



SCIENTIFIC RESEARCH OF THE SCO COUNTRIES: SYNERGY AND INTEGRATION

上合组织国家的科学研究：协同和一体化

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这些会议文结合了会议的材料 – 研究论文和科学工作者的论文报告。它考察了职业化人格的技术和社会学问题。一些文章涉及人格职业化研究问题的理论和方法论方法和原则。

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欧亚经济联盟国家数字化转型中的能效技术：实现既定目标的计划和途径
**ENERGY EFFICIENCY TECHNOLOGIES IN THE DIGITAL
TRANSFORMATION OF THE EAEU COUNTRIES: PLANS AND WAYS
TO ACHIEVE THE SET GOALS**

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作者分析了到2025年实施欧亚经济一体化发展战略方向行动计划的可能性，描述了可能存在的风险，并对欧亚经济联盟国家能源基础设施的演变做出了预测。 即将到来的数字化转型的任务是最大限度地提高所用资源的效率，并降低单一能源结构运行中的成本和热量/能源损失。

关键词：EAEU、EEC、俄罗斯、中国、美国、ADF、能源效率、竞争力、数字化转型、集成、人工智能、智能技术、智能基础设施、智能交通系统、智能生产、RES、联合国可持续发展目标、工业 4.0.、SET、市场、生态系统、元宇宙、双耦合、技术民族主义

Abstract. *The authors analyze the possibilities for the implementation of the Action Plan for the implementation of the Strategic Directions for the Development of Eurasian Economic Integration until 2025, describe possible risks, and make forecasts for the evolution of the energy infrastructure of the EAEU countries. The*

upcoming digital transformation sets the task of maximizing the efficiency of the resources used and reducing costs and heat / energy losses in the operation of a single energy structure.

Keywords: EAEU, EEC, Russia, China, USA, ADF, energy efficiency, competitiveness, digital transformation, integration, AI, smart technologies, smart infrastructure, smart transport system, smart production, RES, SDGs UN, Industry 4.0., SET, marketplace, ecosystem, metauniverse, dicoupling, technonationalism.

The upcoming Industry 4.0., a creatively realized union of machine and man in search of finding the optimum for building further development of networks for various purposes, contributing to the growth of return on capital and realized effects, leads humanity into the era of the most transparent opportunities to take as much and more successfully as possible from the world around us and return to it material products of the Internet of things and virtual worlds of augmented realities that form complete ecosystems in metauniverses of various levels of diversification and development. Here you can also see elements of the global management of human preferences from the 5th generation of the alpha generation, capable of isolating the drawn and invented from birth, from the existing and inevitable, which makes our world more predictable and infinitely romantic, from the standpoint of its desire for beauty and for revealing hidden possibilities of a person on the way to his creativity and development.

It is the versatility of this division of spheres of influence and the reduction of real opportunities to rule from a single center of power that forces competing ideas, as well as the meanings of the possible final consequences of their application in practice, to build various communities to protect their interests and national ambitions, taking into account ethnic, religious and cultural specifics. The “war of all against all” by Thomas Hobbes is gradually being replaced by the concepts of geopolitical zoning and geo-economic architecture of decision-making centers, which cease to be unambiguous and polarize society in a policy of less damage and the maximum possible compromise, which in this century is far from the ideas of “zero sum” or “single center of power” according to the one-stop-shop rule and gives each of its participants’ bonuses for personal involvement. This is his/her historically formed individual workplace in the post-COVID world, where algorithms and routes for the transit of capital, labor resources and technologies are re-formed, giving the power to realize the accumulated advantages and ensure their uniqueness of trusting participation in the production fragmentation of the chains of goods and services, sharing the opportunity to jointly manage part offered for general use of marketplaces and payment systems of banksters of the world of virtual settlements and cryptocurrency ersatz of true transfers. At the same time, the very methods of paying for the logistics and information flows of movable e-commerce goods in

foreign trade are evolving, and the things themselves reach their Internet movement from the customer to the consumer (Internet of things), when the designer has a matrix multilevel, moving away from the classical general economic theory and political economy into the environment of unconscious creation. This is the apotheosis of the synergy of two main global business trends: mergers and acquisitions of the more obsolete and an intermediate version of the pre-bankruptcy dichotomy of partial allocation of unique competencies and the required groundwork for a sectoral market breakthrough (for a product, service or professional management outside the organizational structure) as a strategic alliance of industry and transnational dreams of an unknown super-product of the future, which is always needed by everyone until the loss of its declared unique inaccessibility (before substitute goods enter the market) and capable of sliding to the zero threshold of innovation from market to market, from the scientific and technological way of the metropolis to the wild the level of a deindustrialized colony.

This example demonstrates Europe falling into the abyss of energy poverty, during its imperialist rebirth from a center of technological prosperity into a desert of drifting "brain drains", vacuum-cleaned bills for payment of the collapsing Marshall Plan and the full-scale One Belt, One Road project that did not take place in its grandeur (OBOR), which much more severely forced the Old World to dissolve into the age of advancing Asia. And the United States, just naive and awakened beneficiaries of the post-war milking of the site of ancient game preferences of the Anglo-Saxon territorial oasis of the erased outlines of the ancient civilizations of Rome and Greece, who fell in search of new protection from the invasion of vandals, the most successful of which after the destruction of the USSR of the fascist regimes were Chinese companies, dragging gullible Europeans into their investment traps of new ways of Asian expansion on the historical sites of the most enlightened West. In other words, the New World, which considered that it would never again release the levers of governance by the elites of old Europe and bring it to the state of a cluster-campus greenhouse of technological seedlings of much-needed "fresh forces" in the fight against the Celestial Empire while setting up American techno-nationalism, was late, because "everything stolen before those" who did not see the obvious under the screens of the WTO and the Chinese invasion of the blacksmith of technological laboratories and institutions that forged a red dragon of a European scale, quietly devouring most of the imports of leading countries from the Loire to the Rhine, from the Thames to the Tiber.

And since the European integration project of supranational priorities is burning out in the battle of the two superpowers, then it is time for Russia to build its own track and bring national leadership powers into one of the growing and strengthening groups. It is so promising that, with its geographical and geopolitical content, the countries of the post-Soviet space, the geo-economic reserve of large super-

powers capable of delegating their powers within the framework of the Eurasian integration group, the EAEU (RF, Kazakhstan, Kyrgyzstan, Armenia and Belarus) attract more and more promising players from South America, The Middle East and Africa, deforming in the process of cost reduction and unification of technological regulations, to attract all those who are increasingly demanding the improvement of horizontal ties and competent management of the infrastructure of their own states. This is especially important in the framework of Industry 4.0., which requires the implementation of successful start-ups of innovative “green economy” groundwork in the field of energy infrastructure, which allows for long-term planning of the countries' accumulation opportunities at various points of growth, capable of taking into account multiplier effects, as well as the growing synergy of scale itself, which allows increasing the advantages of mutual penetration of various parts of economies and industries, while reducing production costs, and taking care of the growth of the competitiveness of the national economies of this integration association. This is precisely the task that was set in April 2021 for the EEC Macroeconomic Policy Department, in the process of building up its activities, a list of various world energy agencies and international global institutions that pursue the achievement of the Sustainable Development Goals (UN SDGs) studied within the framework of and on the basis of the Order of the Council of the Eurasian Economic Commission, according to the Action Plan for the implementation of the Strategic Directions for the Development of Eurasian Economic Integration until 2025, in clarification of clause 8.3.2. "Distribution of "smart" energy-efficient technologies" [1].

Previously, the EEC has already concluded documents of various legal force, from memorandums of cooperation to a protocol of possible intentions for integration cooperation in the energy sector and in the field of building a "green economy", as a task of gradually reducing the technogenic pressure on nature and ecosystems of the EAEU countries in the process of their transfer to new industrial tracks and involvement in the unified circuits of generation of the required capacities of non-toxic options for creating a single energy interconnected space.

Among such documents on the achievement of the above goals, one can point out 2 memorandums of cooperation and partnership with the World Energy Council and the Executive Committee of the CIS Electricity Council, protocols on interaction with the European Energy Charter, with the International Solar Energy Agency, as well as with the German Energy Agency, with the International Renewable Energy Agency and the World Wind Energy Association. Based on the submitted joint declarations and clarifying statements on the proposed cooperation in the field of energy efficient projects and the introduction of "smart" technologies of the "green cycle", the EEC Board at its meeting considered the presented report on best practices, start-ups and greenfields in achieving the best possible results, as

empirically tested experience existing scientific schools and concepts in the field of energy saving, generation and distribution of received kcal and methods of their delivery to the end consumer/user within the framework of the created carbon-free economy [2].

