting that after making a some decision, n consequences or events A_1, A_2, \dots, A_n can arise in future. The set (M) that consists of possible future events A_1, A_2, \dots, A_n must be as complete as possible so it is possible to suppose that one of these events will realize obligatory, that is $p(A_1) + p(A_2) + \dots + p(A_n) = 1$. Probabilities $p(A_1), p(A_2), \dots, p(A_n)$ are not known to us a priori and are nominated by a subject according to his own comprehension of the moving events and, therefore, are subjective.

A subject, or an expert, realizing of arbitrariness of his subjective probabilities, instead of relying on them completely, decides to refer to another subject, or expert who is, in his opinion, a specialist in this area.

As the result of the taken research, the expert gives his set of probabilities of events A_1, A_2, \dots, A_n . Opinions of the subject $A_{o,1}, A_{o,2}, \dots, A_{o,n}$ on possibilities of any of future events A_1, A_2, \dots, A_n form a complete group. If the expert's opinion was absolutely true, than his claimed opinion $A_{o,i}$ that the event $A_i \in M$ will take place, it would guarantee its reali-

zation with the probability that equals 1. The expert's opinion $A_{o,i}$ can be both true, so that the event A_i will really takes place, and false so that another event $A_j \in M$ ($j = 1, 2, \dots, n$) will take place instead of event A_i . It means that conditional probability of the expert's prediction of an event $A_{o,i}$ while really one of events $A_j \in M$ ($j = 1, 2, \dots, n$) will take place, is measured with a value of conditional probability $p(A_{o,i}|A_j)$ that is a quantitative measure of expert's predictions accuracy and reflects its reliability.

Accuracy of expert's predictions that are expressed in conditional probabilities $p(A_{o,i}|A_j)$ can be received from information on similar predictions by this expert in past if such exist. Thus, for example, if from former experience we know that the expert's opinion $A_{o,i}$ on the realizing of event A_i was right for 75% of cases, then error of his prediction equals $p(A_{o,i}|A_i) = 0,75$. And, if for 15% of cases the expert predicted event A_i while event A_j took place, then error of this expert's forecast equals $p(A_{o,i}|A_j) = 0,15$. Totality of all conditional probabilities $p(A_{o,i}|A_j)$, $i, j = 1, 2, \dots, n$ describes the reliability level of forecast of the expert on this problem.

If such information is unavailable, or the studied event was not predicted before and are unique, then accurateness of predictions

$$S = \begin{pmatrix} p(A_{o,1}|A_1) & p(A_{o,1}|A_2) & \dots & p(A_{o,1}|A_n) \\ p(A_{o,2}|A_1) & p(A_{o,2}|A_2) & \dots & p(A_{o,2}|A_n) \\ \vdots & \vdots & \dots & \vdots \\ p(A_{o,n}|A_1) & p(A_{o,n}|A_2) & \dots & p(A_{o,n}|A_n) \end{pmatrix}, \quad (2)$$

we receive matrix equation of system (1):

$$P(A_o) = S \cdot P(A). \quad (3)$$

Elements $p_{ij} = p(A_{o,i}|A_j)$ of matrix S carry the information on accurateness of the probabilities of events predicted by the expert, and the complete matrix S describes the reliability of the expert's predictions regarding the studied events.

In matrix S each element, being a probability, is non-negative, and the sum of the elements of each column is equal to 1 due to the completeness of events $A_{o,1}, A_{o,2}, \dots, A_{o,n}$. Elements of vectors $P(A)$ and $P(A_o)$ that are formed of probabilities of events that form a complete group are also non-negative and their sum is equal to 1. Matrix S that possesses the described characteristics, is called stochastic, and vectors $P(A)$ and $P(A_o)$ are called probability vectors [6].

Utmost objective probabilities of the predicted events

Probabilities $p(A_{o,i})$, $i = 1, 2, \dots, n$, that are received from equality (1) or from its matrix analog (3) specify it's a priori subjective prob-

$p(A_{o,i}|A_j)$ by concrete expert are defined by subjective evaluations that reflect personal trust of the subject to the expert's opinion, or from control test evaluations of expert's qualification.

According to the formula of complete probability we receive a system of n equalities that define complete subjective probabilities $p(A_{o,i})$ of an expert that describe the degree of his certainty on actualization of an event A_i , that is

$$p(A_{o,i}) = \sum_{j=1}^n p(A_j) p(A_{o,i}|A_j), i = 1, 2, \dots, n. (1)$$

Probabilities $p(A_{o,i})$ specify a priori subjective probabilities $p(A_i)$ and are defined, on the one hand, by opinion of the expert or the subject, that is probabilities $p(A_j)$, $j = 1, 2, \dots, n$, and, on the other hand, by the indicators of the expert's prediction accurateness that are defined independently of him and thus are objective.

Introducing vector columns

$$P(A_o) = (p(A_{o,1}), p(A_{o,2}), \dots, p(A_{o,n}))^T;$$

и

$$P(A) = (p(A_1), p(A_2), \dots, p(A_n))^T,$$

where T is transpose operation, and matrix S that consists of elements $p_{ij} = p(A_{o,i}|A_j)$, $i, j = 1, 2, \dots, n$,

abilities $p(A_i)$. Therefore, probabilities $p(A_{o,i})$ can again be taken as a priori probabilities and one can continue their specifying, implementing matrix equalities (3).

Let us assume that specified probabilities $P(A_o)$ that are calculated at the 1st stage of specification procedure, equal $P^{(1)}(A_o)$, and specification procedure is carried out by the same expert, so reliability of his forecasts regarding the studied events does not change and matrix S stays unaltered. Then, probability vector of events that has been specified at stage 2, $P^{(2)}(A_o) = S \cdot P^{(1)}(A_o)$. As according to (3) $P^{(1)}(A_o) = S \cdot P(A)$, than $P^{(2)}(A_o) = S^2 \cdot P(A)$.

Procedure of specifying probabilities can be continued and at n -stage of specification we receive a probability vector $P^{(n)}(A_o)$ that is n -specification of initial a priori subjective probabilities $P(A)$:

$$P^{(n)}(A_o) = S^n \cdot P(A), \quad (4)$$

matrix S^n is n -degree of matrix S .

Process of specifying of probabilities that is carried out by the same expert, can be continued unlimitedly. We can prove [6] that for matrix equality (4) with stochastic matrix S and probability vector $P(A)$ the following statement is correct: vector $P^{(n)}(A_0)$ has a finite utmost vector $Q(A)$ while $n \rightarrow \infty$ that, first of all, is a probability vector, and, secondly, does not depends on values of a priori probabilities $P(A)$ and, thirdly, equals the right eigenvector of matrix S that corresponds to its maximum eigenvalue 1, in other words,

$$Q(A) = \lim_{n \rightarrow \infty} P^{(n)}(A_0) = \lim_{n \rightarrow \infty} S^n P(A) = S \cdot Q(A).$$

By this means column vector of utmost probabilities

$$Q(A) = (q(A_1), q(A_2), \dots, q(A_n))^T$$

of the predicted events A_1, A_2, \dots, A_n equals proper eigenvector of stochastic matrix S that corresponds to eigenvalue 1 of this matrix, in other words,

$$Q(A) = S \cdot Q(A). \quad (5)$$

Matrix system of equations (5) can be expressed in an expanded form:

$$q_i = \sum_{j=1}^n p_{ij} q_j, \quad i = 1, 2, \dots, n, \quad (6)$$

where $q_i = q(A_i)$, $i = 1, 2, \dots, n$ are utmost probabilities of future events A_i .

In system (6) one of the equations of the system (actually, any of them) is linearly dependence on the other equations of the system, and, therefore, can be excluded. In order to the rest of the system of equations was compatible and have the unique solution, and the vector $Q(A)$ defined from the system of equations was probabilistic, it is necessary, instead of the excluded equation, join a normalization equality $q(A_1) + q(A_2) + \dots + q(A_n) = 1$ to system (6). It reflects the fact that the predicted events A_1, A_2, \dots, A_n form a complete group. By this means utmost probabilities

$$Q(A) = (q(A_1), q(A_2), \dots, q(A_n))^T$$

of actualization of future events A_1, A_2, \dots, A_n are defined from the system of linear equations (6) and added normalization equality.

Vector of probabilities $Q(A)$ represents an objective opinion of the expert regarding probabilities of the predicted events, to which he will come inevitably if he specifies his forecast regarding values of probabilities of events A_1, A_2, \dots, A_n repeatedly and, at most, unlimitedly. Besides, in order to specify, it is sufficient to possess the data on accurateness of an expert's predictions only. Objective nature of the utmost probabilistic vector $Q(A)$ comes from the

received above fact, according to which, final probabilities $Q(A)$ do not depend on initial a priori subjective probabilities $P(A)$ that are set by a subject or an expert at the beginning of evaluation process. Therefore, utmost objective (UO) probabilities of the actualization of forecasted future events depend only on the degree of reliability of the expert's forecasts that is estimated by the matrix S of conditional probabilities $p(A_{o,i}|A_j)$. Matrix of forecasts' reliability S is defined not only by an expert's predictions' reliability, but also by the specific studied problem.

Specifying probabilities of the predicted events

Let us consider the method of prediction of probabilities of future events that uses both objective indicators of an expert's prediction accurateness that are expressed in UO probabilities, and subjective expert a priori estimations of probabilities of future events. And as we have established earlier, UO probabilities form a eigenvector that corresponds to the eigenvalue equals 1 of the stochastic matrix S of expert's forecasts.

Combining subjective and objective probabilities in the method is achieved via correction, or specifying of UO probabilities according to subjective opinion of the expert on the predicted events $A_i \in M$. This correction is expressed by specified probabilities $q(A_i|A_{j,pr})$, $i, j = 1, 2, \dots, n$, of future event A_i on condition that the event $A_{j,pr} \in M$ will actualized.

After analyzing a new information, the expert predicts the following sequence of events: if future leads to realize the event $A_i \in M$ with UO probability $q(A_i)$, then the probability of new predicted event $A_{j,pr} \in M$, will equal conditional probability $p(A_{j,pr}|A_i)$, $i, j = 1, 2, \dots, n$. As the predicted event $A_{j,pr}$, $j = 1, 2, \dots, n$ actualizes in combination with one of events $A_i \in M$, $i = 1, 2, \dots, n$, then complete probability $p(A_{j,pr})$ can be expressed as:

$$p(A_{j,pr}) = \sum_{i=1}^n q(A_i) p(A_{j,pr} | A_i),$$

$$j = 1, 2, \dots, n.$$

Probability of a compatible actualizing two events $(A_{j,pr}, A_i)$, according to the formula of conditional probabilities, equals $p(A_{j,pr}, A_i) = p(A_{j,pr}) q(A_i|A_{j,pr}) = q(A_i) p(A_{j,pr}|A_i)$. Thus, we receive the desired expression for a specified probability $q(A_i|A_{j,pr})$:

$$q(A_i | A_{j,pr}) = \frac{q(A_i) p(A_{j,pr} | A_i)}{p(A_{j,pr})},$$

$$i, j = 1, 2, \dots, n.$$

Specified probabilities $q(A_i|A_{i,pr})$ are the desired probabilities of future events $A_i \in M$ during the process of making decisions. They are defined both by objective UO probabilities $q(A_i)$ that are received according to the objective information on the expert's prediction of such events in the past, and by subjective probabilities $p(A_{i,pr}|A_i)$ of the forecasted events $A_{i,pr}$ on condition that only events A_i can actualize in future.

By this means the method of prediction values of probabilities of future events while making decisions combine both objective and subjective forecasting. Objective component of a forecast is based upon an objective data massive on an expert's predictions in the past on a relevant problem. This type of forecast is expressed with UO probabilities that, as it is shown in the article, are elements of eigenvector of stochastic matrix of predictions' reliability S that corresponds to its maximum eigenvalue, equals 1. Subjective forecast is carried out by subjective expert's estimations, according

to analysis of new information on conditions of future. The method of prediction probabilities of future events that is described in the article, allows us to increase adequacy of forecasting future events significantly and decrease subjective component of forecasts, increasing their objective component at the same time.

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Materials of Conferences

THE PROOF OF 8-TH EUCLIDIAN AXIOM
(EUCLID–GALILEI–CANTOR–COHEN)

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1. Euclid 8 Axiom, which approves: «The Whole is more than its own Part», was appeared [1] in Euclid's «Principles» already after death of its author. Tannery testifies that as follows: «Geron does not know Euclid 8 Axiom, but Prokl (412–485) had it [1, p. 246]. Euclid himself has had following phrase «...the smaller is equal to the greater, that is ridiculous» [1, Book 1, Statement 6 on p. 21]. On the other hand, G. Galilei, who opened that quantities of natural numbers and their squares are as if equal, bequeathed to be cautious in the comparison of infinite quantities: «... properties of equality, and also greater and smaller size have no place there where it is a question of infinity, and are applied only to the final quantities» (see [2, p. 140–146]). However S. Kleene has written [3, II, IV, 32] about this «Paradox»: «In 1638 G. Galilei has noticed, that squares of the positive integers can be put in 1-1-correspondence with themselves positive integers. And that conflicts with Euclid 8 Axiom according to which the whole is more any of own his frequent». In last quarter of XIX century G. Cantor has created [4] the theory of infinite sets from a regular establishment 1-1-correspondence between pairs of such sets. The concept of capacity of infinite sets was born from such comparisons, as generalization of quantity concept for the final sets. Now almost all mathematicians consider a concept of «one-to-one correspondence» between a pair of sets equivalent with the concept of «bijective function». We usually use from these two concepts the last, as more correct and unequivocally understood. The modern statements about infinity: $a + \infty = \infty$, $a \cdot \infty = \infty$, $\infty + \infty = \infty$, $\infty \cdot \infty = \infty$, $\infty^\infty = \infty$ etc. simplify decisions of many problems on the analysis. However such approach with $\sum(1)^n = \infty = \sum(1)^{-n}$ deprives a concept of the infinity any definiteness and structure, not supposing its studying and increasing a risk of an occurrence of mistakes in the proofs of statements about infinite sets. Meaning Axiom of Choice (AC), we shall be limited to consideration of quite ordered sets (see also item 3). The main aim of our report is the proof of Euclid 8 Axiom. We use known mathematical texts in our report and we follow the Paul Cohen's forecast about continuum-hypothesis (CH) [5, IV.13]: «A point of view which the author feels may eventually come to be accepted is that CH is obviously false».