At the same time, a significant number of technologies used in industry and various sectors of the economy, as well as in the environment of regional and rural economies, can hardly be called "smart", because despite their energy efficiency they cannot be characterized as an interdependent and closed system in control (electronic / intelligent) or the scheme used in organizing the operation of various devices that can reduce energy losses or reduce energy consumption when reaching the value of the useful effect, if this control system were not used and all devices worked in an autonomous and independent mode. That is, there is no loss of quality and changes in the algorithms for controlling and distributing energy during the operation of "smart" AI and Big Data systems, moreover, the accumulated base of initial data launches other algorithms for the evolution of energy generation chains, taking into account seasonality and time of day, identifying the optimum for achieving the required consumption kcal and their timely cyclic supply. In fact, we save the energy system itself from peaks in energy consumption fluctuations and extend the life of the technical devices involved in this, as well as save electricity itself, without losing the set indicators for the quality of serviced facilities and obtaining finished product cycles, thereby reducing its cost.

This synergy of the results of international experience and scientific schools of energy efficient exchange based on "smart" technologies has generated a request for international cooperation and exchange of analytical data in solving joint energy problems; differentiation in approaches to programs and strategies for all existing types of energy resources: electric current generation, hydrocarbon energy, alternative and renewable energy sources (RES); various types of analyzes to search for losses in the energy structure, isolating barriers and dead zones in the process of joint energy generation and energy exchange between states; search and dissemination of the best innovative start-ups, as well as highly competitive business models, also based on the state of domestic engineering and electronics, in the conditions of Russia's sanctions autarky in the process of ongoing ADF; work with the elites of various states of the integration union, which are the owners of energy capacities and pursue an independent policy in pricing and selling surplus electricity; creation of "road maps" for the transition to energy efficient technologies and work with consumers of their subsequent implementation from the standpoint of priorities and joint regional and industry interests; involvement in the work of the Department for Macroeconomic Policy of the EEC and other departments responsible for the development of industry and agriculture, as well as technical regulation and energy infrastructure (all these are separate blocks of the EEC) [3]. For all departments,

an analysis and review of the content and terminology was prepared and presented, in order to form basic approaches to the problem under study and build a single EAEU glossary on AI and energy efficiency issues.

All EAEU countries have different approaches to energy saving and the use of "smart" technologies, but all are fighting to increase the competitiveness of their products and are waiting for multiplier integration effects with the improvement of a single cross-country energy infrastructure. SET themselves ("smart energy efficient technologies") differ from other energy efficient technologies in their involvement in digital transformation based on the principles of AI and Big Data. This relationship allows SET to give feedback on ongoing and corrected processes in the field of energy generation and its transmission to the end consumer, as well as the effect of energy saving and control of consumed capacities, including cascade losses, repairs, accidents, and planned replacement of equipment with a more advanced one. and complex, as Japan demonstrates best of all today [4]. Fukushima's mistakes paid off and Abenomics minimized similar punctures in the future.

The very policy of countries for more efficient and competent power generation leads to an improvement in the global climate agenda, as well as to the creation of a number of new, "green" jobs that promote both renewable energy and alternative energy, as well as Daniel Kahneman's consumer economy societies that launch creative industries [8].

SET refine and supplement energy-saving technologies by applying a new quality of management ecosystems, introducing digital and platform solutions from nano- to macro-levels, leading to reduced energy costs and risk management in the field of ensuring the required level of safety of the devices and assemblies used, the materials used and value chains [five].

The total effect of the introduction of SET can be divided for the population, business and the state in the following areas:

- a significant reduction in utility costs through the use of energy-efficient equipment and computers / robotics (for the population);
- - reduction of greenhouse gas emissions, toxic wastes and pollution of soil and water as a result of the introduction of SET at power generating enterprises and extractive industries (for all);
- reduction of current and capital costs for consumed fuel and lubricants and a drop in financial costs in the construction and operation of the housing stock (for business);
- an increase in the competitiveness of the products received due to the real cumulative drop in costs and the cost calculated in advance (for business);
- improvement of the company's goodwill due to its digital transformation, increase in the level of automation and computerization, growth of potential investments in the growing innovation component and "greening" of the company's

projects, as part of improving its production image (for business);

- growth in the company's capitalization and an increase in the likelihood of a friendly merger with its own kind or building a strategic alliance in the segment of horizontal cooperation or industry specialization (for business);

- savings and deeper processing and extraction of a valuable component from non-renewable natural resources, taking into account the toxicity of their processing, the growth of the "green" component (for the state);

- effective technologies for optimizing the impact on the complex of budgetary and investment expenditures in the application and more efficient use of energy generating / energy consuming capacities (for the state);

- the growth of scientific schools and programs for the joint involvement of production, creativity and education in the development of creative industries and areas of the national economy, the growth of virtual services and services, market-places and ecosystems of e-commerce and payment systems in the field of creating and attracting funding to the virtual economy, as part of the production cycle a deeper level of processing and a "green" orientation (for the state).

Consider the main directions of SET, which are already preparing the offensive of Industry 4.0 everywhere, through the introduction of electronic and digital technologies in "smart" gadgets, metaspaces and houses, as well as to entire "smart" cities, innovative and industrial zones of various sectors of industrial symbiosis machine and human [6].

In the EEC report, they are all divided as "smart": 1) power grids; 2) buildings, residential buildings and public infrastructure; 3) system of transport and communications; 4) production.

So, "smart" power grids (Smart Grid concept) are created by technologically combining various power grids, consumers and producers into a single automated system capable of self-sufficiently solving all issues within a single cycle, from quality to safety of the required parameters of development and evolution of each element. The result of this is the synergy of the electricity market and the participants in its generation and consumption to bring it to the level of the 6th scientific and technological order, reducing its carbon footprint and increasing its resistance to voltage drops and peaks during peak hours or during natural disasters. At the same time, Smart Grid self-tests itself and issues the causes of malfunctions (from technical to malicious), highlights the quality and level of generated and supplied electricity at all stages of its passage through the energy infrastructure to the consumer device (correctly solves the "last mile" problem), and through Smart Metering ("smart" metering system) gives the economic feasibility of the architecture of the used sections of the electricity transmission network and evaluates their economic feasibility of working in a single supply chain. The data is obtained from smart meters, of which more than 7,500 have already been delivered in Moscow

alone in the first quarter of 2022. The effect of the Smart Grid has already led to 30% energy savings and the possibility of its more efficient and cheaper transmission in all directions, in accordance with the existing contracts of the countries of the integration community.

The same miracles of control from the introduced accounting and automation systems are manifested in 3 other directions, which gives hope that the EAEU countries will enter Industry 4.0 with dignity, and will also be able to compete in a qualified and competent manner in the market of "smart" industries and goods, beyond consumer marketing 5G. And these effects should bring our economies closer together, make them resilient to stress, and address issues of countering external challenges and threats [7].

Also, it must be taken into account that the leading countries in the SET, such as the USA, South Korea, Japan, Singapore, the EU, China and India, will not provide us with the required and high-quality assistance in our digital development and help with parallel imports, which is necessary until creation of the required level of domestic science in order to bring the previously launched programs of the EAEU in the field of transport, energy and construction using a wide range of SET. Therefore, we must firmly understand that our battle for a better environment and realizable carbon neutrality is impossible without common efforts, and jobs everywhere in our states require an increasingly differentiated approach in joint planning and more clear and balanced, controlled and predictable activities in the field of evolution of joint transport and energy infrastructures. At the same time, not only technological regulations, but also the orientation towards political polarization and the country, religious and cultural conjuncture of our partners in the EAEU will increasingly determine our true joint opportunities for our further development and common centers of competence and technological interaction, which is in Industry 4.0. will require big concessions to each other in building a single zonal-bloc center of interaction and partnership that will guarantee us joint success and our own markets and monetary unity. The likelihood of this foresight will force politicians and elites to find a common compromise for the EAEU, because only such an approach will allow this union to create a living alternative to the CIS and defend its national priorities within the framework of any other groupings and pacts [9].

The main task will be to ensure that it is Russia that remains the leader of these processes, but does not become the final and sole donor, following the example of the RSFSR in the USSR, of all processes, which fatally led us all to the collapse of the entire Soviet red project. Future superpowers will not tolerate Russian leadership if we cannot quickly and adequately bring order to our partners in the EAEU and adequately bring it to deeper stages of integration [10].

While the ongoing decoupling of East and West is separating the wheat from the chaff, our direct task is to take the best from such a divorce and take out those

key opportunities that will make us part of the new global industrialization and help us, on the basis of the EAEU, as well as on the BRICS and SCO platforms, declare our technological sovereignty and the required power supply, which will lead us not only to the leaders of the digital transformation of global industries that is already ending, but also to include AI and neural networks in the zones of urban self-sufficiency of countries of uniform standards and regulations, protocols and technologies in the robot-oriented and cyborg-demanded economy.

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远东联邦区粮食食品市场特点
**FEATURES OF THE GRAIN FOOD MARKET IN THE FAR EASTERN
FEDERAL DISTRICT**

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粮食市场的有效运作直接取决于其发展方式的正确性以及组织参数的确定程度。在这方面，对粮食市场发展管理问题的研究就显得尤为重要。文章讨论了粮食市场的发展，特别是远东联邦区的粮食生产。目标是确定谷物生产的趋势

关键词：粮食市场，播种面积，粮食总收成，远东联邦区，粮食供应

Abstract. *The effective functioning of the grain market is directly dependent on how correctly not only the ways of its development are determined, but also the parameters of the organization are substantiated. In this regard, the study of the problems of managing the development of the grain market becomes relevant. The article discusses the development of the grain market, in particular grain production in the Far Eastern Federal District. The goal is to identify trends in grain production*

Keywords: *grain food market, sown areas, gross grain harvest, Far Eastern Federal District, grain supply*

The state and development of grain production largely depend on the conditions prevailing in the region: natural, economic, socio-demographic, and others. Ultimately, they can either help or hinder the functioning of the regional grain market. At the same time, the degree of their influence on its development is also different.

To characterize the grain food market in the Far Eastern Federal District, it is important to find out its place in the structure of the country's market.

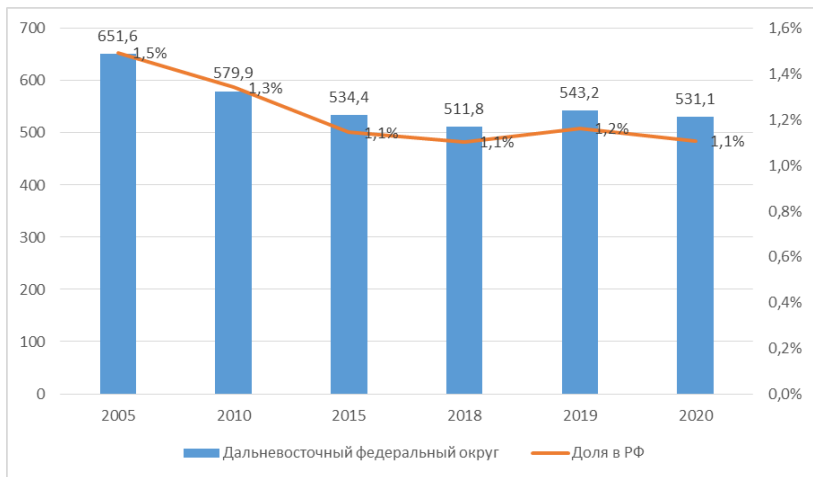


Fig. 1. Dynamics of sown areas in the Far Eastern Federal District and their share in the total volume of the Russian Federation, thousand hectares, % [2].

As can be seen from fig. 1 the negative dynamics of the volume of cultivation areas led to a drop in the share of sown areas in the Russian Federation. As of 2020, the Far Eastern Federal District ranked last in Russia with an indicator of 531.1 thousand hectares or 1.1% of the share of cultivation areas in the Russian Federation.

The Amur Oblast is the largest agricultural region in the Far East, including 2,733.6 thousand hectares of agricultural land and 1,213.7 thousand hectares of arable land. 34% of agricultural land is concentrated in the Amur Oblast, 59% of arable land in the Far Eastern Federal District [1].

Agricultural crops in farms of all categories were located on an area of 1,138.3 thousand hectares (3.6% lower than in 2019): grain and leguminous crops - 219.9 thousand hectares, with a plan of 235.0 thousand hectares.

Farms of all categories of grain (in weight after processing) harvested 418.3 thousand tons, or 15.4% more than in 2019[3].

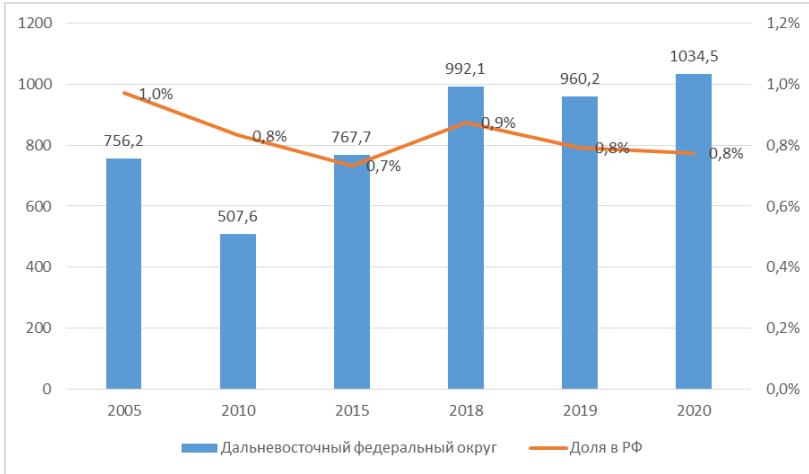


Fig. 2. Dynamics of the gross harvest of grain crops in the Far Eastern Federal District and the share in the total volume of the Russian Federation, thousand tons, % [5].

In the Far Eastern Federal District, 507-1034.5 thousand tons of grain are harvested per year. In terms of gross grain harvest, the district also ranks last in Russia. Since the share of the gross harvest is lower than the share of sown areas, it can be concluded that the grain yield in the Far Eastern Federal District is almost one and a half times lower than the average for Russia, which is explained by difficult climatic conditions.

Let us consider the distribution of the gross grain harvest by the regions of the Far Eastern Federal District. On fig. 3 and 4, it can be seen that three regions of the Far Eastern Federal District - the Amur Oblast, the Trans-Baikal Krai, and the Primorsky Krai are of the utmost importance in grain production. But at the same time, their shares are also subject to serious changes. If in 2016 the Trans-Baikal Krai was the leader in production, giving 39% of the gross grain harvest, then in 2020 the Amur Region and Primorsky Krai became the leaders, collecting 40% and 37% of the gross grain harvest, respectively.

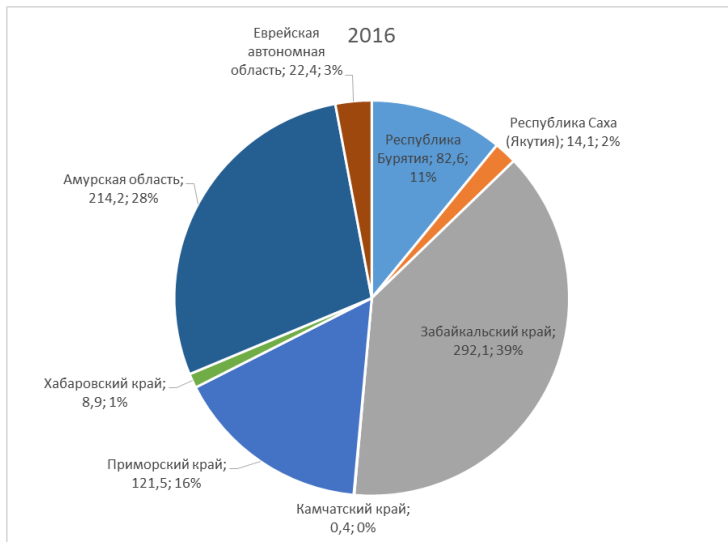


Fig. 3. Distribution of gross grain harvest by regions of the Far Eastern Federal District in 2016[5]

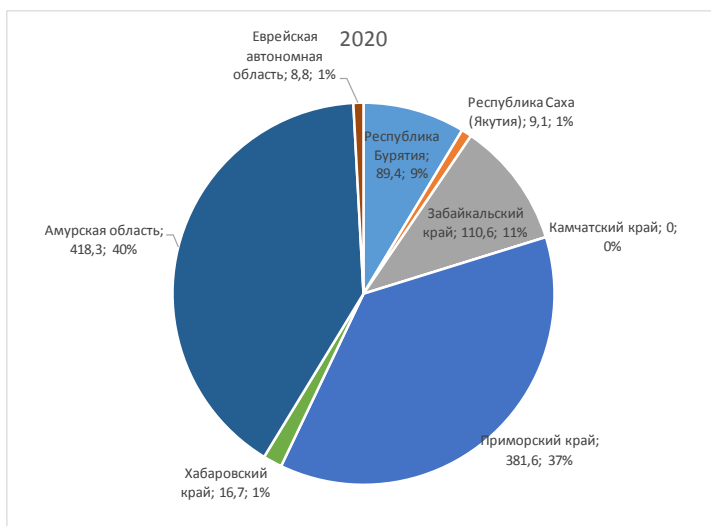


Fig. 4. Distribution of gross grain harvest by regions of the Far Eastern Federal District in 2020[5]

Table 1. Grain production (in weight after processing) in 2021

Regions	Grain production, thousand tons	The share of the region in the production of grain in the total volume in the Russian Federation, %
Russian Federation	121397,3	100
Far Eastern Federal District	1263,8	1,04
including:		
Primorsky Krai	520,6	0,43
Amur Oblast	426,0	0,35
Transbaikal Krai	162,0	0,13
The Republic of Buryatia	122,3	0,1
Khabarovsk Krai	16,4	0,01
The Republic of Sakha (Yakutia)	9,3	0,01
Jewish Autonomous Oblast	7,0	0,01
Kamchatka Krai	0,1	0

[Compiled by the author by 4]

The share of grain production in the Far Eastern Federal Region in 2021 amounted to 1.04% of the total grain production in the Russian Federation.