2. To begin with we shall remind [6, 3.5] a correct definition of final and infinite sets: the linearly ordered set F is said to be final one if it is or empty, or one-element, or each its subset, except empty and one-element, has two extreme elements: the least and the greatest. Linearly ordered set I_n is said to be infinite one if even one its subset has less than two extreme elements.

Everyone knows the set N of positive integers has not greatest number. However, as it follows from Peano's axioms, the least element of N designates either 0, or 1 [3, IV.32]. The admissibility of this fact complicates understanding of proofs of statements about properties of set N . We shall use a method of the mathematical induction in such proofs. Now we give the most simple and most obvious proof of Euclid 8 Axiom. Let I_n be an initial piece of natural row:

$$I_n \triangleq (1, 2, \dots, n) N$$

and

$$I_{n+1} \triangleq (1, 2, \dots, n+1).$$

Theorem 1. There does not $\forall n \in N$ any injection $\varphi: I_{n+1} \rightarrow I_n$; $\forall n \in N$ each function $\varphi: I_n \rightarrow I_{n+1}$ does not be surjective one.

Everyone can easily prove Theorem 1 by mathematical induction technique. Counterexamples to Theorem 1 are based on naive understanding of the fundamental concepts of set theory: the injection, the surjection and the bijection. We are still not be later to define these concepts more precisely. Let $F(A, B) \triangleq \{f | f: A \rightarrow B\}$ be a set of all mappings from A in B (on B). A mapping $\varphi: A \rightarrow B$ is said to be injective one, or an injection, if either $a = q$ holds $\varphi(a) = \varphi(q)$, or

$$\varphi(a) \neq \varphi(q) \Rightarrow a \neq q. \quad (1)$$

A mapping $\varphi: A \rightarrow B$ of this kind that $\varphi(A) = B$ is said to be «mapping on» or «a surjective mapping», or, more shortly, «a surjection». Injective mapping $\varphi: A \rightarrow B$ is named bijective mapping or bijection if it is surjective too, i.e., when it is true (1) and $\varphi(A) = B$. In this case one speaks, that sets A and B either are bijective, or they have equal power and we write $A \sim B$.

Stephen C. Kleene used [7, I. 1.2] the diagonal method of Cantor for the proof of uncountability of all natural sequences set. Namely, it has chosen from the set $(f_i(k))_{i,k=0}^{i,k=\infty}$ of natural sequences $(f_i(k))$ any countable subset of them – the list of some sequences $(f_j^*(k))$ also has written below them on a square matrix F :

$$F \triangleq \begin{pmatrix} f_0^*(0) & f_0^*(1) & f_0^*(2) & \dots \\ f_1^*(0) & f_1^*(1) & f_1^*(2) & \dots \\ f_2^*(0) & f_2^*(1) & f_2^*(2) & \dots \\ \dots & \dots & \dots & \dots \end{pmatrix}. \quad (2)$$

Further he has defined one more sequence $f^*(k)$ as follows $f^*(k) \triangleq f_k(k) + 1$. That is obviously the sequence $f^*(k)$ has not entered into the list $F(2)$. And consequently Stephen Kleene has made only the following conclusion: «The set of all natural sequences is not countable set». Actually he has proved greater: «There not exists any bijection between set F of all sequences $(f_j^*(k))$ and the set $F^* \triangleq F \cup \{f^*(k)\}$. Now we use this method for proving of Euclid 8 Axiom. Linear independence (dependence) is the main concept of the linear space E_n . «If there is a finite number of vector in the basis, the space is said to be finite dimensional and its dimension is equal to the number of vectors in its basis. Otherwise, it is infinite dimensional. For an infinite dimension space a basis usually means a sequence of elements x_1, x_2, \dots such that every x is uniquely expressible in form $x = \sum_1^n a_i x_i$ (mean-

ing that the limit as n becomes infinite $x = \sum_1^n a_i x_i$ is zero)» [8, p. 27]. The basis B_n of E_n contains n linearly independent vectors and the set of any $n + 1$ vectors are linearly dependent and there does not exist any injective mapping of basis B_{n+1} into the basis of B_n . And other way there does not exist any surjective mapping of basis B_n into the basis B_{n+1} . These statements are easily generalized by mathematical induction technique on infinite-dimensional linear space E_∞ (see Theorem 1). Let identity matrix E be basis matrix of the all natural sequences set

$$E \triangleq \begin{pmatrix} 1 & 0 & 0 & \dots \\ 0 & 1 & 0 & \dots \\ 0 & 0 & 1 & \dots \\ \vdots & & & \ddots \end{pmatrix}.$$

$$\{a\} \subset \{a, b\} \subset \dots \subset \{a, b, c, \dots, q\} \subset \{a, b, c, \dots, q, p\} \subset \dots \subset A. \quad (7)$$

here $b = \psi(a)$, $c = \psi(b)$, $d = \psi(c)$, ..., $p = \psi(q)$, ...

It is obvious, that the set of elements of a chain (7) is quite ordered, i.e. each its subset has the least element. In such a way we can quite order each set having even one exact-rearrangement. If $\exists \xi \in B_{ex}(A, A)$ then $\xi(a) = g \neq a$ and the mapping ξ will transform a full a -chain (7) into some full g -chain which has symbol $P(g, \xi, A)$.

Let a family $S(P(A))$ be a class that contains only all elements of set $P(A)$ and all chains from its elements. Then any chain V has the least element, if

Hence, the lines of matrix E form basis $B_\infty \triangleq (f_i(k), : f_i(k) \triangleq \delta_i^k, i, k = \overline{1, \infty})$ of an infinitely measured space E_∞ – the set $(f_i(k))_{i, k=0}^{i, k=\infty}$ of all natural sequences. Now we shall identify each element $f_i(k)$ of this basis B_∞ with corresponding natural number i by natural bijection f

$$f: N \rightarrow B_\infty; \quad f(i) = f_i(k). \quad (3)$$

Let, for example, $f^*(k) \triangleq (0, 2, 0, 3, 0, \dots, 0, \dots)$ then $f^*(k) = 2f_2 + 3f_4$. Now let

$$k_0 \in N; \quad N^* \triangleq N \setminus \{k_0\}; \\ B^* \triangleq B_\infty \setminus \{f_{k_0}(k)\}. \quad (4)$$

Consequence of Theorem 1. Second condition in (4) holds $\neg(B_\infty^* \sim B_\infty)$

Consequence of Theorem 1 and condition (4) holds $\Rightarrow \neg(N \sim (N \setminus \{k_0, k_0 \in N\}))$

The second example too is indicative: a bijective mapping exists between the set of even numbers and, for example, a subset of these elements of basis B_∞ , which has even number-index.

3. Generally, we shall prove the Axiom 8 Евклида in the following form

$$B \subset A \Rightarrow \neg(A \sim B), \quad (5)$$

in particular, $q \notin A \Rightarrow \neg(A \sim (A \cup \{q\}))$. Last implication approves, that infinite sets are broken into the equivalence classes, also as well as final sets, to within an element. Let $f \in F(A, A)$ and $H \subset A$ then either $f(H) = H$ or $f(H) \neq H$. The set $B_{ex}(A, A)$ of all exact-permutations (rearrangements without cycles) $f \in B(A, A)$ we define as follows

$$B_{ex}(A, A) \triangleq \{f : f \in B(A, A) \& (f(H) = H) \& H = A\}. \quad (6)$$

For example, ex -bijection $f \in B_{ex}(I, I)$, $I \triangleq [0, 1]$ may be defined by formula:

$$f(x) \triangleq \begin{cases} x+h, & \text{if } 0 \leq x \leq 1-h, \\ 1-x, & \text{if } h-1 < x \leq 1. \end{cases}$$

Further we chosen a pair (a, ψ) , $a \in A$, $\psi \in B_{ex}(A, A)$, by means of the Axiom of Choice, and build following chain (a chain on an investment) for the proof of the implication (5):

it was built from the elements of some full q -chain $P(q, \xi, A) \subset S(P(A))$.

Theorem 2. Let $B \subset A$ and $\varphi \in F(A, B)$ then there are in the set A such pair elements a and q , that

$$a \neq q \& \varphi(a) = \varphi(q) \quad (8)$$

Proof Not breaking a generality, we shall consider that $\varphi(A) = B$. Now we shall assume opposite (8), i.e. $\varphi \in I(A, B) \neq \emptyset$, $B \subset A$. Now let $H \triangleq A \setminus B$,

so $B \cap H = \emptyset$. We have a chain of equalities with these designations:

$$B = \varphi(A) = \varphi(B \cup H) = \varphi(B) \cup \varphi(H).$$

Hence, $\varphi(B) \subseteq B$ and $\varphi(H) \subseteq B$. Inclusion $\varphi(H) \subseteq B$ means, that $\forall h \in H \exists b \in B$ such, that $\varphi(h) = b$. On the other hand, if $\varphi(B) = B$ for any $b \in B$ exists by virtue of $\varphi \in I(A, B) \neq \emptyset$ some element $g \in B$ such, that $\varphi(g) = b = \varphi(h)$ at $g \neq h$ as $B \cap H = \emptyset$. This holds (8). If $\varphi(B) = B_1 \subset B$ and $H_1 \triangleq B \setminus B_1$, then $\varphi(B) = \varphi(B_1 \cup H_1) = \varphi(B_1) \cup \varphi(H_1)$. Hence, $\varphi(B_1) \subseteq B_1$ and $\varphi(H_1) \subseteq B_1$. As well as it is above proved, that either $\varphi(B_1) = B_1$ and the condition (8) is proved, or $\varphi(B_1) = B_2 \subset B_1$, $H_2 \triangleq B_1 \setminus B_2$ and so on.

Thus, we shall receive following decreasing sequence Z of investments:

$$B \supset B_1 \supset B_1 \supset \dots \supset B_k \supset \dots$$

Here $k \in J$ and a set J is the set of indexes corresponding to constructed chain Z . As the sequence $Z \in S(\mathcal{P}(A))$ then there exists some a -цепь $\mathcal{P}(a, \xi, A)$ such that $Z \subseteq \mathcal{P}(a, \xi, A)$. Hence there exists an index $k_0 \triangleq \max\{k, k \in J\}$ of this kind that $\forall k B_k \subset B_{k_0}$. This inclusion holds (8).

4. Comparison of axiomatic definitions of the set N by different authors suggests that in set N as there is no the greatest number, and the least number is defined by a choice of the author (for example, there is the least natural number unit by Peano

and Kleene has zero as the least natural number). In opinion of the author of this report, such situation complicates search of the correct proof of the Аxiom 8 Евклида for set N , on the one hand, and, on the other hand, causes the assumption of the feasible existence of different theories of the real numbers dependent upon the first element of set N .

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DISCHARGING ANTI-BACTERIAL PREPARATION OF INTENSE RED COLOR FROM GASTROINTESTINAL TRACT OF COWS

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The taken experimental research has shown that a completely new component is discharged inside lively tissues. Unlike any known antibiotics, this anti-bacterial preparation of intense red color is not an allogenic substance for lively parts of an animal, but is received from alive structures. This fact is an obvious advantage in terms of exterminating harmful microorganisms that penetrate a lively body. The preparation was unofficially named Petrokul.

Keywords. Anti-bacterial preparation, microorganisms, antibiotics

It is well known that most antibiotics are received from moldy fungi that were grown in artificial nutritious environments or via synthetic method. Anti-bacterial preparations, such as penicillin, streptomycin, or antibiotics of tetracycline line tend to oppress and exterminate pathogenic micro-organisms inside a lively body [1].

– most antibiotics are received from moldy fungi that grow in the environment. Therefore, introduction of antibiotics in large and continuous doses into a lively body of an animal is a complex task [2].

– all anti-bacterial preparations have a short period of impact upon the pathogenic microflora in blood channel of a lively being. Active period of antibiotics ranges from several hours to 2 days, and after introduction is stopped, they are discharged with sweat, urine, and faecal masses, leaving an organism unprotected against an impact of a pathogenic agent [3].

– most anti-bacterial preparations, under maximum, surplus introduction into a lively body, tend to accumulate in lively tissues, causing allergic reaction of the lively system that is accompanied by: heart rate increase, impairment of the condition of an animal, lack of appetite, that can lead to death of the organism [4].

– many of anti-bacterial preparations have a side effect upon organs and tissues of a lively organism [5].

– most anti-bacterial preparations are ineffective in terms of hard-to-cure diseases (tuberculosis, gastric and bowel ulcer). Their efficient potential decreases [1–5].

The objective of this work was to find an animal substance of intense red color that possesses clear anti-bacterial characteristics in comparison with pathogenic microflora of the environment in contents of stomach.

Materials and methods of research

The research was taken in LLC Agricultural firm «Mordovzernothers» of the city of Saransk, republic Mordovia, upon cows of Hereford breed that died due to different reasons, linked to diseases of non-contagious aetiology.

According to the contents of stomach of the animals and their main components, we have taken selection of similar components that are aimed to receive artificial gastric juice in laboratories. To do it, clean water was mixed with a concentrated hydrochloric acid in glass vessel with add-

ing of pepsin ferment. In order to accelerate the discharge of intense red substance, percent correlation of hydrochloric acid to water was measured so the biochemical process does as fast as possible. In standard acidity of gastric juice equals app. 0,5–1,5% of concentration for agricultural animals. The provided table represents an approximate acidity of hydrochloric acid for different animals:

Number	Type of lively organism	Acidity (pH) of gastric juice
1	Cow	2,17–3,14
2	Horse	1,2–3,1
3	Pig	1,1–2,0
4	Sheep	1,9–5,6
5	Dog	1,5–2,0

Such percent correlation of gastric juice is sufficient for a complete splitting of stern masses in stomach. In this case 5% of gastric juice acidity was achieved in laboratory conditions.