In Primorsky Krai, 520.6 thousand tons were harvested in 2021, or 0.43% of the total volume in Russia, or 41.2% in the federal district. The Amur Oblast is considered the breadbasket of the Far East, but due to unfavorable climatic conditions, the harvest amounted to 426.0 thousand tons, or 0.35% of the total harvest in the Russian Federation and 33.7% of the total in the Far Eastern Federal District.

The most important characteristics of the food grain market in the Far Eastern Federal District is the gross grain harvest per capita, which characterizes the availability of own food grain for the population of the Far Eastern Federal District.

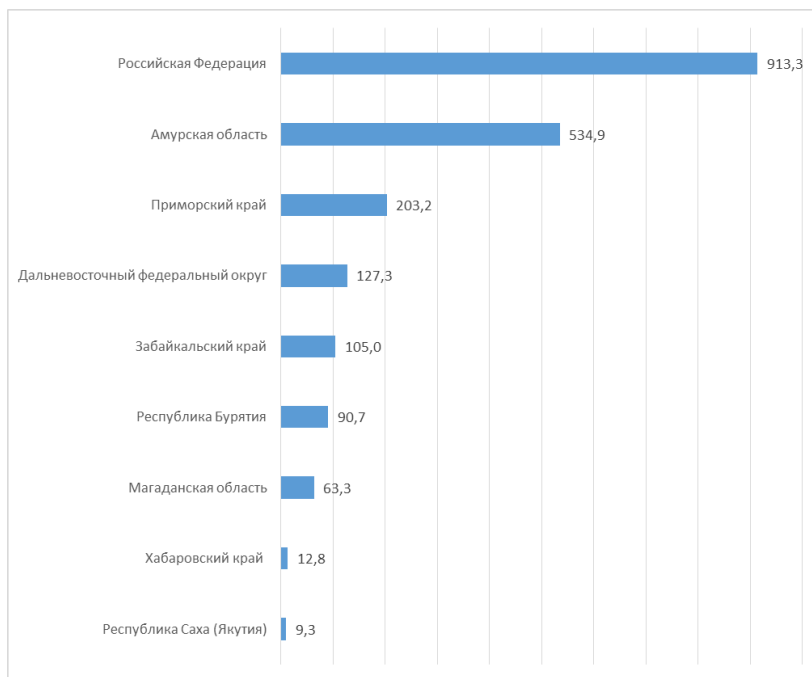


Fig. 5. Supply of grain to the population of the Far Eastern Federal District kg/person. [6]

The provision of grain in the whole of the Russian Federation is more than 900 kg per person. In the Far Eastern Federal District, this figure is 127 kg, that is, almost 8 times less than in the Russian Federation. From these indicators, we can conclude that the Far Eastern Federal District is the lowest provided district in terms of grain crops per capita. A number of regions of the Far Eastern Federal District do not have acreage at all, transport links between the regions are very difficult, so the level of provision is much lower than the figures for the gross grain harvest in the region show. Since the consumption of grain within the country per capita in Russia in 2020 accounted for 298 kg, therefore, the Far Eastern Federal District cannot fully provide its population with grain of its own production, nevertheless, some regions of the Far Eastern Federal District are grain donors for other regions of the district. Thus, the Far Eastern Federal District cannot be a grain donor for other districts and does not have a large grain export potential.

Based on the results of a study of the food market for grain in the Far Eastern Federal District, it became clear that the district occupies the last place in terms of sown areas in the Russian Federation. Comparison of the gross grain harvest with

the available sown areas suggests that the district collects one and a half times less grain than the average for the Russian Federation. This indicates a lower yield of grain crops in the district.

In general, the conditions for growing grain crops are very difficult in the Far Eastern District. Many regions of the okrug (neighborhood) do not have grain crops at all. More favorable conditions are formed only in the south of the district - in the Amur Oblast, in the Primorsky Krai and the Trans-Baikal Krai. These three regions are the leading grain producers in the Far Eastern Federal District.

The study also showed that in terms of grain production per capita, the district is in last place in the Russian Federation, while producing only an eighth of the Russian average. At the same time, the gross grain harvest per capita gives an indicator significantly less than the average grain consumption in the Russian Federation. This indicator lags behind almost twice. Consequently, the Far Eastern Federal District does not produce grain in the required amount for consumption by the population.

At the same time, the okrug does not have an export potential for other regions of Russia. The uneven distribution of grain production in the Far Eastern Federal District indicates that the district is in a tense situation with the redistribution of grain, which should be sent to other regions in the absence of a developed transport system between them.

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俄联邦行政领土实体：抵制对俄制裁

THE RUSSIAN FEDERATION'S ADMINISTRATIVE-TERRITORIAL ENTITIES: RESISTANCE TO SANCTIONS ON RUSSIA^{1*}

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在复杂多变的地缘政治形势和对俄制裁不断扩大和深化的条件下，人类社会不仅存在、适应生存条件，而且发展的能力，即生存能力，都在不断增强。重要性。该文件介绍了在对该国实施禁令、限制和制裁的情况下对俄罗斯联邦组成实体的生存能力的评估结果。该研究的目标是：从可用的统计数据中选择一套俄罗斯联邦行政领土实体生存能力的初步量化指标；基于这些指标制定通用的弹性指标（系数）；评估每个初始指标的变化对泛化指标动态的影响。

关键词：俄罗斯联邦、组成实体、制裁、复原力、抵抗力、活力。

Annotation. *In a complex and unstable geopolitical situation and in the conditions of constantly expanding and deepening anti-Russian sanctions, the ability of human society not only to exist, adapt to living conditions, but also to develop, that is, its viability, is of increasing importance. The paper presents the results of an assessment of the viability of the constituent entities of the Russian Federation in the conditions of bans, restrictions and sanctions imposed on the country. The objectives of the study were: to select from the available statistical data a set of initial quantitative indicators of the viability of administrative-territorial entities of the Russian Federation²; development of a generalizing resilience indicator (coefficient) based on these indicators; assessment of the impact of changes in each initial indicator on the dynamics of the generalizing*

1 * The paper was prepared based on the results of research carried out at the expense of budgetary funds according to the IEIE research plan for 2023, Project 5.6.6.4. (0260-2021-0008).

2 “Administrative-territorial entities”, “constituent entities”, “subjects” and “regions” terms are used as synonyms in this paper.

indicator.

Keywords: *the Russian Federation, constituent entities, sanctions, resilience, resistance, vitality.*

Resilience coefficient

To quantify the viability of the subjects of the Russian Federation, 15 macro-economic indicators were selected, available in the database of the Federal State Statistics Service of the Russian Federation (see Table 1). The first 12 of them, indicated by letters G1-G12, have a positive effect on resilience: with their growth the level of resilience increases. The last three (Q1-Q3) reduce it: with their increase the level of resilience decreases. These 15 indicators are accepted as factors of resilience of the subjects of the Russian Federation and used as ingredients of a generalizing indicator of resilience. When calculating the latter, all the cost indicators of the values of the factors under consideration are taken at constant prices.

Table 1. Factors involved in the calculation of viability coefficients V

Symbol	Factor
G1	Population (end of year)
G2	Life expectancy at birth
G3	Number of population in working age
G4	Annual average number of employed
G5	R&D personnel
G6	Real money income of population
G7	Investments in fixed capital
G8	Gross regional product
G9	Industrial production
G10	Agricultural production
G11	Paved public roads (at the end of the year, kilometers of communication routes per 1000 sq. km of territory)
G12	The ratio of consolidated budget revenues to its expenditures
Q1	Newly diagnosed patients morbidity
Q2	Fixed assets depreciation rate
Q3	Volume of polluted waste water discharged into surface water bodies

Source: the table is compiled by the author.

To assess the strength of the influence of the studied indicators on the dynamics of the resilience of administrative-territorial entities of the Russian Federation, we use the formula proposed by the author (see Appendix)

The calculated coefficient of the significance of the factor shows the strength of the influence of the change in the factor's value on the dynamics of the level of resistance. The value of the factor significance coefficient depends on the growth

rate of this factor in the studied period of time, on the set of factors affecting the viability and on the speed of their changes. Therefore, it should be considered an indicator of the *relative* importance of the factors resilience.

The word "relative" indicates that the measure of the influence of a factor depends on the set and strength of the impact of the selected factors, and each set of factors generally has a different impact on the viability of the object or subject of the study.

Calculations' Results

Calculations of the relative importance of 15 factors of resilience of the Russian Federation and 79 of its administrative-territorial entities³ in 2001-2019 showed that the significance of the factors under consideration for ensuring the resilience of the subjects of the Russian Federation, firstly, was different and, secondly, changed over time.

The significance of each of the 15 factors of the change in the coefficient of resilience in the study period was approximately the same and close to the arithmetic mean ($100/15 = 6.66(6)$) only in three subjects of the Russian Federation. They are: Nizhny Novgorod Region, Altai Krai and Primorsky Krai. This, in particular, is indicated by the coefficient of variation.

The other regins had from one to three of the most significant factors. For example, in the Republic of Tyva, such a factor was the growth of investment in fixed assets (the relative importance of this factor is 36.1%). In the Chuvash Republic, the coefficient of resistance by 12.5% depended on an increase in real monetary incomes of the population and by 12.4% – on the fixed assets depreciation rate. There are three most significant factors in the Astrakhan region: volume of agricultural production (the relative equals to 16.7%), volume of industrial production (the relative is 16.0%), and number of research and development personnel (the relative =12.7%).

Depending on the direction of change of the factors under consideration (growth or decline), their impact on the dynamics of resilience can be either positive or negative. One should take it into account when disclosing the content of the obtained values of the factors significance.

For example, in 52 subjects of the Russian Federation out of 79 considered, the relative importance of the factor "volume of investments in fixed assets" exceeded 20% in 2003-2008. The volume of investments in fixed assets in all these subjects of the Russian Federation increased in 2003-2008. So, the growth of investments has had a positive impact on the level of resilience.

In 2015-2016, there were 35 subjects of the Federation whose relative impor-

3 20 republics, 9 territories (*kraj*), 47 regions (*oblast'*), one autonomous okrug, Moscow and St. Petersburg.

tance of the factor “volume of investments in fixed assets” exceeded 20%. At the same time, 31 of them have decreased investment volumes. The influence of this factor on the level of resilience was mostly negative. According to the magnitude of the indicator of significance, the factor «volume of investments in fixed assets» took the first place in 200-2008 and in 2015-2016. However, if in 2003-2008 it increased the resilience of the subjects of the Russian Federation more than other factors under consideration, then it decreased it more than others in 2015-2016.

A similar pattern was observed with the factor “real monetary income of the population” (see Table 2).

Table 2. The number of subjects of the Russian Federation with the level of significance of viability factors is more than 13,33(3) % (A) and of these, those whose factor value has increased⁴ (B) in 2003-2006 and in 2015-2016, units.

Determinant	2003-2008		2015-2016	
	A	B	A	B
Investments in fixed capital	73	71	50	9
Real money income of population	67	67	17	0

Source: the table is compiled by the author.

The calculations performed showed that the most important for ensuring the viability of the considered subjects of the Russian Federation in 2001-2019 were the growth rates of investments in fixed assets (G7), real monetary incomes of the population (G6) and the volume of industrial production (G9).

Calculations showed that the significance of the considered resilience factors varied over time. The coefficient of resilience also changed. This is due to the mutual, but not always unidirectional, action of many external and internal forces, phenomena and processes in relation to Russia. Let's consider the changes that have occurred in the significance of the studied factors under different conditions of the development of the economy and society of the Russian Federation.

It is possible to see seven time-periods in from 2002 to 2019.

2002 – the Russian economy was most affected by the consequences of the collapse of the dotcom bubble and the collapse of the NASDAQ technology index on March 10, 2000.

2003-2008 - the period of the fastest economic growth in the history of modern Russia.

2009- the year of the greatest impact on the Russian Federation of the global financial and economic crisis of 2008-2010.

⁴ An increase in the values of the indicators presented in the table 8 increases the level of resilience of society, and a decrease reduces it.

2010-2012 - recovery from the 2009 recession.

2013-2014 - a perceptible slowdown in the Russian Federation economic growth.

2015-2016 – the years of the greatest damage caused to the economy of the Russian Federation by anti-Russian sanctions after 2014. The coefficient of change in resilience was less than one: $V = 0.997$.

2017-2019 - adaptation to development in the conditions of anti-Russian sanctions.

These sub periods fully correspond to

The ups and downs of the values of the V index fully correspond to these sub periods (see Fig. 1).

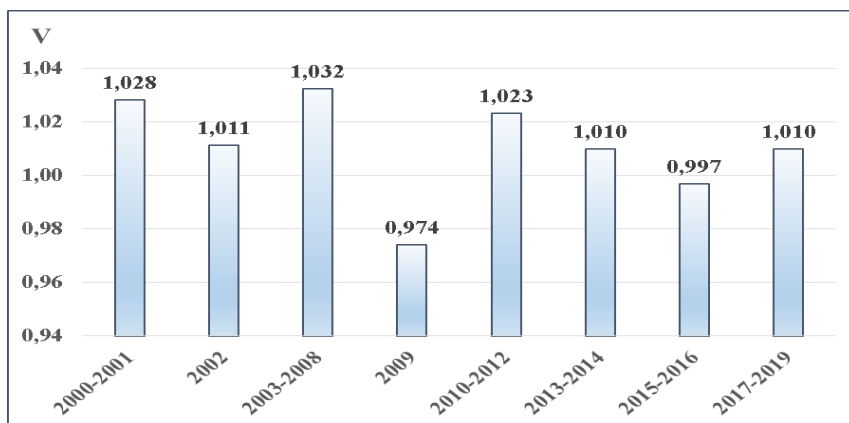


Figure 1. Average annual values of the vitality coefficient of the Russian Federation in 2002-2019, units.

Source: drawn by the author.

Conclusion

The study showed that, depending on their capabilities and the circumstances, the subjects of the Russian Federation focus on one or another resource of their development, they change sets of mainly used resources. Thus, in the years of the most tangible damage from anti-Russian sanctions (2015-2016), an increase in agricultural production (by 3.4% on average per year) had a positive impact on vitality. This increase was due to the growth of crop production (by 4.9% on an average annual basis), which allowed to expand the volume of agricultural exports and thereby to increase export revenues.

The reduction in the volume of polluting wastewater discharge into surface water bodies (by 7.4% in 2009, 5.8% in 2013-2014 and by 14.4% in 2017-2019)

had a positive effect on the resilience of society. But the reduction by almost a quarter in 2001-2019 of the number of personnel employed in research and development had a negative impact on the analyzed indicator of resilience.

Appendix

Accepted designations:

$t = 1, 2, \dots, T$ – time index, $T \geq 1$;

$i = 1, 2, \dots, H$ – index of factors whose growth increases resilience, $H > 1$;

$j = 1, 2, \dots, P$ – index of factors whose growth decreases resilience, $P > 1$;

$G_i(t) > 0$ – the growth rate of factor i , which increases resilience, in the time interval t ;

$Q_j(t) > 0$ – the growth rate of factor j , which decreases resilience, in time interval t ;

$r = 1, 2, \dots, H, H + 1, H + 2, \dots, H + P$ – index of factors included in the calculation of the coefficient of resilience V ;

$U_r(t) > 0$ – the growth rate of factor r included in the calculation of the coefficient of resilience V , in the time interval t ;

$V(t) > 0$ – the value of the coefficient of resilience in a period of time interval t ;

$VI(r;t) \geq 0$ – the value of the coefficient of resilience $V(t)$ without factor r (i.e. when the growth rate of factor r equals to one) in a period of time interval t ;

$y(r;t) \geq 0$ – absolute discrepancies of coefficients $V(t)$ and $VI(r;t)$;

$s(t) > 0$ – the sum of absolute discrepancies of coefficients $V(t)$ and $VI(r;t)$ across all factors;

$d_r(t) \geq 0$ – the relative importance of the factor r in the time interval t .

The growth rate of the factor, included in the calculation of the resilience coefficient $U_r(t)$, is assumed to be equal to the growth rate of the factor that reduces the resilience and the inverse of the rate of change of the factor that reduces the resilience:

$$U_r(t) = \begin{cases} G_i(t), i = 1, 2, \dots, H; \\ 1/Q_j(t), j = 1, 2, \dots, P. \end{cases} \quad (1)$$

The $U_r(t)$ is used in calculating the values of the resilience coefficients, taking into account and without taking into account the estimated factor:

$$V(t) = \left[\prod_{r=1}^N U(r,t) \right]^{1/N}. \quad (2)$$

$$V1(f, t) = \left[\prod_{r \neq f}^N U(r, t) \right]^{1/N}. \quad (3)$$

After that, the absolute discrepancies of the coefficients $V(t)$ and $V1(r; t)$ are found, the sum of these discrepancies ($s(t)$) and the relative significance of the factor ($d_r(t)$):

$$y_r(t) = \text{abs}\{V(t) - V1(r, t)\}; \quad (4)$$

$$s(t) = \sum_r y_r(t); \quad (5)$$

$$d_r(t) = \frac{y_r(t)}{s(t)} 100\%. \quad (6)$$

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在现代条件下发展大图曼甘倡议 (GTI) 的机会
**OPPORTUNITIES FOR THE DEVELOPMENT OF THE GREAT
TUMANGAN INITIATIVE (GTI) IN MODERN CONDITIONS**