Domestic bird (chicken, goose, or guinea fowl) egg shell was well-rinsed with water and cleaned from visible dirt and then place into glass vessel with a solution of hydrochloric acid. In sour hydrochloric solution egg shell starts to interact actively with 5% hydrochloric acid [6]. After the chemical reaction glass vessel was placed in shady warm place where moldy fungi grew in 40–50 days [7]. This fungi discharged a substance of intense red color that possessed obvious anti-bacterial characteristics against vulnerable pathogenic organisms (Fig. 1 and 2). The discharge took place in a short time period and under fixed terms.

Results of research and their discussion

While using all the described components in laboratory conditions, we receive moldy fungi and anti-bacterial preparation of intense red color, similar to the color of blood [8]. Due to its intense red color, this anti-bacterial substance that was unofficially called “Petrokul” (short from Petr Kulyasov), hasn’t been revealed by men before. Having this color, antibiotic Petrokul sucks into soaks into blood from stomach and dissolves in its flow completely. Discovering this anti-bacterial substance in blood, and therefore, all internal and external organs of a lively organism, allows us to claim that antibiotic Petrokul has some typical protective characteristics that keep it safe from an impact of pathogenic micro-organisms upon its lively structures [9].



Fig. 1. Acidproof moldy fungi. Sideview



Fig. 2. Intense red antibiotic that is discharged in gastric part of a lively organism. View from above

Since moldy fungi grows only in solutions that have hydrochloric acid in its content, growth and development of moldy fungi with a further discharge of anti-bacterial substance of intense red color from its body in lively structures is possible only in rennet camera of digestive system of an organism [10].

Among cows of Hereford breed that had been brought to Mordovia from Canada and Australia and died suddenly of diseases of non-contagious aetiology a liquid environment that contained components, similar to those of contents of domestic bird eggs – proteins, carbohydrates, fats, vitamins, and mineral substances, was found in the fourth camera of true stomach (rennet bag) during autopsy.

It allows us to suggest that both in laboratory conditions and in organisms of lively beings, under certain similar terms (acidity of a solution, temperature, and complete lack of daylight), a moldy fundi is born and forms an antibiotic of intense red color in its body. It

bears typical characteristics that oppress many incurable chronic diseases (tuberculosis, leukemia, brucellosis).

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TECHNOLOGY OF TEACHING IN MODERN EDUCATION

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In this article it is considered the modern educational technologies in improving the quality of training and teaching at university. The researching of the problem has prompted us to develop and introducing a process of learning Pedagogical of High School (magister) complex training sessions using priority technologies («cooperative education», «Project method», «Technology of critical thinking», etc.) This problem was solved by the use of active learning techniques that could provide dialogic communication, intellectual and personal activity, the development of reflexive position.

Keywords: technology, modern education, researching

The primary goal of modern education in the Republic of Kazakhstan is the formation and development of a students, to able to live in a developing generation of preparing for habits, skills and imaginative abilities and well power, students are generally concerned with improving their own grade and interests of group-wide.

The intensification of the learning process in higher education is associated with an increase in the number of training information for learning, as well as there was a contradiction between the theoretical knowledge and practical efficiency of the professions . A large amount of new information does not leave time to students for reflection, comprehension, whereby knowledge ceases to be important for facilitating and encouraging the development of comprehension. In this situation, reproductive forms of learning are not effective, and modern forms of activities must be properly trained teaching staff, it is ready for a planned and purposeful organization of the educational process that meets the requirements of modern education.

Basis and content of modern education is innovation, the substance of which is to essentially an evaluation of the pedagogical process, introduction of new formations in the traditional system of education. This condition to the emergence of new and improved technologies used before training at different levels and with different current. According them more popular is the motivational learning technology. Actively instilling into the learning process, they are bring the accordance content and methods of education with the changeable demands of society and the individual, contribute to overcoming the crisis in education. Today, motivational technologies characterize learning as a importance of conscious purpose, scientifically cultivation interdisciplinary works, and permit to denote it as a motivational learning, a special type of acquisition of knowledge, as an alternative to traditional education.

Individual experience of the use of motivational technologies in teaching students and

masters can be noted that in the process of training sessions between students (masters) and a teacher, as well as between learners are set enough productive and constructive relationship, there is a separate search for knowledge, mutual learning, be creative abilities. Analysis of studies indicates that learning technologies always cause cognitive, social activities of students, to progress their learning motivation and convinced of the value of knowledge.

Since the university under a credit system of education is the main form of independent work, the use of motivational technologies to extend the capabilities of the teacher to organize different types of independent work for a group of students with different levels of education. Organized such training activities, ensures the availability of works, the individual approach, the possibility of self-control, the work of consultants. The teacher acts as an able organizer of collective, cooperative and individual students work. Certainly, the use of motivational technologies requires more intensive work of the teacher and higher requirements for independent and activity of the student. In spite of, the benefits of innovation are obvious.

The researching of the problem has prompted us to develop and introducing a process of learning Pedagogical of High School (magister) complex training sessions using priority technologies («cooperative education», «Project method», «Technology of critical thinking», etc.) [1]. Since the predominant method of data technologies are problem solving, creative, discussing, they provide not only a successful assimilation of educational material, but also develop critical thinking of students, form their reflexive position.

In this aim, masters are offered works in the execution, not only and not so much could as a new study. In some cases, works gained for discussion, which demonstrates the interest of students of educational information, the active participation of, and attempt to find the answer yourself. However, the training was based on the concern and game situations that contrib-

uted to the development of cognitive interest, critical thinking masters, forming their reflexive position. The analysis of studies pointed to the significant changes that have taken place in the organization of training activities masters. First of all, the increased interest in cooperative learning and mutual learning. As seen in execution, assignments differed creativity, critical assessment. Masters benefit and defend their works, learned how to work in a team where important were the mutual control and group- grade. As a result of increased installation to quality education and knowledge has become topical value. Further observation of graduate teaching masters, the analysis of their actions, comments allowed significance that they are ready to decide educational and cognitive tasks, if necessary, to seek, to find, prove, argue. They have great desire to bring higher education, setting the professional career and therefore, the best living conditions and material security, characterize the value orientation, motivation for success, the constitution of such socio-psychological qualities as determination, independence, and sociability. This system of values and motives, has successfully formed in motivational learning, is important in the regulation of behavior and activity masters, in the development and forming them as a person and allow them to show in the future social activities and realize their potential.

During researching masters decided to the conclusion that in the process together works, they significantly improve knowledge on the subject. However, some types of work, for example, in small groups, have contributed to the improvement of skills – to listen to and evaluate the various options for the work, to supplement, to prove and substantiate their arguments, to assess their contribution to the work of micro groups, as well as how this contribution is taken members. Attracts attention, and the fact that almost all undergraduates reported at fellow students and the lack of development skills to consider the opinion of others that were taken into account in the subsequent stages. This problem was solved by the use of active learning techniques that could provide dialogic communication, intellectual and personal activity, the development of reflexive position. Thus, the method debate, the method of «brainstorming», as well as teaching strategies in the International Education Program «RWST» – «discuss selection», «Reading with pair, a exposition with pair», «Jigsaw-1», «Jigsaw-2» [2].

Our research on the use of technology, «Education in cooperation» in different learning conditions have shown that they are highly effective for the presentation and communication, giving information, the creative interpre-

tation of the material studied and the formation of values. Among the factors of depth and quality learning material, we have identified the following forms:

- introduction of each participant micro groups with the information possessed by the other participants (information exchange);
- promoting different approaches to the same object or phenomenon;
- essentially of different views and assumptions about the subject studied;
- abilities to criticize and reject any of the views expressed by;
- motivation the participants to find a group agreement.

Experience in organizing training sessions using innovative learning technologies can see that the didactic function of these classes are associated with two kinds of tasks:

- tasks specific terms of content;
- tasks of interaction in the group, subgroup.

The sphere of problems of the first kind includes:

- perception of students of contradictions, difficulties associated with the solution of educational problems, the problem;
- urgency of previously acquired knowledge;

And creative redefinition of the scope of their application, include them in a new context, etc.

The spheres of second kind are the roles in groups, teams, execution

Collective task, agreement to discuss the problem and to develop a common, group approach, subject to the special rules and procedures adopted by the joint search operations.

Pedagogically important are the results obtained «at the intersection of» concrete meaningful activities and the interaction in the group:

- Processing of data, information specifically for a convincing exposition;
- Presentation of his point of view as the position of its argument;
- Selection and weighting approaches to learning task;
- Application of the approach or point of view as a result of a conscious choice.

Results of in fact, derive from the context of distribution training activities, which is a way of organizing work in small groups. In our studies on the implementation of this technology, it was found that the joint training work in small groups promotes leadership, giving the largest contribution to elaborate meaningful group task (to clarify and specify the source of information, making suggestions about the collaboration, saying new ideas, opinions, etc.). Along with this, some statements and actions encourage other members to support each micro groups and join in the discussion, cre-

ate a general positive atmosphere. This causes all members respect each other and support a working environment work together.

Special conditions for the development of personality provide a method of projects. Solution of the urgent problem requires not only collaboration, but also to identify its causes, with consideration of different perspectives, to find the most effective solutions. In the protection project uses clarifying techniques. Among them is employed please clarify concepts, to indicate the sources of actual phenomena, etc. It should also be noted that the solutions to problem areas as such is not a didactic purpose, it is associated with the development of thinking and communication skills of students. With all the options, this method focuses primarily on the promotion of creative ideas and their further development. Important organizational feature: sequential combination of individual work (primary extension ideas), working in small groups, and finally, the general discussion. As a result, the ideas expressed by each student, either directly or in a modified form included in the first discussion in a small group, and then in the general idea. Thus, the method of projects in general, and various training activities in particular, combine problematic meaningful learning orientation and ensure the integration of each participant in the active learning process.

Provide opportunities and gaming technology training, which allow to approximate the various parties of real phenomena future careers. First of all – playing the role, update and oral reproduction learned that described his point of view, knowledge sharing with partners, partners in the game. This includes the analysis, the critical assessment of the actions of individual participants in the game, the selection of information, the construction of inductive and deductive reasoning, synthesis and integration of the available information, the development and evaluation of actual findings, and, finally, the outcome of business or subject-role-playing, as a result of joint creative learning activities reflecting the formation of the knowledge and skills to solve professional problems.

The above leads to the conclusion that the use of innovative learning technologies allows students not only acquire knowledge but also to regulate and manage the process of their education, which ultimately leads to the fact that knowledge becomes the actual value. Learning technologies are of great importance in the regulation of behavior and activities of future professionals in the development and shaping them as a person, which will ultimately help them in the future to manifest social activity, to realize their full potential. Our research has

shown that innovative learning technologies always cause a student social activities, increase learning motivation, promote intensive development of special professionally significant qualities and form a competitive person.

It should be noted that the implementation of innovative teaching requires appropriate training and those who have to implement them. In other words, they must be competent to carry out, a fresh thinker pedagogical process, owning a professional and pedagogical knowledge and carrying out innovative teaching. Unfortunately, many teachers who are far from the teaching of science and this significantly complicate the process of introducing innovative technology in high school education system. Professional and pedagogical knowledge of high school teachers based on the use of innovative learning technologies, can be seen as information about the methodological foundations of learning technologies, their nature, characteristics and different approaches to classification, characteristics of training in high school and how to implement innovative technologies under the credit system. These skills are considered as the basis for orientation in a variety of technology training, which is the prerequisite for their optimal use in the practice of university learning. In our case, there are three important features of professional and pedagogical knowledge: their awareness, critical processing and effectiveness. Therefore, only when the knowledge of innovative learning technology thoroughly meaningful and acquired as a result of practice, they can be made available to the individual, well-used in practice and become effective. Such knowledge enables the teacher to solve a variety of educational and training objectives. They, in turn, provide an opportunity for students to receive their base knowledge. Thus, knowledge is not simply transferred, they are produced in the process of co-curricular activities of the teacher and the student, and in the implementation of such activities to develop an active, initiative, independence of students, formed their individual learning paths.

The use of learning technologies will not only enhance the learning process, but also the professional growth of teachers, professional formation of a complex trait, reflecting its expertise and commitment to innovation. The main signs of readiness, in our opinion, should be considered:

– The presence of the target set for the implementation of innovative technologies in teaching activity; clearly defined innovative orientation of the teacher in

Specifically, understanding of the importance of innovation processes in education, the desire to learn new ideas, trends in education;

– The depth and fullness of knowledge about innovative technologies, methods of adaptation and implementation features in the university; the formation of the professional and pedagogical skills;

– Development of reflexive position necessary for further improvement.

As mentioned above, the implementation of innovative technologies in the university requires pedagogical knowledge, and in relation to the conditions of modern education and credit system, their role is growing twice. It should include specific knowledge of the credit system, and the ability to perceive and implement innovative learning technologies, adapt them to the curriculum. One solution to this problem, in our view, is to organize and conduct a series of training and development seminars for teachers of high school with no teacher training on «Innovative learning». Their importance is due to the peculiarities of the modern and the educational process, which is accompanied by significant changes in educational theory and practice. The purpose of seminar – to expand and deepen knowledge about innovative learning technology. At this the main objective – to help high school teachers possess theoretical knowledge with technology training and practical skills and the skills to implement them. The use of innovative learning technologies aimed at refocusing the teaching of information to organizational.