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该研究的主题是东亚区域主义的进程，在大图曼干倡议的发展背景下进行考虑。预期目的是描述、分析和评估新的地缘政治现实对东北亚一体化进程前景的影响。本研究采用的主要研究方法是文献综述法和描述法。作为这项工作的结果，可以区分以下内容：分析影响东北亚一体化进程的地缘政治因素；确定了大图曼甘倡议发展的特点，并确定了限制该倡议有效性的主要问题。科学创新在于证实了 Great Tumangan Initiative 未开发潜力开发的优先方向：改善机构支持；需要同时在四个层面开展合作：区域、地方、多边和双边。结论认为，实现区域互联互通是东北亚区域合作和经济一体化发展的主要优先方向。

关键词：GTI、大图曼干倡议、东亚、区域经济一体化、一体化进程、制度支持

Abstract. *The subject of the study is the process of East Asian regionalism, considered in the context of the development of the Great Tumangan Initiative. The intended purpose is to characterize, analyze and evaluate the impact of the new geopolitical reality on the prospects of integration processes in Northeast Asia. The main research methods used in the study are a literature review on the topic and a descriptive method. As a result of the work, the following can be distinguished: analysis of geopolitical factors affecting the integration processes in Northeast Asia; the features of the development of the Great Tumangan Initiative are identified and the main problems limiting the effectiveness of this initiative are identified. The scientific novelty consists in substantiating the priority directions for the development of the untapped potential of the Great Tumangan Initiative: improving institutional support; the need to cooperate simultaneously at four levels: regional, local, multilateral and bilateral. It is concluded that the achievement of regional connectivity is the main priority in the development of*

regional cooperation and economic integration in Northeast Asia.

Keywords: *GTI, Great Tumanan Initiative, East Asia, regional economic integration, integration processes, institutional support*

Introduction

The processes of international economic integration are, in addition to globalization, one of the main directions of the modern world economy. They occur in almost all geographical areas, and their motives are complex and diverse. Generally speaking, integrating countries should see opportunities to benefit from closer relations with other countries, otherwise they will not want to participate in such initiatives. Regional integration processes should also fit into the strategy implemented by a particular country. It should be emphasized that not all countries are interested in developing the institutional dimension of regional cooperation and are guided by the benefits arising from the spontaneous intensification of trade and capital ties [10].

The processes of regional economic integration can be viewed in two aspects: as a manifestation of initiative at the institutional level and as a spontaneous, upward deepening of economic ties between countries. In the first case, it is the so-called *de jure* regional integration, otherwise called regionalism, whereas in the latter it is *de facto* regional integration, called regionalization. This approach is identical to the division of regional economic integration processes into the so-called institutional and instrumental component (*de jure*) and the real component (*de facto*). The real component (*de facto* integration) is created by the strengthening of economic interdependence on a regional scale as a result of the tightening of trade and financial ties, not necessarily conditioned by institutional arrangements. On the other hand, the manifestation of the institutional and instrumental component, which this study is aimed at, is the increase in the number of regional economic agreements [7].

There are many regional integration groups operating on the territory of East Asia, all of them have great potential, but, in our opinion, the least used is the Great Tumanan Initiative (GTI). Therefore, the purpose of the study is to study the prospects for the development of GTI, taking into account modern changes in the geopolitical arena.

Main part

GTI is a space for international cooperation, tourism and transport interaction. The potential of the initiative is connected with the fact that within a radius of 200 km with the center in Hunchun there are more than ten ports of Russia, North Korea and other countries. It is not only the only channel of China's direct access to the Sea of Japan, but also the closest point from China to the east coast of South Korea, the west coast of Japan, North America and Northern Europe. Despite the ample opportunities, they are not fully used by the countries of the GTI [4].

Over the past 20 years, all interested parties have made great efforts to develop

regional cooperation on the Tumangan (Tumannaya) River, but in general, most of the development plans expected by all parties have not come true. In recent years, many studies have been conducted in the academic community on the reasons why GTI has not achieved a fundamental breakthrough, mainly in terms of the complexity of the international environment and differences in the policies of the countries of the region. It is believed that the countries of Northeast Asia are characterized by huge ideological differences in political, economic systems, cultural traditions, etc., as well as complex and diverse regional conflicts, which can be called serious fundamental limitations. The purpose of this article is not to repeat the existing conclusions of the study, but to analyze the prospects existing in the GTI in terms of target positioning, cooperation mechanism, regional scale and institutional support [5].

Taking into account the reasons why the vision of regional cooperation within the framework of the GTI and various cooperation plans have not been implemented, we must first think about whether the relevant vision and plans are realistic and whether there are effective measures to implement them. Since the United Nations Development Programme (UNDP) decided to include the development of the Tumangan River region in its fifth (1992-1996) priority support project, the relevant parties have repeatedly issued reports on the goals and action plans of the Tumangan River region [1]. Since then, some research institutions and specialists have consistently drawn up a series of special plans for the development of the Tumangan River area [2, 4, 5]. However, over time it turned out that these ambitious reports and plans are simply impossible to implement. According to some scientists, the main plans and most of the planned studies of GTI development projects are not based on regional plans that were prepared and implemented in different countries, nor were actual local needs fully taken into account, trade potential, institutional barriers and financial opportunities were not unanimously supported by all participating countries [2, 5].

In November 1995, China, Russia, North Korea, South Korea and Mongolia officially signed three framework documents on the development and cooperation of the Tumangan River region at the United Nations headquarters in New York, namely the "Agreement on the Establishment of the Tumangan River Basin". In subsequent years, a number of declarations and plans of cooperation were consistently issued, but these declarations and plans of cooperation are obviously of a principled nature, and there are still no specific agreements on cooperation in various fields.

The main vision of joint development includes two aspects [8-9]:

1) creating a growth pole for GTI; 2) turning the entire GTI space into an attractive region for investment.

Moreover, the strategic action plan also puts forward common strategic goals for the countries participating in the GTI, and describes in principle strategic goals and strategic measures for cooperation in priority areas such as transport, tourism, energy, investment and the environment.

Currently, the targets have not been achieved because they have problems such as vague content and poor feasibility [4, 11, 12, 13]:

Firstly, many cooperation projects are listed, but mostly the specific significance or advantages of each project, partners, budgetary mechanisms, mandatory requirements and etc., so it basically does not meet the specific requirements.

Secondly, the schedule of each cooperation plan was not stipulated in principle, a standard system of evaluation and monitoring of the implementation of relevant projects was not established, limited by the lack of statistical data, it is difficult for anyone to evaluate cooperation projects and make reliable estimates.

Thirdly, many grandiose goals of cooperation include the above-mentioned long-term goals, such as "growing the pole of growth" and "turning the entire Large region into an attractive region for investment." That is, the number of goals for large-scale construction of cooperation projects is large, but there is no consideration of whether the existing GTI cooperation mechanism can ensure the implementation of various cooperation goals and how to provide human, financial and material guarantees for these projects.

Fourth, the real needs of the various stakeholders are not fully reflected, since, in general, the participating countries have not shown a strong willingness to consistently implement the plans.

The essence of sub-regional cooperation lies in cross-border functional economic cooperation carried out by neighboring countries in the border territories. This means that local authorities and enterprises in the respective border areas of different countries benefit most from cooperation and are often a key force in promoting sub-regional cooperation. However, in the process of regional cooperation within the framework of the GTI, local governments and local enterprises did not even participate fully in the discussion and coordination of cooperation plans, and it is even more difficult to talk about how to effectively support sub-regional cooperation for development [12].

It should be noted that today it is important for Russia to develop cooperation in the Asian direction. By 2021, it was already clear that the Russian economy was in a state of crisis, exports and imports were declining annually.

We agree that the GTI region has an extremely important strategic position in the sub-regional cooperation of Northeast Asia and has the opportunity to develop into an important hub between Eurasia and the Asia-Pacific region. The most fundamental way to fully exploit the potential benefits of this area is to strengthen cooperation in the construction of transport infrastructure and coordination of cross-border transport systems between China, Russia and North Korea, rather than general cooperation in the field of economic development.

To implement these directions, the following problems need to be solved:

Firstly, there is no institutionalized framework for cooperation covering the entire region. Compared to the EU, NAFTA and ASEAN, the Northeast Asia regional coop-

eration has not formed an effective regional cooperation mechanism covering all six countries.

Secondly, the weak multilateral mechanisms in the region are insufficiently motivated.

Thirdly, bilateral cooperation is active, but uneven. Although cooperation in Northeast Asia at the regional and small multilateral levels is unsatisfactory, bilateral cooperation is very active. Sino-Japanese, Sino-Korean, Korean-Japanese, Chinese-Russian, Russian-Japanese, Russian-Korean and other bilateral trade and economic relations are active, especially Sino-Korean and Sino-Japanese.

Fourth, there is competition or even substitution between the mechanism of inter-regional cooperation and the mechanism of intraregional cooperation. The signing of the Comprehensive Regional Economic Partnership (CEP) Agreement with ASEAN as a center and the participation of China, Japan and South Korea has a complex impact on regional economic cooperation in Northeast Asia. It may have the effect of competition and substitution of a free trade agreement between China, Japan and South Korea. In addition, Japan plays a leading role in the Comprehensive and Progressive Trans-Pacific Partnership Agreement (CPTPP), and both China and South Korea have expressed interest in joining. The combination of VREP, CPTPP, USA, Japan, Australia and India (QUAD) allows Japan to become a "hub" of the regional cooperation mechanism. Given the "centrifugal nature" of Japan in relation to Northeast Asia, the impact of these mechanisms on the regional cooperation of the GTI is extremely difficult in the context of the escalating game between China and the United States.