Implementation of learning technologies would be useful and exchange of experience in the group-grade training sessions, analysis, providing constructive criticism and recommendations to improve innovation and educational activities. The reorientation of the system of higher education in the new

values determined humanizing pedagogical process and interpersonal relationships of its subjects characterizes modern times. University graduate to become a competitive person, which implies a high level of overall development, possession of communication skills, lateral thinking and adaptability to changing conditions. Therefore, in high school, priority should be interactive learning, educational technology, new techniques and methods of training activities that give innovative learning process. Progress in science and technology will continue, and this means that the amount of educational information will constantly increase. Changes in the timing of training in high school is not expected, therefore, their learning, of course, affect the quality of education. That is why, it is necessary to radically change the educational process in higher education. It should aim at improving the quality of education, and thus to improve the quality of teaching. Secure that end innovative technologies and technologization educational process in general, and their effective implementation will depend on the level of professional and pedagogical knowledge and pedagogical innovation-oriented activities high school teacher.

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THE FORMING OF PROFESSIONAL AND COMMUNICATIVE COMPETENCE OF SPORTSPEOPLE FOOTBALLERS IN THE TRAINING PROCESS

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In this article we analyzed the features of forming communicative competence of sportspeople footballers as a factor of successful activities of highly skilled footballers. It is shown that professional skill depends largely on professional communicative competence. In this work we presented the main components of the content of professional communicative competence: cognitive, communicative, organizational and operational, reflexive. All this components have influence with the high sportsman's qualification.

Keywords: professional communicative competence, pedagogical conditions, forming, football

Professional activity of an expert in Physical Education and sports is largely governed by knowledge and skills of communicative nature connected with organization and implementation of business and interpersonal communication, that's why the problem of forming communicative competence of footballers is of great importance. At times sportspeople, differing the high level of professional knowledge, skills and abilities, having necessary physical training but at the same time not managing the rules of interaction with other players, are absolutely helpless in communicating process with a trainer because any communication is effective only when people interacting with each other, are component in this situation [4, 6].

We revealed, relying on achievements of pedagogical science and our own experience, that the leading place is occupied by communicative component in the structure of professional activity of a sportsman-footballer when we participated in the championships on football in different zones of Russia, including the commands, becoming champions in different regions of the country. Communicative activity of a sportsman is a difficult multi-channel system of interaction «sportsman-sportsman», «trainer-sportsman», «sportsman-referee»; the main sides (processes) of this system are:

- communicative (providing of information exchange);
- interactive (organization of communication);
- perceptual (mutual understanding).

It is carried out as a socially significant, purposeful and specially organized by a trainer process of interaction with the use of previously thought over forms of communication, content and structure of relations with partners in a team and an opponent, with trainers and referees, at last, with the audience.

The successful action of communicative activities assumes sportsman-footballer's grasp of professional competence providing realization of communicative activities in case of the solution of problems to solve by means

of the control of communication processes in a certain game situation.

Communicative competence is consisted in human ability to realize and control his social behavior, to understand behavior of others, to understand reasons of origin of this or that emotional state, to own communication mechanisms which are necessary for successful achievement of these activities, in ability to see communicative problems in the activities, ability to formulate them and look for ways of their adequate resolution.

All above-mentioned elements characterize communicative «profile» of sportsman's professional activity as he should be able to establish psychological contact with partners in a team and an opponent, with trainers and referees, with the audience, to control communication process, to have formed speech and reflexive abilities, to have formed personal qualities: benevolence, tactfulness, objectivity, tolerance, organized nature, initiative and others, to be capable to solve non-standard problems structurally which arise in the process of competitive and training activities [2, 3].

We consider communicative competence as a necessary component of common cultural and professional development of a personality because it allows to provide personal and professional formation of a future specialist and it optimizes process of professional activity.

Certainly, it is possible to use communicative competence in the context of the analysis of sportsman's professional activity.

Analyzing the different points of view concerning the structure of professional communicative competence in particular a sportsman-footballer, influencing on game skill, it's included both the most narrow and extremely wide set of mental, social qualities, processes, knowledge and communicative skills [1, 7]. We pointed out the following principal components of the content of communicative competence: cognitive, communicative, organizational and operational, reflexive:

- *cognitive* – the system of knowledge allowing a sportsman to organize effective communication according to purposes and conditions of his professional and interpersonal interaction:

- knowledge about rules of professional behavior;

- knowledge about communication and its types, phases, regularities of development, existing communication methods and techniques, their action, possibilities and limitations;

- knowledge about effective methods for different people and different situations;

- knowledge of the level of development of these or those communicative abilities and of methods which are effective for me or aren't effective;

- *communicative* – the system of skills of interaction with people (a trainer, teammates, with referees), allowing to realize communication adequately to a certain type of situations and situational tasks and respectively includes:

- ability of a sportsman to positive interaction with a trainer, teammates;

- ability to build communicative relations on the basis of knowledge of problems and features of the sporting professional environment;

- readiness for practical activities according to the solution of professional tasks on the basis of grasp of professional lexicon;

- ability to analyze and project communicative activities taking into account professional environment and concrete personality;

- ability to find optimal forms of communication with partners for effective implementation of professional potential;

- ability to perceive and make verbal, non-verbal and paralinguistic signals, abilities to perceive expressional verbal, nonverbal and paralinguistic signals which a partner would prefer to hide;

- ability to define personal traits and emotional states of other people;

- *organizational and operational* – is characterized by the presence of the following skills of a sportsman:

- ability to act in the interests of a collective, to concern respectively to members of a group, to organize optimal communication with partners in case of the action of joint activities;

- use of psychological and pedagogical technologies in the process of interaction with partners; control, correction of results of activities according to desired goals;

- *reflexive* – is characterized by stable motivation of self-knowledge, self-development and self-improvement in communicative activities:

- readiness for manifestation of responsibility for a work on hand;

- ability to solve problems independently and effectively in the field of professional activity;

- ability to save internal autonomy during interaction;

- ability of adequate self-evaluation;

- empathy and social reflection (as a result of systematic contacts partners acquire the most different knowledge about themselves, about partners, about activities methods etc.).

We are of the opinion that these components define the content of professional and communicative competence.

It is necessary to notice that communicative competence provides the high level of professional competence of a sportsman – footballer as it assumes *knowledge* in the field of communication (social-psychological mechanisms, styles, methods and stages), professional *abilities* (use of techniques of effective communication, establishment of contact, submission of back coupling, behavior in business communication, active listening and conflict resolution), and also professionally significant *personal qualities* of a specialist (empathy, reflexivity, sociability, psychological facility, ability to cooperation, emotional attractiveness) [3].

Formation of professional and communicative competence of sportspeople-footballers will be the purposeful process of the systematized accumulation of knowledge, abilities, skills, allowing to realize professional and communicative activities effectively which will include carrying out the analysis of a game situation, determination of optimum methods of its resolution and achievement of a purpose by means of processes control of professional communication.

Therefore, the technology of communicative competence formation of a professional sportsman-footballer represents the general-purpose tool for the design of the trainer process in the educational and sporting club, including:

- precision and multiple-level system in setting goals;

- numerical composition and high-quality filling of studies by methods of training including pedagogical devices and created game situations, and forms of organization of training (paired, group, collective, individually isolated);

- organizational and pedagogical conditions focused on high-quality conversion of personal and psychological, communicative and pragmatist, valuable and semantic components of sportsman's personality which as a whole provide ease and confidence in communication, psychological rapport and communicative compatibility, and also active position in interaction with partners in a command, a trainer [5, 7].

All this in the aggregate provides a basis of functioning of a professional team, including principle of professionalism and competence which as a result has the impact on results of display in competitions.

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PUPIL'S WORKING ON FLUENCY AS A FACTOR OF INDEPENDENT STUDY

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The article is devoted to the problems of formation of smooth speech. It is necessary to create appropriate conditions for pupils to teach fluent speech and help them correct their mistakes related to speaking improperly. It is necessary to train pupils to make up sentences and to speak and to use grammatically right and appropriate constructions. And pupils should feel the language to be able to retell.

Keywords: smooth speech, fluent speech, speaking improperly

Development of public education is determined by economic, social, cultural and other factors and conditions of the life of the society. The great scholar I.A. Zimnyaya stated that radical reforms are more closely connected with culture. This type of approach was worked out by the Uzbek scholars as well. According to the concept of teaching Uzbek, vocational education is considered to be the stage of formation of standard of speech (Uzbek maktablarids ona tili ta'limi kontseptsiyasi, 1994). The reason why much attention is paid to develop the youth's standard of speech is explained by their general assurance of advanced comprehension.

Usually human being's speech develops on the basis of feeling the language rules. This process takes place as one's being happy of his success and as one's being unhappy of one's mistakes. As professor N. Mahmudov states that "it is an old tradition of Uzbeks to love words, to try to understand words denotative and figurative meanings, to enjoy the beauty of the speech, the harmony of words in speech, and to respect people who use words properly and have art of using words" (Mahmudov, 1998). And that admiration will make a pupil master the art of using words. The fact of not being eloquent makes a person be alone in some circles and keep silence for a long time and the lack of speech fluency is the ground for thinking over the reasons of it. Some children who are of pre-school age are usually inactive in terms of speech and they do not speak much in the family, and less attention is paid to speech exercises at school, and the fact that some pupils are unable to master the new topics and difficulties in obtaining knowledge in certain subjects and avoiding to do retelling exercises, will have a negative consequences in their future life. There fore one should facilitate correcting pupils' mistakes related to fluency and create the appropriate conditions which cause the necessity for fluency and strive for learning will appear. It is not easy to catch up with those children who are eloquent and it is not efficient on the first stages. It requires much effort and time to be eloquent.

As G.V. Yeger stated «If the eloquence is obtained without any difficulties there will

be no feeling of language. But obstacles like sound, word and word combination facilitates pronouncing difficulties in speech as they may appear in selecting and pronouncing words, making up sentences and recognising the elements of speech mechanism based on suffering of understanding logical relations. It is vividly seen when making up sentences is unsuccessful and it is reflected in unsatisfaction of emotional reaction». This may be repeated when somebody hears emotional speech of the orator: the listener will be sorry for not being able to speak like the orator. On the contrary, eloquent speech always charms the listener.

Mastering of speech standards is closely connected with speech activities including speaking correctly, selecting appropriate words and word combinations, using them appropriately in its context and expressively. The more speaker thinks of enriching his vocabulary and making up beautiful sentences and polish his speech to succeed in his speech activity the more positive changes he will have in his communication. But not everybody can master the art of eloquent speech. The main condition of speech is to influence one's listener and make him believe what he says. Speaking trustfully and logically grounded, in its turn, depends on correct flow of thinking process.

A pupil needs necessity for eloquent speech. The difference between speech activity, practical action and speech necessity is revealed as following in the book «Optimization of Speech Impact»: «The speech replaces the action within the activity. As the way of creating the speech is connected with creation of repeated activity and it is directly based on the communication situation. Therefore, in the long run, necessity is the ground of any activity based on need. The notion theory of activity is the basic conclusion which can be made related to the speech. It is not directed only to its aim but also to its motivation, expected purpose of the speech according to its intention» (Optimization of speech development, 1990). Therefore a man, besides speaking correctly, tries to speak impressively and trustfully. In this case he will think of demonstrating himself before others and his aim.

Pupils' speech advantage mainly related to correct and efficient organization of classes in mother tongue. It should be stressed that as much attention is paid to oral and written speech so much attention should be paid to teaching mother tongue, its content and developing new knowledge, skills and abilities. Here revision should be organized properly and it will contribute much to develop speech standards as well.

Enriching pupils' speech with syntactical constructions during the lessons of the 8th grade in mother tongue is considered to be one of the directions of developing speech abilities. Syntactical construction is complicated in two aspects:

1) constructions types related to the syntax of simple sentences;

2) peculiarities of parts of sentences.

We think that syntax and morphology described in the textbooks of 5-9th grades should be studied in connection that should facilitate pupils' correct, smooth, fluent and logical speech which will meet all the requirements. And it will promote syntactical enrichment of the youth's speech and standard of speech and it will also facilitate the formation of spirituality. It should not be done formally. Revision should be carried out so that education fulfills the function of a social society and institute.

Observation and analyses show that on basis of what have been said above we can con-

clude the following: sufficient attention should be paid to developing oral speech of every pupil in the textbooks in mother tongue. It will be appropriate to do so when other subjects are integrated. Pupils should practice their speech not only on the basis of various topics using one but also using several phrases when retelling them. And in this case they have to practice their oral speech/presentation.

First pupils will speak slowly stopping for a while and then they will obtain the desired results. It is natural that not everybody can participate in oral participation. But a pupil can be directed and managed according to the plan worked out beforehand.

In conclusion, we can say that every lesson in mother tongue should have a task directed to correct every pupil's shortcomings in his speech and prepare appropriate conditions to make him speak and achieve the aim including other activities for retelling.

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Materials of Conferences

**THE PROBLEMS OF THE FURTHER
INTEGRATION OF THE EDUCATION
SYSTEM OF THE REPUBLIC
OF KAZAKHSTAN IN THE CONTEXT
OF THE BOLOGNA DECLARATION**

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Expansion of international relations and the integration processes at all levels of development of modern civilization is one of the current circumstances requiring reform of the entire education system, its compliance with international standards and the integration of national education systems in the world educational space.

And an introduction of the concept of «human capital» into science has become an extremely important factor in changing attitudes to education. Understanding the importance of education and the educational level of the citizens of the country as a strategic resource of any country, was another important factor in the reforming both secondary and higher education, to adapt to the rapid pace of evolutionary processes in the world, as well as compliance of educational strategic plans for social and economic development of the country.

Integration of Education of the Republic of Kazakhstan in the world educational space – one of the long-term strategic priorities of successful international cooperation. Basic condition of our country's integration into the world educational space – the adaptation of the educational system of Kazakhstan to the provisions of the Lisbon Convention and the Bologna Declaration, which involves: 12-13 years of schooling, which is the admission to higher education, a two-level higher education system, the introduction of credits of ECTS – European Credit Transfer System, the transition to an integrated system of excellence: undergraduate, master, doctorate (PhD) etc.

In 2010, the year of Kazakhstan's chairmanship in the OSCE, a decision on our country's accession to the Bologna Process was implemented. The goal of Kazakhstan's participation in the Bologna process – access to European education, further improving its quality. In accordance with the obligations assumed by the accession to the Bologna Declaration, Kazakhstan has to implement a number of activities until 2020. Bologna Declaration set the adoption of the system of easily readable and comparable academic degrees, based on two main cycles – undergraduate and graduate[1].

Accession to the Bologna Declaration also acquires special importance in the light of the Message of President Nursultan Nazarbayev «New Dec-

ade – New Economic Growth – New Opportunities of Kazakhstan». It spelled out a specific task: «The quality of higher education must meet the highest international standards. Universities of the country should strive to enter the ratings of the leading universities in the world». Work on Kazakhstan joining the world educational space has been carried out for several years.

Since 2004, multistage structure of higher and postgraduate education: bachelor-master-doctorate (PhD) has been introduced in Kazakhstan. This structure has found its legal consolidation in the new Law of the Republic of Kazakhstan «On Education» [2].

In 2007, a Memorandum of Kazakhstan universities («Taraz Declaration») was initiated, which was signed by 18 of our rectors of higher educational institutes of the country. In fact, the Taraz Declaration adheres to the principles of the European Great Charter of the Universities.

One of the fundamental principles of the Charter – the inseparability of teaching activities from research, as education should follow the evolution of the needs of society in scientific knowledge.

Learning outcomes to be comparable, they should be evaluated in the framework of a common system. The most widespread system in Europe is ECTS (European Credit Transfer System). Credit system has two main functions. First – re-crediting of courses obtained at another university, in other words, a student can gain the part of the required amount of units at another university, and his «own» university must set them off the student. The second function – accumulating: for various reasons, a student may be educated «in portions», with a time lag, changing universities, etc.

The program of double-degree education is currently being implemented in 37 universities of the Republic of Kazakhstan, including Gumilyov Eurasian National University. Due to the program of double-degree education, the problems of convertibility of Kazakhstan diplomas of higher education, their recognition at the international level, the involvement of local universities in international rankings and other educational projects are successfully solved in collaboration with foreign universities.

In Kazakhstan, Gumilyov Eurasian National University was one of the first to switch to a tiered system of education. This initiative has a serious basis, as leading universities of the world have long been working on it.

Naturally, integration of higher education system of Kazakhstan into the world educational space requires a transition to the credit program, due to the need to review the whole system of or-

ganization and management of educational process not only in universities, but also at the general educational level.

Any reforms in education suggest changes within the educational system (ES) of training and parenting, the functioning of which is determined by the essential principles of didactics.

And, as you know, any activities in didactics, including education, are constructed based on the structure of activity (Leontiev) including: purpose – the motive – content (means) – the results, which was the basis for the emergence of different educational systems (ES).

And, in any ES, the major components playing the role of «the pillars» in it are the teachers and students. It is the tandem «teacher-students» which is the direct functionary of the process of training and education, being a subject to more and more stringent requirements each year.

Today, the trivial axiom needs a special emphasis: it is a teacher, teacher-scientist, who is the essence of any educational system, the practical performer of important new conceptual approaches in the field of training and education [3].

It is fully dialectical that the adequate human resources of teachers – the quintessence of any educational system – are needed to raise the quality of education (training).

Recent years' superhigh competition for financial and economic specialization becomes an insurmountable barrier for even the best school graduates – excellent pupils and medalists; and the opposite situation: the young people's rejection of the education system as the sphere of their future activity. This was clearly demonstrated by enrollment of students for the profession, providing for their work in the school, for example, in the natural sciences: Chemistry at School (ChS), Biology at School (BS), Physics at School (PhS), then MS, IS and others.

Attempts to regulate the preferences and choices of entrants by allocating a certain amount of grants have not given tangible results yet – rating of pedagogical (teaching) profession remains extremely low. Applicants were not attracted even by the fact that the passing scores on the aforementioned specialties were set lower than the same on the most prestigious – in terms of today's youth – ones.

It should be noted that a lot of positive is done, for example, for those who decided to work in rural schools – granting loans for housing, «lifting» money etc. – in order to maintain and raise the edu-

cational system to a higher level of quality in the current difficult economic and social conditions

However, these are solutions to point, local and long-standing problems; and today, the current situation, as it seems to the authors, requires more serious, more radical measures to update and improve the quality of the human resource capacity of the education system. As in the words of one politician, «the quality of the education system can not be higher than the quality of the teachers working in it».

The need to form the teachers of new formation – a teacher-scientist-educator in one, – to create attractive to young people image of a modern teacher, especially teachers of natural sciences, still remains unsolved serious problem of the entire education system.

It is obvious that in the age of rapid scientific and technological progress, the development of innovative processes, nanotechnology, space exploration, the requirements of natural resource management and much more, only highly skilled professionals not only with functional literacy but also with the fundamental basic education and natural-scientific worldview can compete in the international labor market.

It is also obvious that the training of such specialists needs not years but decades and they need to be trained from the school-age.

Thus, the training of highly qualified specialists is closely linked with the problem of raising natural-science education in schools and universities to a new level.

And we think, this is one of the main goals of the reform of the education system of Kazakhstan and its integration into the global educational environment.

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CONCEPTUAL MODEL OF ANTI-CRISIS MANAGEMENT IN AGRICULTURAL COMPLEX

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This article is devoted to the purposefulness of developing conceptual model of anti-crisis management in agrarian business structure in terms of agricultural regions that provide for a development in its functional structure and formation of a new mechanism of financial provision of different subjects of property, and also in stimulating business activity. Studying the described directions is linked to a necessity of gradual realization of economic-institutional terms with attracting bank sector of economy.

Keywords: anti-crisis management, agrarian business, conceptual model, bank sector

Alteration in state priorities in economic area, giving up plan methods economic control, and transition to market basics of business has led to emergence and existence of different forms of property. Formal re-organization of large agrarian business structures had no significant effect over the situation in agriculture. The stake on private property in agrarian sector of economy without a suitable control and support of an agricultural producer has put the letter face to face with cruel reality of market nature. Some of them have managed to get over it and survived in complicated conditions due to an outstanding energy and experience of leaders. However, more than 40% of agrarian business structures of Russia are on an edge of almost complete shutdown of their activity, and their property complex can disappear.

These facts has defines the main purpose of developing a conceptual model of anti-crisis management of agrarian enterprises in terms of agricultural regions, that provide for a development in its functional structure and formation of a new mechanism of financial supply of various subjects of property, and also stimulating business activity. In order to realize the listed objectives we suggest the following gradual realization of economic-institutional conditions.

The first stage in realizing this concept of anti-crisis management of agrarian business structures of a region (on an example of Stavropol region): government of Stavropol region suggests agrarian business structures sign contracts on supplying goods for reasonable prices (a little over real market prices), on the 1st of September of this year. Besides, payment according to the contracts partially with money (30%) at the moment of signing contract, and the rest of it (70%) – in governmental notes of hand with clearing off on the 1st of October of the same year. The emitted money of paper bill can be accepted as means of paying debts with regional budget. Finan-

cial resources (30%) are formed of money that are assigned in regional budget for buying products for state reserves.

The means, necessary for defining definite agricultural operations, include futures contracts. In case there are not enough financial resources, agrarian business structures can sell paper bills to special authorized financial companies that would place it with supplies of fuel, for example. Of course, selling and buying paper bills before the period of their existence goes with a discount. Such mechanism of financing allows us to provide credit for agrarian business structures at a regional level.

The second stage of realizing the concept into the system of utilized institutes of futures contracts on buying agricultural products. Futures contract on buying products of agrarian area are introduced. Thus, region government obtains a possibility to attract additional money that can be directed to solve problems in sectors of producing agricultural raw materials and its industrial processing. Placing contracts that are supported by a region government provides for an increase in efficiency of managing financial resources.

Realization of the suggested concept allows a subject of Russian Federation to regulate prices at agrarian market with financial instruments. The third stage includes development of investing projects that are aimed to develop measures on creating optimal conditions for development of market relations, introduction of new technologies, formation of favourable social-household conditions for villagers.

One of the important investment source of financing investments, including agriculture, is bank sector.

Complex financial condition of business subjects in agrarian area points the purposefulness of setting benefits in paying off ground for agrarian business structures that are involved into processing their own raw

materials and decrease in part of federal budget in case enterprises place mini-factories of processing agricultural raw materials on these territories. An effective economic measure of stimulating agricultural re-production can be an abolition of benefit for business subjects that buy or import materials for non-productive purpose that was included into the Tax Code of RF. Stimulating import with such tax benefit directs producers towards goods-mediatory activity and limits abilities of the domestic production. Thus, decrease in degree of fiscal tax system in agriculture is a neces-

sary condition in emergence and development of agrarian business in Russia.

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*Materials of Conferences***THE PRIOR DIRECTIONS OF EXPENSES
OF THE STATE BUDGET
OF THE REPUBLIC OF KAZAKHSTAN**

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Kazakhstan was the first post-Soviet countries have chosen the path of strategic planning, which includes long-term priorities of the country development. The long-term priorities are permanent guidelines in formulation of plans and programs for the development of the country for the near future.

The first document describing the development of the Republic of Kazakhstan for the long term, was the Strategy «Kazakhstan-2030», which, as is known, consists of the following seven basic priori-

ties: National security; Internal political stability and consolidation of society; Economic growth, based on an open market economy with high level of foreign investment and internal savings; Health, education and wellbeing of citizens of Kazakhstan; Energy resources; Infrastructure, particularly transport and communication; Professional state [1, p. 10].

Long-term priorities laid down in the Strategy of development «Kazakhstan-2030» are specified annually, depending on the situation within the country and abroad, and are told by the President in his message to the people of Kazakhstan.

The state budget is a tool for the implementation of the Strategy «Kazakhstan-2030», so the functional expenditure correspond to the priorities of the Strategy, the amount of which for 2009–2011 [2, p. 1] is presented in table 1:

Table 1

Financing long-term priorities by state budget, mln. tenge

Functional expenditure of state budget	2009	2010	2011	Priorities of the strategy «Kazakhstan-2030»	2009	2010	2011
Defense	187 615,3	221 345,1	264 503,3	National security	503 805,0	590 121,4	712 998,6
Public order and security	316 189,7	368 776,3	448 495,3				
Agriculture, water, forestry and other household	168 117,9	207 073,8	270 763,4	Economic growth based on an open market economy with high level of foreign investment and domestic savings	268 245,5	329 926,6	417 255,3
Manufacturing and construction	30 920,7	28 236,0	24 816,7				
Debt service	69 206,9	94 616,8	121 675,2				
Education	660 917,1	755 294,8	986 773,4	Health, education and welfare of citizens	2347784,9	2773612,3	3 337 534,1
Healthcare	450 892,5	551 325,7	626 309,9				
Social security and social aid	758 308,4	905 272,7	1 133 573,0				
Housing and public utilities	304 048,8	334 154,8	389 238,2				
Culture, sports, tourism and information freedom	173 618,1	227 564,3	201 639,6	Power resources	58 577,0	79 720,0	112 490,7
Fuel-energy complex and usage of mineral resources	58 577,0	79 720,0	112 490,7				
Transport and communication	337 511,5	390 669,5	449 210,7	Infrastructure, particularly transport and communication	337 511,5	390 669,5	449 210,7
State services of general nature	166 062,7	224 944,3	296 481,2	Professional state	230 916,1	293 114,7	393 745,1
Others	64 853,4	68 170,4	97 263,9				
Total	3 746 840,2	4 457 164,6	5 423 234,6	Total	3 746 840,2	4 457 164,6	5 423 234,6

Note – Compiled and calculated by the data of the State budget of Kazakhstan for 2009-2011.

The calculated data in table 1 shows that the long-term priorities of the Strategy «Kazakhstan-2030» depending on the amount of the allocated state budget funds, can be ranked in the following order: Health, education and welfare of Kazakhstan citizens; National Security; Infra-

structure, in particular transport and communication; Economic growth based on an open market economy with high levels of foreign investment and domestic savings; Professional state; Energy resources. This ranking once again emphasizes the social orientation of the budget.

However the priority of one or the other direction of budget spending can be determined due to the rates of growth of their share in the total amount of expenses of the state budget.

With this purpose we give the analyzed data for the years 2009–2011 in a comparable form through the consumer prices index (coefficient-de-

flator), which in 2010 was 107,1% of (or 1,071), in 2011 – 108,4% (or 1,084) [3, p. 1]. Then define the weight of each article in the context of the priorities of the Strategy «Kazakhstan-2030», as well as the growth rate of the share of a particular long-term priority of the Strategy. Such calculations are shown in table 2.

Table 2

Structure and growth rate of specific weights of the expenditure volume of the state budget in the long-term priorities, adjusted for the coefficient-deflator

Priorities Of The Strategy «Kazakhstan-2030»	2009		2010		2011		The absolute increase of weights, %		The growth rate of weights	
	mln. tenge	sp. g, %	mln. tenge	sp. g, %	mln. tenge	sp. g, %	2010-2009	2011-2010	2010/2009	2011/2010
National security	503 805,0	13,4	551000,4	13,2	657747,8	13,1	-0,2	-0,1	0,99	0,99
Economic growth, based on an open market economy with high level of foreign investments and domestic savings	268 245,5	7,2	308054,7	7,4	384921,9	7,7	0,2	0,3	1,03	1,04
Health, education and welfare of the citizens of Kazakhstan	2347784,9	62,7	2589740,7	62,2	3078906,0	61,5	-0,5	-0,7	0,99	0,99
Energy resources	58 577,0	1,6	74435,1	1,8	103773,7	2,1	0,2	0,3	1,13	1,17
Infrastructure, particularly transport and communications	337 511,5	9,0	364770,8	8,8	414401,0	8,3	-0,2	-0,5	0,98	0,94
Professional state	230 916,1	6,2	273683,2	6,6	363233,5	7,3	0,4	0,7	1,06	1,11
Total	3 746 840,2	100,0	4161685,0	100,0	5002983,9	100,0	-	-	-	-

Note. Compiled and calculated by the data of the State budget of Kazakhstan for 2009-2011.