Conclusion

Summing up the research, it can be concluded that the future development of regional cooperation within the framework of the GTI requires the countries of the region to form a basic consensus and a high degree of readiness for cooperation to jointly promote the development of regional economic integration and the creation of institutional mechanisms for interaction. The promotion of regional cooperation in Northeast Asia should be carried out at four levels: regional, local, multilateral and bilateral. Currently, it seems that all parties can consider the possibility of promoting the GTI initiative so that it turns into an institutional agreement covering all countries of the region. The necessity of transforming the GTI into an effective, results-oriented mechanism of economic cooperation, as well as the constant expansion of the circle of partners, is substantiated.

All parties also need to further strengthen the momentum of the existing mechanism of small multilateral cooperation, for example, to eliminate the interference of other, primarily geopolitical, factors and to realize a pre-set goal - achieving regional connectivity, from infrastructure to personnel exchange, is a top priority in the development of regional cooperation and economic integration in Northeast Asia.

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审计师专业能力在大学生学习过程中的形成
**FORMATION OF AUDITOR'S PROFESSIONAL COMPETENCIES IN
THE PROCESS OF STUDYING AT THE UNIVERSITY**

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该研究的目的是说明俄罗斯审计服务市场的现状，确定危机的原因，并考虑高等教育机构在克服危机的机制中的作用。目标的制定导致以审计师和审计公司数量统计信息系统化的形式设定任务，分析审计服务市场的交易成本量。将基于能力的方法整合到学生准备“会计、分析和审计”概况中，实施审计员准备的必要要求是本研究的无条件创新。

关键词：审计，审计活动，统一鉴证委员会，学生能力，大学。

Annotation. *The aim of the study is to illustrate the current state of the audit services market in Russia, identify the causes of the crisis and consider options for the role of a higher educational institution in the mechanism for overcoming the crisis. The formulation of the goal led to the setting of tasks in the form of systematization of statistical information on the number of auditors and audit firms, analysis of the volume of transaction costs in the audit services market. The integration of a competence-based approach in the preparation of students for the "Accounting, Analysis and Audit" profile in the implementation of the necessary requirements in the preparation of auditors is an unconditional innovation of this study.*

Keywords: *audit, audit activity, unified attestation commission, competence of students, university.*

Introduction

Audit as a tool of financial control should be developed as actively as possible because it is designed to protect not only the interests of the state but also the interests of the whole society.

To date, the audit activity as a whole has undergone significant changes, audit has formed into a separate tool for analysis and control of the financial activities of economic entities.

On December 31, 2020, the Russian Prime Minister Mikhail Mishustin signed a decree approving the concept of the development of audit activities in the Russian Federation until 2024. It calls for assessing the main problems of the audit activities development in the Russian Federation.

According to this document, the main goal of further development of audit activities in the Russian Federation is to build and maintain confidence of the business community and society as a whole in the results of audit services.

The Concept of Development of Audit Activities in the Russian Federation until 2024 (hereinafter referred to as the Concept) is a system of views on the further development of audit activities in the Russian Federation until 2024. The Concept defines the goal, main tasks and priorities in the development of audit activities in the Russian Federation, mechanisms, measures and activities to implement them in order to enhance the role of these activities in the nationwide system of financial control and raise the level of demand for their results. The Concept is designed to ensure the solution of the following tasks:

1) assessment of the main problems in the development of audit activities in the Russian Federation;

2) determination of the main long-term target model of organization, regulation, implementation of audit activities, as well as control (supervision) over audit activities;

3) realisation of the audit institution's potential as an important infrastructure element of the financial system of the Russian Federation;

4) identification of key measures aimed at achieving the goal of further development of the audit activity.

5) the provisions of the Concept do not apply to the audit activities of state (municipal) financial control bodies, administrators and recipients of budget funds, administrators of budget revenues and sources of financing of a budget deficit, internal audit services of organizations, as well as to the activities of rendering services which are not audit services under the Federal Law 'On Auditing Activities'.

The said Concept allows:

- Increase the involvement of auditors in the anti-money laundering system in government circles (provides for the possibility of involving chief accountants in auditing through membership in specialized Self-Regulatory Organizations);

- strengthen the responsibility of taxpayers in avoiding the submission of false financial information and evasion of mandatory inspections;

- Strengthen the accountability of auditors. [4]

However, as the study shows, not all aspects of the concept have prerequisites for successful implementation. And the legislative reforms may not be enough. It is necessary to attract additional institutional units, one of which inevitably becomes the University, as the future audit talent foundry. How can we demonstrate the role and functions of the Higher Educational Institutions in the implementation of the Concept?

Research methodology

The situation in the market of audit services is largely determined by general economic conditions. The characteristic of the market is presented in table 1 [3].

Table 1

**Number of audit organizations and auditors in the Russian Federation
(according to the reference copy of the register of Auditors and Audit
Organizations, self-regulatory organizations of auditors)**

Indicators	As of 01.01.18	As of 01.01.19	As of 01.01.20	As of 31.12.20	As of 31.12.21
Have the right to carry out audit activities - total, thous.	4,8	4,7	4,5	4,2	3,9
Including					
audit firms	4,2	4,1	3,9	3,6	3,4
among them					
organizations that have an auditor with an unified certificate	2,0	2,0	1,9	1,8	1,8
individual auditors	0,6	0,6	0,6	0,6	0,5
Auditors - total, thous.	19,6	19,5	18,8	17,5	17,0
among them					
who have passed the qualifying examination for the unified certificate	4,0	4,3	4,7	4,6	4,6

Another important problem is the fact that the number of employees in the audit sphere is gradually decreasing. According to the scientists, "Demographers would say that ‘death rate’ of auditors exceeds ‘birth rate’ by 13 times". It is associated primarily with inflated requirements for auditors, rigid selection, problems in the study of disciplines and constant changes in legislation, which generates the need to retrain for new regulations and formats.

Thus, we can see that the audit market in Russia, quite, noticeably reduced.

This trend can be seen in Table 2 [3].

Table 2

Data of the Audit Market in the Russian Federation

Indicators	AAS		Federal Treasury	
	2019	2020	2019	2020
Number of inspections carried out – total	2 407	2 813	218	55
including:				
audit firms	455	527	218	55
individual auditors	45	57	X	X
auditors (without individual auditors)	1 907	2 229	X	X
Of the total number of inspections carried out:				
Scheduled	2 393	2 792	193	46
Unscheduled	14	21	25	9
Audits of audit organizations that have audited the accounts of socially significant organizations	203	235	218	55
Number of cases of evasion from external work quality control - total	269	198	21	6
including:				
audit firms	164	112	21	6

Experimental part

The main factors that have a negative impact on this market segment are:

- austerity in the cost planning of audit and consulting services by clients, respectively, expenditures for auditors and consultants;
- reduction or fixation of the prices for audit and consulting services at the same level;
- decrease in the solvency of customers;
- price dumping;
- established practice of open tenders for procurement of audit services.

The level of demand for quality audit services remains low. The main reasons for this are:

- underestimation of the value of audit services by economic actors, owners and investors;
- low interest in audit services on the part of the state;
- limited range of services offered by audit organizations, individual auditors;
- introduction of cases of mandatory audit without taking into account the needs of users of accounting (financial) statements.

The economic actors in most cases continue to consider the audit as a unnecessary administrative burden imposed by the state.

The status of the audit institution is also adversely affected by the continuing attempts to unreasonably narrow the activities traditionally carried out by audit firms, individual auditors.

One of the most significant reasons for the low level of credibility of the audit opinion continues to be the insufficient level of auditors' qualifications. The system of continuous professional development of auditors in many cases is formal. There is a shortage of teaching staff for training auditors on advanced training programs, as well as a lack of proper control over the organization of professional development of auditors and the final quality control of auditor training.

In recent years there has been a decline in the prestige of the audit profession. To a certain extent, this phenomenon is generated by the influence of the general economic situation on the audit market, the growth of transaction costs: the costs of training and examinations, the formation of working documentation to pass the quality control of audit assignments with the continuing decline in demand for audits, which is associated with changes in the current legislation and the abolition of the audit of small companies. At the same time, there is no effective system of motivation of the most professional and experienced employees in order to retain them in the audit profession. Young professionals demonstrate an extremely low level of interest in obtaining an auditor's certificate.

The most important measure to improve professional attestation of auditors is the transition to a new qualification examination format from the second quarter of 2020. At the same time, an important component is the amount of money to be spent to enter the profession. The primary amount of costs according to the average assessment of training centers and Autonomous non-profit organization "Unified Attestation Commission" is presented in Table 3.