These calculations give a sense of the priority items of state funds' expenditure:

1. Thus, for example, a long-term priority «Health, education and well-being of Kazakhstan citizens» takes the greatest fraction in 2009-2011 in total amount of expenses of Republic of Kazakhstan's state budget, despite the annual decrease. Relative density of given item in 2010 in comparison with 2009 had decreased to 0,5% and had made 62,2%, so the rate of growth was equal to 0,99. In 2011 relative density had decreased to 0,7% and made up 61,5%, and rate of growth remained at a former level – 0,99;

2. The long-term priority «National security» is the second according its priority of spending the means of Republic of Kazakhstan's state budget. In 2009 relative density had made 13,4%, in 2010 had decreased on insignificant percentage – 0,2% and then became 13,2%. In 2011 relative density of the item continued to decrease, reduced to 0,1% and in the end of the period constituted 13,1%. In 2010-2011 rate of growth had made 0,99;

3. Next on the priority of the expenditure of means of Republic of Kazakhstan state budget is «Infrastructure, in particular transport and communication». Relative density of given item for 2009-2011 underwent annual decrease. Thus in 2010 it had decreased to 0,2%, made up 8,8%, rate of growth was equal to 0,98. In 2011 the decrease in

relative density of article had occurred, decreased to 0,5%, rate of growth was equal 0,94;

4. The long-term priority «Economic growth, based on open market economy with a high level of foreign investments and internal savings» owing to the volume of relative density for 2009-2011 takes the fourth place on priority of the budgetary funds expenditures. If relative density of the given item in 2009 made up 7,2%, in 2010 – 7,4%, and in 2011 – 7,7%. Rates of growth were 1,03 and 1,04 accordingly;

5. Next according to the priority of expenditure of Republic of Kazakhstan state budget is the item «Professional state» on fraction of which is 6,6; 7 and 7,3% respectively by the years.. Rate of growth in 2010 had made 1,06, in 2011 this figure increased up to 1,11;

6. The lowest value on the priority takes group «Power resources». Relative density of the given priority in total amount of expenses of Republic of Kazakhstan state budget in 2009 had made only 1,6%, in 2010 increased for 0,2%, that is up to 1,8%, rate of growth is equal 1,13. In 2011 – on 0,3%, which made 2,1%. Rate of growth is equal 1,17.

Proceeding from the made analysis, it is possible to emphasize once more the priority of a social orientation of Republic of Kazakhstan state budget in dynamics. Consequently, effective and rational use of budgetary funds of social area is one of the prominent aspects in activity of the state.

At the same time efficiency of expenses from the social point of view can be calculated by coefficient of budgetary security of the population (Cbsp) which is equal to the ratio of the budget expenses for the period and a population in the given period.

The relation of the state budget for the long-term priority, «Health, education and welfare of the citizens of Kazakhstan» and the population during 2009-2011 should be determined for calculation of this indicator [4, p. 8]. Calculation of the budget sufficiency of the population for the years 2009-2011 is shown in table 3:

Table 3

Calculation of the budget sufficiency of the population of Republic of Kazakhstan

Expenditure on Health, education and welfare of Kazakhstan citizens, mln tege			Population, mln people			Cbsp, tege/person			The rate of growth of coefficient of Cbsp	
2009	2010	2011	2009	2010	2011	2009	2010	2011	2010/2009	2011/2010
2347784,9	2589740,7	3078906,0	16,2	16,4	16,7	144925	157911	184366	1,1	1,2

Note. Compiled and calculated by the data of the State budget and Statistical digest of Kazakhstan for 2009-2011.

Analyzing the data given in table 3, it is possible to note the tendency of growth of budgetary sufficiency of the population for 2009-2011: pace of growth in 2010 made 1,1, in 2011 increased up to 1,2. Thus in 2009 on 1 person 144925 tege were accounted, in 2010 – 157911 tege or growth made 9,0%, in 2011 – 184366 tege with growth on 16,8%. The growth of such annual financial maintenance allows to judge about the efficiency of the state expenditure on social area in general.

In 2012 expenses of the state budget are aimed on improvement of life conditions of the population and preventing the growth of unemployment, increase of wages, support of small and medium business, development of agriculture, etc. Thus the state expenditure on social area in 2012 will make 3 377 200,0 million tege – about 53% of all expenses, and the growth in comparison with 2011 will make 9,7% [5, p. 3].

Such dynamics allows concluding, that expenses of the state budget of Republic of Kazakhstan for 2009-2011 have strongly expressed social character and in 2012 financing of social area on account of the State expenditure remains the same prior direction. Increase of budgetary funds use efficiency will be reached due to growth of quality of state services to the population, maintenance of the employment, available housing and qualitative growth of the human capital in Kazakhstan.

Thus, the social orientation of the budget in intermediate term prospect will be kept and the basic priority at planning the state expenditure will be well-being of Kazakhstan citizens, namely their social support, health and formation, as well as creation of conditions for qualitative growth of economy.

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ROLE OF TECHNOPARKS AS A TOOL OF LIVING STANDARDS IN DEVELOPING COUNTRIES AT THE CASE OF MEXICO

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Technoparks are one of the important tools in developing economy in modern world. They are actively used to economic development by such countries as the USA and China that occupy leading positions in the World economy.

When Russia enters WTO, tools of economic development become more and more significant. Mexico, a country that is involved into North American agreement on free trade and has similar features with resource-dependent economy of Russia, can serve as an example in this problem.

The subject of the research that served as a ground for this article, were factors of life level and economic growth that can be influenced with tools of economic development – technoparks.

A number of scientists define technoparks' efficiency according to the following indexes:

- Increase in production rate due to new technologies, training high-qualified specialists;
- Improvement in life quality and welfare of citizens due to formation of social infrastructure, creation of work positions, and, therefore, increase in wages due to emergence of high-qualified specialists and technologies that create a consumption potential of a country [1, 7].

For example, Russian economic researchers consider a positive effect of modernization of Russian enterprises for increase in competitiveness of national producers that can lead to an increase in welfare and life quality of citizens [6, 8].

In 1955 a concept of increasing consumption was realized. It was introduced by Viktor Lebov in the USA and aimed to make consumption a way of life. Later, economies of many countries adjusted to this economic idea that stays actual nowadays [1]. Thus, we can formulate the general purpose of an economy – an effective satisfaction of unsatisfied needs. It leads to a necessity of studying consumption and life quality of people as a factor that must be supported by economic activity and its components.

Scientists outline a number of factors that influence a quality of life. All these factors are used according to a research objective. Those factors of quality of life that cross factors of economic growth have been selected for the further analysis [1, 2]:

- education (as a factor of labour productivity);
- level of unemployment;
- state debt (as a factor that influences future income of a country);
- general consumption (as a factor of increase in economic growth);
- personal final consumption per year;
- distribution of income among working population (through coefficient of Genie);
- GDP per a person;

The urgency of economic growth is described in a work of McConell and Brue «Economics» [1]. In it the authors indicate a direct dependence of life quality of people and economic growth of a country. Solving problems economically-outdated countries the authors link to economic growth as well. However, specifics of outdated countries consist in a number of factors, such as immigration of educated population, growth in birth rate that out runs economic growth. Low education level, poor man's mentality, etc. lead to numerous problems that can zero an effect of economic growth. Therefore, developing countries see a solution in increase in economic growth rate with creation of free-trade areas and attraction of foreign investments [10]. This position is reflected in the Declaration of millennium of UN and is implemented in practice through organization of free trade areas, such as WTO and North American trade agreement with participation of economically-outdated countries. Besides, scientists point out currency risks [9] and emergence of

state debt due to ineffective use of investments. In case of Mexico they are correct about the part of currency risks, since recessions of 1980, 1994, and 2007-2008 had a terrible effect due to instability of peso [5].

When it comes to a state debt, when we study Mexico, we can claim that a risk of state debt is not real for this country, as during the period of 1993-2010 it grew by 70 billion USD, and general consumption level grew by 735 billion USD during the same period [4].

However, the authors did not study, how a steady economic growth of a developed country influence factors of life quality, welfare, and economic growth of an undeveloped country in terms of free trade.

Consumption level per a person increased from 1084,5 USD to 7355,0 USD in Mexico from 1994 to 2010, and the same index increase from 22099,0 USD to 41274,0 USD in the USA. Mexico shortened the gap in relation to the consumption share of the USA when in 1994 its consumption level equaled only 4% of the similar index of the USA, and in 2010 this value grew up to 17%. But, in natural values consumption level in Mexico grew only by 6271,0 USD, while it grew by 19175,0 USD in the USA. Therefore, consumption level in Mexico grows according to its position of 1994, but stays outdated in comparison to the USA [4].

Index Ginie in the USA is lower than in Mexico [3,4], therefore, we can conclude that consumer potential in the USA is significantly more attractive for producers of both countries.

According to the data of international organizations of labour [3], the lowest unemployment level in Mexico is registered among low-educated and uneducated people. An immigration of educated people to the USA is registered. GDP of Mexico in 2010 equaled 9132,0 USD per a person [4]. With a zero index of Ginie, we can conclude that wages cannot be higher this value. Thus, we can define that with a relatively low unemployment, there is a high demand for cheap labour in Mexico. The state cannot afford to maintain low unemployment level and high wages at the same time. All that forms a low market demand, and therefore, underdevelopment of domestic companies that cannot increase their productivity and wages level. More firms have integrated the World trading according to analysis of the World Bank. These very companies show a significant growth in labour productivity [3, 5].

So, we observe a closed circle in Mexico, when a high demand for cheap labour forms inside the country and leads to a low level of wages, slow growth of productivity, and further it affects the demand of domestic market and high demand for cheap labour.

To conclude the analysis, we can state that integration into the World trading is only a stimulus for countries to leave their poor positions, it is a possibility to improve life quality of citizens through

free trade. However, it doesn't put their economies on the same level with that of developed countries that have their own technologies and attractive market. Nowadays Russia has put itself on a way that was once open for Mexico, therefore, it is necessary to consider those indexes that were determinant for the development of this country.

Opportune creation of technoparks in Mexico could alter the modern situation of this country significantly. Technoparks have a complex effect over a number of critical factors: emergence of domestic qualified scientists/workers and technologies within a country that free it from borrowing the developed foreign ones. These factors lead to an independent development of prior sectors of economy that define life quality, growth of wages, and development of domestic markets.

Russian economy must be directed for creation of technoparks that increase labour productivity and consumption potential of a market, putting itself on the same level with other participants of WTO.

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WORKING AND HEALTH CONDITIONS OF WORKERS OF CONFECTIONERIES

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The article presents the results of analysis the introduced working conditions over health of personnel of a confectionery, who operate in hazardous conditions of production and work.

The received data served as a ground of developing measures, aimed to improve health of confectionaries' personnel

A problem of preserving health in given conditions, maintenance of high level of professional workability, stability against unfavourable ecological-professional factors is an urgent issue and it requires a special solution (G.G. Onishenko, 2003, A.A. Kalininskaya, 2010). Evaluating health condition of workers of a confectionary, developing measures of decrease in disease rate and optimization of ratio among persons of major professional groups is an urgent scientific problem.

Labour of specialists of waffle workshop is defined by a complex of unfavourable factors: heavy work load; insufficient illumination of working places, high level of noise. Expression and strain of their work process can be classified as moderate (class 2.0) (table).

According to parameters of microclimate conditions (air temperature, speed of air flow, air humidity) working conditions corresponded to class 2.0. General illumination of working surfaces was lower than allowed by 30-100 lux (class 3.1).

Noise level at all working places exceeded an allowed level insignificantly and corresponded to class 3.1 of working conditions. While evaluating tension of electric field under frequency of 50 HZ indexes did not exceed maximum allowed values. Class of working conditions of waffle workshop worker and confectioner depended on electric field and equaled 2.

Impact of general and local vibration over organisms of workshop workers (waffle workshop worker and engineer) did not exceed normal standards. It allowed us to refer this position to class 2 (allowed labour – moderate physical strain).

Technological processes at production areas are not linked to a discharge of hazardous chemical substances into the air. The investigation has established that working conditions of waffle workshop workers can be described as unhealthy heavy of the first and second degree (class 3.1, 3.2).

Disease rate among workers of waffle workshop according to a number of disability cases per

100 employees equaled 102,7 and is described as «over average» according to the scale of E.L. Notkin (among control group – 73.6 «below average»). And

according to a number of disability days per 100 employees it equaled 1488.6 and is described as «high» (control group – 1045,6, «above average»).

Classes of working conditions according to indexes of unfavourable factors of productive environment (waffle workshop)

Class of hazard	Worker of waffle workshop	Confectioner	Engineer of forming-packing machine	Equipment adjuster
FDP aerosols	–	–	–	2,0
Noise	3.1	2.0	3.1	2.0
General vibration	2.0	–	2.0	–
Local vibration	–	–	–	2.0
Non-ionizing emanation (EMF of 50 HZ)	2.0	2.0	–	–
Microclimate	2.0	2.0	2.0	2.0
General illumination	3.1	3.1	3.1	3.1
Work heaviness	3.1	3.1	3.1	2.0
Work tension	2.0	2.0	2.0	2.0
General evaluation of working conditions	3.2	3.1	3.2	3.1

While comparing the received data and the disease rate with working conditions of administrative workers of a factory we have revealed a statistically-significant increase in cases rate ($t_{cr} = 4,12$, $p < 0,001$) and in days of disability ($t_{cr} = 4,36$, $p < 0,001$).

While studying ration of workers we have established a composition disbalance in contents and relations of macro- and micronutrients: we have established a carbohydrate-fat direction, deficit of proteins (up to 20%), excess of carbohydrates up to 26% that was mostly expressed in age groups of 18-29 years, excess of fats (up to 12%) in groups of 40-49 years, lack of vitamins of group C, A, B, E, PP, folates from 30 to 75% that was mostly expressed in the mentioned age groups, lack of mineral substances (Ca – up to 45%, Fe – up to 12%, Mn – up to 14%) was typical for all age groups.

Under clinic investigation among 53,5% of the studied the following chronic diseases have been registered: 40% – «Diseases of digestion organs and endocrine system» (chronic gastritis; chronic cholecystitis, calculary and non-calculary cholecystitis; ulcerous stomach disease, chronic pancreatitis), among 20,0% – «Diseases of blood circulation system» (hypertonic disease), among 20,0% – «Diseases of organs of breath» (conditions after an endured acute pneumonia, chronic bronchitis). Among the attendant disease we have registered non-inflammatory diseases of female pelvic and genital organs among 20% of the studied.

During an initial investigation 40,0% of the studied had complaints about headaches, pains in right subcostal area that was often expressed after meals. 30,0% had bitter taste, 40,0% had headaches,

20,0% – back pains. A significant part of workers had complaints about fatigability, weakness.

Obesity of the 1st degree was established among 20,0% of workers. Obesity of the 2nd and 4rd degree was established among 40% of the studied. Only 40,0% of the studied workers had a normal body mass. According to the data of general blood analysis anaemia of degree 1 and 2 was revealed (6,7% each). Among 33,3% of the investigates an increased systolic arterial pressure has been registered (140,0–150,0 mm of quicksilver), among 26,6% diastolic arterial pressure was within limits of 90,0–100,0 mm of quicksilver.

According to the data of ECG, disturbances in heart activity have been registered among 33,3% of employees: sinus arrhythmia, deceleration of intratrial conductivity, supraventricular extrasystole, bradycardia, diffuse disturbance in processes of repolarization.

According to the results of US, 93,3% of workers have functional disturbances of liver, gull bladder, and pancreas: among 53,3% – chronic cholecystitis (non-calculary, calculary), among 53,3% of them – in combination with diffuse alterations in pancreas, fat hepatosis of liver (20,0%), chronic pancreatitis – among 20,0%. Besides, an increase in size of right part of liver up to 5,7% was registered among 26,6%, decrease in left part of liver up to 43,3% – among 40,0% of the studied.

While studying ration of workers we have established a composition disbalance in contents and relations of macro- and micronutrients: we have established a carbohydrate-fat direction, deficit of proteins (up to 20%), excess of carbohydrates up to 26% that was mostly expressed in age groups

of 18-29 years, excess of fats (up to 12%) in groups of 40-49 years, lack of vitamins of group C, A, B, E, PP, folates from 30 to 75% that was mostly expressed in the mentioned age groups, lack of mineral substances (Ca – up to 45%, Fe – up to 12%, Mn – up to 14%) was typical for all age groups.

Conclusion. Working conditions of workers of waffle workshop (according to heaviness of working process, indexes of illumination and noise) do not correspond to modern hygienic regulations. Working conditions of persons of major professions of waffle workshop correspond to hazardous conditions of work of the 1st and 2nd degree (class 3.1, 3.2). An impact of hazardous working conditions leads to a development of diseases of organs of digestion and endocrine system, breath, blood circulation system, and attendant diseases. Chronic

diseases were registered among 53,5% of waffle workshop workers.

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*Short Reports***LOW-CARBON AND ENERGY-EFFICIENT ECONOMY OF KAZAKHSTAN FOR SUSTAINABLE DEVELOPMENT**

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The Republic of Kazakhstan has developed the concept of transition to a low-carbon economy is the first among the central Asian countries. This document was developed within the framework of the joint project «capacity building» in the field of sustainable development through the integration of climate change issues to strategic planning in the Republic of Kazakhstan.

Kazakhstan pursues an active policy in the field of reduction of emissions of greenhouse gases. In March 2009, our country has ratified the Kyoto protocol to the UN Framework convention on climate change. One of the main requirements of this agreement is to reduce emissions of greenhouse gases (GHGS) and the transition to low-carbon development.

In November 2009, Kazakhstan announced that took on itself the quantitative commitments, which resulted in a 15% reduction in GHG emissions by 2020 and 25% reduction by 2050.

In the project of the concept noted that «low-carbon» or low emission growth is the new development paradigm, which creates a new engine of growth and increases the number of «green» jobs, promotes green technology and clean energy. According to experts, the choice of path of low-carbon development is a critical point for the future of humanity.

At the present time on the volume of greenhouse gas emissions Kazakhstan is the largest source of in Central Asia, occupying the third place in the CIS after Russia and Ukraine. The major share of emissions of greenhouse gases in Kazakhstan (more than 80%) comes into the atmosphere from energy activities, including the electro- and thermal power and other kinds of fossil fuel combustion to produce energy.

In order to meet commitments to reduce emissions of carbon dioxide Kazakhstan has to take in the electricity sector more large-scale and accelerated use of the potential of renewable energy sources in the electric power industry (wind, solar, hydraulic, geothermal, biomass); accelerated and intensive development of nuclear energy; wide-scale implementation of CCS technologies at existing and newly thermal power plants; reduction of energy losses during its transportation to consumers; audit of production facilities, planning of depreciated inefficient capacities and renovation and moderniza-

tion of production facilities to prolong their lives for 10–15 years; introduction of modern technologies and equipment for the capture and storage of CO₂; transfer stations to cleaner fuel.

From non-carbon energy technologies it is required an increase a forestation to enhance carbon sequestration and capacity building of forest biomass; recycling of waste and the production of energy biomass in agriculture.

On the ways of problem solution of energy supply and energy efficiency in the energy sector in Kazakhstan will be implemented 24 projects of the card industrialization. In the framework of the project it is planned to create 12 918 jobs in the period of construction and 6422 place in the period of operation. In particular, the expansion and reconstruction of the Ekibastuz GRES-2 in Pavlodar region will allow to increase capacity up to 1,500 Mw.

JSC «National company «Kazatomprom» has developed innovative projects for the development of solar energy. Projects include the production of photovoltaic modules based on silicon Kazakhstan. Project for the production of solar panels is designed for the production of energy from 50 Mw with further increase up to 100 Mw. Kazatomprom plans to build a new plant in Astana during the two years.

In October 2007, has started the project of construction of a plant elements of solar batteries in Aktau. The project is supposed to realize in three stages. At the first stage there will be organized production of crystalline rods and plates (solar batteries) annual total capacity of 110 Mw. At the second stage is scheduled for production of electronic boards (cells) with total capacity of 77 Mw. At the third stage – the production of electronic displays the total capacity of 20 Mw.

At the Ekibastuz GRES-1 full speed goes a realization of the investment project included in the industrialization Map of the country. The project includes the restoration until the end of 2016 blocks № 8, 2 and 1. Enter them, respectively, at the end of the 2012, 2014 and 2016. Implementation of the investment project «Restoration and reconstruction of TPP-1» will allow to increase considerably the so-called the available power station with 2 500 to 4 000 Mw by the end of 2016, as well as its annual production from 11,7 billion Kwh in 2010 to 21 billion Kwh by 2015. At the end of 2010 on one of the power station was the first high-efficiently electrostatic precipitators was installed with a factor of trapping of ashes up to 99,6% and an reduction in the annual release into the atmosphere of combustion products from 20,5 thousand tons up to 3 thousand tons. At the end of 2011, the second electrostatic precipitators was installed, and in 2012 it is

planned to launch the third electric filter. Geographical and meteorological point of view, Kazakhstan is one of the countries of the world with the best conditions for large-scale development of wind energy. UNDP/GEF project «Kazakhstan – wind energy market development initiative» provides assistance to the Government of the RK in the formulation of the National Program of development of wind energy and the development of opportunities for the development of projects for wind energy, and their financing.

Improving the energy efficiency of municipal heat supply, introduction of new financial models for investment in energy efficiency projects and enhance the capacity of the local stakeholders are key directions of the Project «Removing barriers to energy efficiency of municipal heat supply».

Project proposals in the draft law on energy saving and amended the law on public utilities. In the cities of Almaty, Astana and Karaganda project involves the KSK in trainings and grant program

for modernization of buildings. In Karaganda was created the first private energy service company (ESCO) in Kazakhstan.

Project «**Energy Efficient design and construction in the housing sector of Kazakhstan**» will demonstrate the use of an integrated design of residential buildings in several cities of Kazakhstan.

The aim of the project is to improve the observance of mandatory building codes for energy efficiency standards and labeling building materials. The project will support the development of the domestic production base of energy effective materials and will create the potential for an integrated approach to the design of buildings in general.

In the process of transition to a low carbon economy the country will continue to carry out socially-oriented policy aimed at the accelerated growth of GDP with the aim of increasing the welfare of the population and improvement of living standards. The low carbon economy offers an alternative *path* of development, bringing a certain socio-economic benefits.

Short Reports

SCIENTIFIC INTERESTS
OF A.T. BOLOTOV'S TITLED
ACQUAINTANCES

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Based on a little-known historical source of the XVIII century: «The Life and Adventures of Andrey Bolotov, Written by himself for his Descendants», the article tells about some representatives of the princely and count families, who revealed their interest towards A.T. Bolotov's works.

The biography of the well-known Russian scientist, writer, and founder of the Russian agricultural science – Andrey Timofeevich Bolotov (1738–1833) is very-well known. Apart from four thousand of his scientific works, there exist plays, verse, paintings, and architectural designs. With every new line one can tell about new talents of Andrey Timofeevich in Botany, Mineralogy, Physics, Design, etc. And it is natural that his quick mind and ability to arouse interest in the interlocutor draw to him the attention of various representatives of different communities and estates. Many of his neighbors-friends, as well as A.T. Bolotov's peasants, were literally 'infected' with his research activity. In his extensive work published by the descendants 'The Life and Adventures of Andrey Bolotov, Written by himself for his Descendants' (In 4 volumes, – SPb., Publishing House of V. Golovin. 1738–1793: V.1. parts I–VII: 1738–1760. – 1870. – 1017 pp.; V.2. parts VIII–XIV: 1760–1771. – 1871. – 1120 pp.; V.3. parts XV–XXI: 1771–1784. – 1872. – 1244 pp.; V.4. parts XXII–XXIX: 1784–1795. – 1873. – 1330 pp.) – the author dwelled upon many of the events which are of interest to our contemporaries. In particular, the issue of some certain cognitive interest from A.T. Bolotov's titled friends is not very-well studied today. Now we are going to address these obscure pages of our history, which found their place in the book of A.T. Bolotov's Memoirs. We do not claim to cover the whole issue, but shall dwell upon some of the examples.

One of the richest manufacturers of Russia in the second half of the XVIII century was Demidov Nikita Akinfevich – councilor of state, member of the Academy of Arts and Free Economic Society. He got interested in A.T. Bolotov's works and wrote letters to him. In connection to this A.T. Bolotov wrote in his 'Notes': «Among my many correspondents one particularly attracted my attention, who wrote to me at first under the name of 'not a Chinese, but a Russian noble', but later I learnt that he was our glorious rich man Nikita Akinfevich Demidov, with whom I later got acquainted and was

very much pleased with his friendliness» (1779)¹. When in Moscow in the Autumn of 1779, A.T. Bolotov decided to meet N.A. Demidov: «...so rode I to our glorious rich man of that time Nikita Akinfevich Demidov, who lived in the German Suburb, the brother of well-known and glorious fidget Pron'ka Demidov». «He did not let me go without dinner, and we spent the whole morning continuously talking to each other about different things...». But still he made an impression of – «a very simple man..., in whom even behind the gold you could see all the roughness of his base origin...». Nevertheless, A.T. Bolotov got a real pleasure «at looking through his wonderful pictures and jewelries and many other rarities», he also paid proper attention to «the wonderful garden»². In the winter of 1782 Andrey Timofeevich organized an excursion to the «natural den» of N.A. Demidov for his wife, children and nieces: they were especially impressed by the «Chinese den» and «little American birds...»³.

A.T. Bolotov also got letters from Prince Scherbatov Ivan Petrovich. Describing the events of the summer of 1781, A.T. Bolotov wrote: «...not long ago I had a lot of correspondence concerning the publication of my journal with one of my correspondents from Belev, the old Prince Scherbatov, Ivan Petrovich. ... and he loved me a lot for my compositions, and sent to me more then others, even the whole notebooks, filled with his notes...» Unfortunately, «because of the awkward style», A.T. Bolotov had to «translate from Russian into Russian»⁴.

A great role in the life of A.T. Bolotov was played by Nartov Andrey Andreevich – one of the founders of the Free Economic Society, its first secretary, and later – its president (in «Notes» he is addressed as «Mr. Nartov» only). In 1768 A.T. Bolotov for the first time received the letters from A.A. Nartov as the secretary of the FES, approving his scientific articles: «...they definitely should be published»⁵. In 1773 one of the letters from «the secretary of the Society Mr. Nartov» read (*according to A.T. Bolotov*): «...as far as he, according to his position, has to correspond with all those members who are absent, concerning the economic issues, he asks me to start correspond-

¹ Bolotov A.T. (The works mentioned above). V.3. P. 818-819.

² Bolotov A.T. (The works mentioned above). V.3. P. 862-863.

³ Bolotov A.T. (The works mentioned above). V.3. P. 1023-1024.

⁴ Bolotov A.T. (The works mentioned above). V.3. P. 957.

⁵ Bolotov A.T. (The works mentioned above). V.2. P. 730.

ence with him from now on»⁶. It is worth paying attention to the fact that this correspondence with A.A. Nartov became a turning point in A.T. Bolotov's career: «on the 5th of March (1773 – E.S.) all my soul was uneasy due to the letter I by chance received from St.-Petersburg from Mr. Nartov, the secretary of the Economic Society. This person, whom I do not know, but who loved me by correspondence, informed me, that he had an occasion to recommend me to Prince Sergey Vasilievich Gagarin, senator and holder, and member of our Society, who also loved me by correspondence, only after reading some of my work». S.V. Gagarin needed «help in surveying over the regions, trusted to him by the Empress, so he will get me a position and proper payment from the state». As A.T. Bolotov concluded: «...this day was very much remembered among the days of my life»⁷.

⁶ Bolotov A.T. (The works mentioned above) V.3. p. 121.

⁷ Bolotov A.T. (The works mentioned above) V.3. p. 135.

Among common scientific interests of the correspondents was Geology. In one of the letters A.A. Nartov thanks for the stone which he received for his collection «trochitis, or wheel stone, which is very rare in the nature». He sent Leman's 'Mineralogy' to A.T. Bolotov as a present, «thus urging me even more to collecting rarities»⁸.

In different time A.T. Bolotov had scientific conversations with Princess Belpsel'skaya Anna Fedorovna, earl Vorontsov Roman Illarionovich, Prince Gagarin Sergey Vasilievich, Prince Golizyn Pavel Fedorovich, Prince Repnin Nikolay Vasilievich, governor-general Muromtsev Matvey Vasilievich, and many other outstanding people of his time. These and many other interesting sketches of the Russian history one can learn when reading detailed, written in a wonderful XVIII century language, «Notes» by A.T. Bolotov.

⁸ Bolotov A.T. (The works mentioned above) V.3. p. 143.

Short Reports

**THE ATHLETES' ANXIETY LEVEL,
DEPENDING ON QUALIFICATION
DEGREE**

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The athletes' and sportsmen's anxiety level, depending on the sports training qualification, has been studied. It has been shown, that for the highly skilled athletes and the sportsmen, it is characterized the situational and the personal anxiety low levels, that it can be recommended the situational and the personal anxiety indicators usage for the further selection of the best prepared and the trained athletes for the competitions responsible, as well as it is indicated the direction for the correction carrying out, for the purpose of the vocational sports performance improving.

The physical training (PT) high results are usually provided not only by the physical characteristics training, but also by the athlete's and the sportsman's emotional training [1,2]. The experts and the specialists in the field of the sports psychology are paid their great attention to the anxiety impact on the course of the whole training process, and also on the sporting events. So, the Cretti, Zajonc, Hanin, Lenders, Martens and the other ones studies are the confirmation to this fact. Thus, the carried out studies have been shown the quite different opinions of the scholars and the diverse views of the scientists on this challenge. The athlete's and the sportsman's anxiety is quite connected with the social consequences waiting of his success or his failure. The anxiety sensitivity is determined the individual sensitivity of the athlete and the sportsman to the competitive stress [3]. From the given practice, we know it very well, that the athletes and the sportsmen, who were wanted to be achieved the quite high result, their activity was usually broken, and that is why, they simply showed the worst results, due to the extra competition stress. But and the athletes and the sportsmen with the very low anxiety level have usually their tendency not to be performed well and to be achieved the good results, due to their insufficient and the lack of their motivation [4].

The Objective. To be studied the athletes' and the sportsmen's emotional state, depending on their qualification and the skill level for the efficiency and the effectiveness improvement of their competitive activities.

The Study's Object and Methods: The adaptive possibilities, psychological and the psycho-physiological state of the 62 athletes and the sportsmen of the quite varying qualification skill

and the sports specialization – the students of the 1–2 courses by «The Physical Culture» specialty of the Zhetysusky State University after E. Zhansugurov have already been studied by us. So, all the students had already been enquired the obligatory (e.g. for the incoming and the enrolled in the high school) medical examination, on the basis of which they were classified just in the «practically healthy» group, not having any contraindications for the increased physical activities.

So, the general, personal, and the situational anxiety levels study and the evaluation have been performed by the Spielberger test. This method is made it possible to be differentially measured the anxiety, as the personal property, well as the state. This study can be carried out both, as individually, well as in the groups. By each tested patient, it is made the final conclusion, which it is included the anxiety level assessment, and, if it is quite necessary, the further recommendations by his correction.

The Study Results and Their Discussion

The diagnostics at the study conducted by the general anxiety level of the highly qualification skilled athletes and the sportsmen has been shown the following results. In average, by the group, the 25% athletes and the sportsmen have the high level, the 30% athletes and the sportsmen – the average level of the general anxiety with the tendency to the high level, the 45% athletes and the sportsmen have been shown the final results, corresponding to the low level anxiety. Consequently, to be performed in the sportive competition, the athletes and the sportsmen are quite suitable with the anxiety different and the various levels. This is easily explained by the personal characteristics of the athletes and the sportsmen.

At the anxiety differentiation (e.g. the personal and the situational anxiety levels selection), it has been revealed the following the specific features of the athletes and the sportsmen anxiety structure. In general, for highly skilled athletes and the sportsmen, it has been characterized by the lower level of the situational anxiety (e.g. the high level – at the 20%, the moderate one – at the 35%, the low one – at 45% ones). Also, in average, in the group, the completely examined 25% athletes and the sportsmen have had the high level of the personal anxiety, the 35% athletes and the sportsmen – the average one with the tendency to the high level, the 40% athletes and the sportsmen have been shown the results, corresponding to the anxiety low level. So, the tendency to the high level of the personal anxiety can be explained by the constant neuron-psyhic and the mental stresses of the athletes and the sportsmen.

At the same time, the athletes and the sportsmen performance effectiveness analysis (e.g. and this is one of the key indicators in the sport) has been shown, that for the highly elite athletes and the sportsmen, having had the highest achievements

(e.g. the champions, the medalists, and the prize – winners of the RK, Asian, and the world championships), it is characterized the low level of the personal anxiety. So, all the given observations are quite permitted us to be recommended the anxiety indicators usage for the necessary selection just before the responsible sportive competitions the best prepared athletes and the best trained sportsmen. Also, the anxiety structure study is quite necessary for the athletes and the sportsmen efficient correction carrying out, that, as a result, will be promoted to be boosted their performance.

It is known, that the anxiety is, as the personality trait, well as the state. So, for athletes and the sportsmen anxiety level assessment, not having had any qualification, the comparative analyses has been carried out, and the mean grouped indicator of the situational and the personal anxiety level has already been calculated. The students of the physical faculty have already been taken their participation in this study, the written inquiry and the survey have already been conducted, having used the personal Spielberger scale self. Thus, the 30 respondents have already taken their participation in the inquiry and the survey, the averageage – has been 18 years old.

At the results analyses of the anxiety level, the general total indicator by each from the subscales has been in the range from 35 up to 75 points. The conduct of our diagnostics at the general anxiety level studying of the athletes and the sportsmen has already been shown the following results. In the average, by the group, the 62% of the athletes and the sportsmen, not having had any sportive qualification skills, have the high level, the 23% of the athletes and the sportsmen – have the average level of the general anxiety, the 15% athletes and the sportsmen have already shown the results, corresponding to the low level of the anxiety. The obtained practice had been shown, that at the highly – anxious athletes and the sportsmen, who wanted to be reached the high and the good results (e.g. the high level need for the sportive achievement), their sportive activity was usually broken, and, that is why, they simply showed the worst results, due to the additional and the extra competition stress.

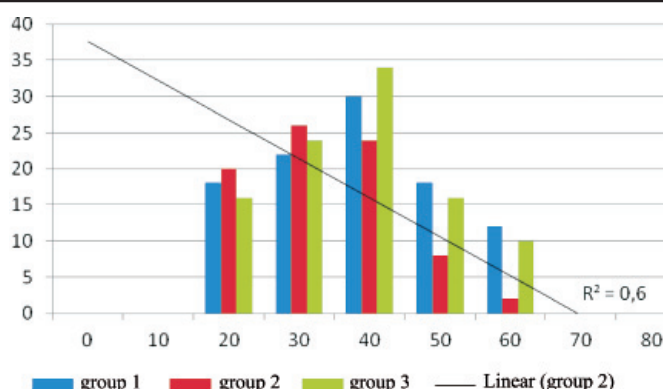
At the personal and the situational anxiety levels selection, there have been revealed the following peculiarities and the specific features of the athletes' and the sportsmen's anxiety structure, not having had any sports skills qualification (table).

The Anxiety Level at the Young Athletes and the Sportsmen, Not Having Had Any Sports Skills Qualification

The Group	The State								
	The General anxiety			The Situational anxiety			The Personal anxiety		
	high	average	low	high	average	low	high	average	low
The points, mean values	69,5	41	25,5	70	44	21	69	38	30

The anxiety self – appraisal scale has been designed for the study of the examined patients' clinical state. So, the normal levels of anxiety, by this clinical scale, have been classified as follows: the 20–40 points – is the low level, the 41–60 points –

is the average level, the 61–80 points – are the high level of the anxiety. By the Zung scale, the average point has been made up $40,1 \pm 1,3$ in the athletes and the sportsmen group of the highly skilled qualification (Fig. 1).



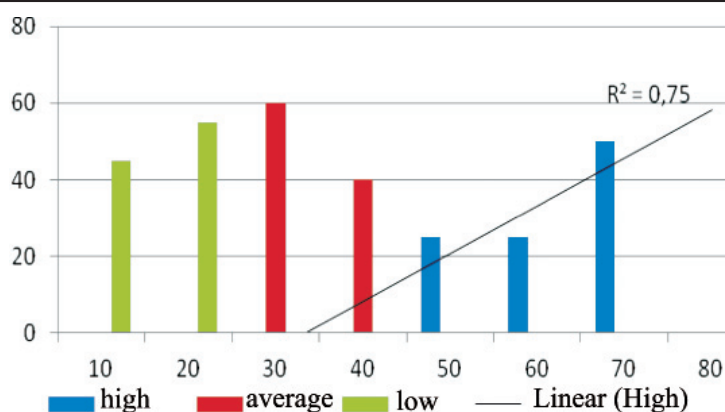
Note. By the absciss – anxiety axis by the scale (e.g. in the points); by the vertical axis – the competitors number (e.g. in% from the total number).

Fig. 1. The Frequency Diagram of the Indicators Distributions of the Personal Anxiety at the Athletes and the Sportsmen of the Highly Skilled Qualification

In general, the high level of the situational anxiety has been characterized for the young athletes and the sportsmen (e.g. the high level – at the 60% ones, the average level – at the 30% ones, the low level – at the 10% ones). Also, in average by the group, the examined 58% athletes and the sportsmen have had – the high level of the personal anxiety, the 35% athletes and the sportsmen have had – the average one with the tendency to the high level, the 7% athletes and the sportsmen have been shown the results relevant – the low level of the anxiety. So, the tendency to the high level of the personal anxiety can be explained by the permanent neuro – psychiatric and the mental overexertion of the athletes and the sportsmen. It is also known, that the very low level of the anxiety presence, due to the insufficient and the lack of their motivation, may be tended not to be performed the good and the best results.

So, the healthy individuals and the persons distribution, by the Zung scale indicators, has been allowed to be revealed, that the overwhelming majority of the examined patients (e.g. 91,8%) have had the low level of the anxiety, the average level of the anxiety has been defined at the 8,2% of the examined patients. The persons with the high level of the anxiety, among the athletes and the sportsmen have not yet been identified. The individual distribution, by the scale, beyond the border, has been in the range from 5 up to 34 points.

Thus, in result of the athletes' and the sportsmen's unskilled level of the anxiety study, the anxiety level, by the clinical anxiety scale, has been adequate the 41–60 points, which is the average level, the 61–80 points – has been the high anxiety level. By the scale, in the athletes and the sportsmen group, the average point has been made up $45 \pm 1,2$ (Fig. 2).



Note. By the absciss – anxiety axis by the scale (e.g. in the points); by the vertical axis – the competitors number (e.g. in % from the total number).

Fig. 2. The Frequency Diagram of the Indicators Distributions of the Personal Anxiety at the Athletes and the Sportsmen of the Low Skilled Qualification

So, the healthy individuals and the persons distribution, by the Zung scale indicators, has been allowed to be revealed, that the overwhelming majority of the examined patients (e.g. 62%) have had the high level of the anxiety, the average level of the anxiety has been defined at the 23% of the examined patients. The individual distribution, by the scale, beyond the border, has been in the range from 10 up to 70 points.

Conclusion

Thus, the conducted psycho-physiological and the metal examination has been shown, that, in general, the lower level of the situational and the personal anxiety is characterized for the highly skilled qualification athletes and the sportsmen. Among the athletes and the sportsmen, who achieved the best results, are more frequently met and more common, with the low level of the personal anxiety. The over-

whelming majority of the examined patients have had the low level of the anxiety by the self – appraisal anxiety scale, in the group of the high skilled qualification athletes and the sportsmen. So, the obtained practice had been shown, that the activity was usually broken at the highly – anxious athletes and the sportsmen, who wanted to be achieved the high results (e.g. the high need for the sportive achievement), and, that is why, they showed the worst results, due to the extra and the additional competition stress. So, it had been found out at the personal and the situational anxiety levels selection, that, in general, the high level of the situational and the personal anxiety levels were characterized for the young athletes and the sportsmen. The tendency to the high level of the personal anxiety can be explained by the permanent neuron-psychical and the mental overexertion of the athletes and the sports-

men, their unwillingness to the intensive loads, the excessive and the fanatic desire to be achieved the necessary results. It had also been revealed by the self – appraisal anxiety scale, in the group of the athletes and the sportsmen, not having had any qualifications, that overwhelming majority of the examined patients had the high level of the anxiety.

Resume. The low level of the situational and the personal anxiety is quite characterized for the most skilled qualification athletes and the sportsmen, which it is allowed to be recommended the anxiety indicators usage for the selection before the responsible competitions of the best – prepared athletes, and the best – trained sportsmen. So, the

anxiety structure study is quite necessary for the effective control and the efficient correction of the athletes and the sportsmen, which, as a result, will be promoted their performance growth.

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