Table 3

Amount of funds for training one auditor to take the qualification exam of the Unified Attestation Commission

Stage	Disciplines	Cost	Form	Workload ac. hour	Price per copy, rub.	Frequency
1	Fundamentals of the Legislation of the Russian Federation	8 910	distance	16	6 500	once a month
	Fundamentals of Auditing	8 910	distance	16	6 500	
	Basics of Accounting	13 860	distance	28	6 500	
	Basics of the Russian Tax Legislation	8 910	distance	16	6 500	
	Finance and Financial Analysis	8 910	distance	16	6 500	
Total		49 500	x	x	32 500	

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	Training Materials	x	x	x	23 000	x
2	Audit Activities and Professional Values	23 000	distance	32	10 500	2 times a year
	Accounting and Accounting (Financial) Statements	39 000	distance	72	10 500	
	Business Sustainability Analysis and Assessment	23 000		20	10 500	
	Management Accounting, Risk Management, Internal Control	23 000		28	10 500	
	Legal Regulation of Economic Activities	23 000		32	10 500	
	Taxes and Tax Administration	23 000		28	10 500	
Total		154 000	x	x	63 000	
3	Complex task	x	x	x	13 500	x
Total					335 500	x

Source: compiled by the authors.

Thus, on the basis of Table 3, we can say that according to Unified Attestation Commission the transaction costs for entering the profession are high. This fact discourages applicants to go into the profession.

Conclusions. It seems possible to level negative tendencies of auditing profession's training and professional development transaction costs growth by integration of professional training of auditors into the principal educational program of higher educational institutions on the basis of Federal State Education Standard (FSES) 3++ and unification of the examination procedure of the Unified Attestation Commission and Universities. Examples of this approach can be found in the modern system of training specialists in the field of accounting and reporting at the international level. For example, the Association of Certified Chartered Accountants has confirmed the possibility of exempting a number of its examinations from the results of successfully passed examination modules of the new qualification examination for auditor certification, which is conducted by the Unified Attestation Commission.

The Federal State Education Standard FSES 3++ has a number of important features that distinguish it from the previous generation standards: focus on achieving a new quality of education adequate to modern and projected demands to the labor market; strengthening the variable part to obtain additional competen-

cies aimed at improving the competitiveness of graduates and their further professional development; change in the vector of requirements on the minimum content of education to its results, structure and conditions of implementation of the basic educational program. Orientation to the final result of education allows developing both professional and personal characteristics, acquiring universal abilities of learning activities through mastering relevant competences.

At the same time, the central aspect of actualization of higher education programs is their interrelation with professional standards. "Implementation of professional standards requirements into state educational standards will allow closing the existing gap between teaching content and requirements of employers and market"[6]. The necessary legislative basis for such a process has been created at the state level. It is no coincidence that among the first professional standards the standards 'Accountant', 'Auditor', 'Internal Auditor', 'Internal Auditor' were approved.

The FSES 3++ stipulates mandatory and recommended professional competencies and indicators of their achievement. We believe that these positions are a priority in the implementation of the basic educational program in the educational process. At the same time, it should be noted that the updated educational standard forces to coordinate curricula with professional standards, but at the same time narrows the opportunities for the implementation of this requirement. Changing the structure of academic hours distribution between compulsory and variative part towards increasing the share of the compulsory part from 50% to 70% does not allow to fully develop purely professional competences [7], which is an obstacle for implementation of full-fledged auditor training on the basis of a higher educational institution.

Thus, we can conclude that a graduate who has successfully mastered all stages and sections of the basic educational program 'Accounting, Analysis and Audit' at the Institute of Management, Economics and Finance of Kazan Federal University is ready to take the qualification exam at the UAC.

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共享经济的数字平台：全球趋势与中国发展特点
**DIGITAL PLATFORMS OF THE SHARING ECONOMY: GLOBAL
TRENDS AND DEVELOPMENT FEATURES IN CHINA**

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本文考虑了作为共享发展基础的现代经济的数字化转型，作者提供了数字平台的发展动态及其在信息化背景下向未来商业模式的转变，考虑了主要趋势。通过对 2015-2021 年中国共享消费经济发展动态的分析，作者系统地梳理了中国共享消费的制度和法律法规基础，为共享消费经济作为中国有前途的经济模式的进一步发展做出了贡献。

关键词：共享，信息经济，数字化转型，数字平台，基础设施，创新

Abstract. *The article considers the digital transformations of the modern economy, which serve as the foundation for the development of sharing, the authors provide the dynamics of the development of digital platforms and their transformation into prospective business models in the context of informatization, consider the main trends and dynamics of the development of the shared consumption economy in China in 2015-2021, the authors systematize the foundations of institutional and legal regulation of sharing in the PRC, contributing to the further development of the shared consumption economy as a promising economic model of China.*

Keywords: *sharing, information economy, digital transformation, digital platforms, infrastructure, innovation.*

A new economic consumption model – the sharing economy – is emerging at the intersection of networked social technologies, the possibilities of mobile communications and social mechanisms that respond to modern economic crises, leading to a reduction in the purchasing power of consumers. The main idea of the sharing economy is the willingness to use available resources more rationally and

efficiently and to gain access to various goods and services that are impossible or very expensive to obtain individually on property rights. Not coincidentally, the sharing economy peaked during the 2019-2022 coronavirus pandemic in China. The lack of financial resources of the population contributed to the spread of ideas about collective ownership and joint consumption.

In the context of digital transformation, the sharing economy becomes objectively dependent on digital platforms, which become the basis of their emerging ecosystems. IT sharing segments are highly adaptable, where ecosystems are seen as one of the main assets of the organization. However, according to *E. Avdokushin, E. Kuznetsova* we should not associate the elements of simple and complex cooperation inherent in business processes with sharing and, accordingly, issue models of commercial platforms (such as Uber, Airbnb, Sberbank, etc.) for sharing ecosystems. What is passed off as sharing by many foreign researchers is more related to the recycling economy model, where the sharing economy is just a part of it [1]

According to the research agency *Dti Research*, the total socio-economic effect of the formation of the digital economy for the period from 2016 to 2025 can be estimated at 100 trillion US dollars. The research showed that more than half of digital transformation initiatives rely on the effects and opportunities of B2B digital platforms, and the agency estimates that the cumulative value of these platforms for businesses could reach \$10 trillion over this period. If we consider the combined value to industry of the eight largest digital transformation initiatives, between 2016 and 2025, the share of the total value of B2B digital platforms in them will be 320 billion dollars (7.1%).

Among the 273 digital platforms of the sharing economy, 44 digital platforms (16%) belong to the B2B segment of the sharing economy. The considered digital platforms operate in 48 industries, such as healthcare (15%), finance (10%), transportation (8%), education (5%), tourism (5%) and others. The identified B2B digital platforms of the sharing economy operate in 23 industries, including logistics (16%), software (7%), business services (5%) and others.

The total investments that the considered digital platforms were able to attract are at the level of 26.2 trillion dollars in the period from 1995 to 2020. At the same time, B2B digital platforms of the sharing economy attracted investments in the amount of \$3.6 trillion, which is 14% of the total investment in digital ESP platforms (Figure 1).

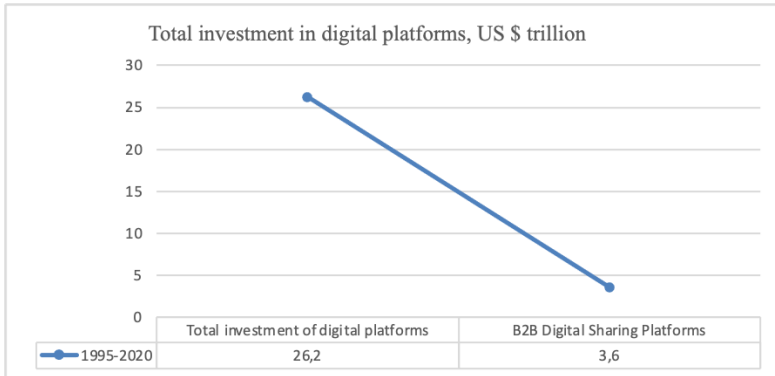


Figure 1. The share of investments in B2B digital platforms from the total investment in digital platforms

The trend for shared resources is relevant for all industries, business models (B2B, B2C, C2C) and geography (megacities and regions).

According to *Statista*, the digital platform revenue of the sharing economy will more than double between 2017 and 2022, reaching \$40.2 billion in 2022 (Figure 2). Taking into account the share of B2B digital platforms of the sharing economy in the total number of digital platforms (16%) and the share of investments in B2B digital sharing platforms (14%), it can be predicted that by 2022 about 15% of the total revenue of digital sharing platforms of the economy will fall in the B2B segment (\$6 billion).

According to an *Accenture research*, 80% of executives believe that B2B digital platforms are becoming the main link to connect industrial enterprises in the information economy. Thus, 38% of representatives of industrial enterprises are ready to invest in activities for interaction with B2B digital platforms [2].

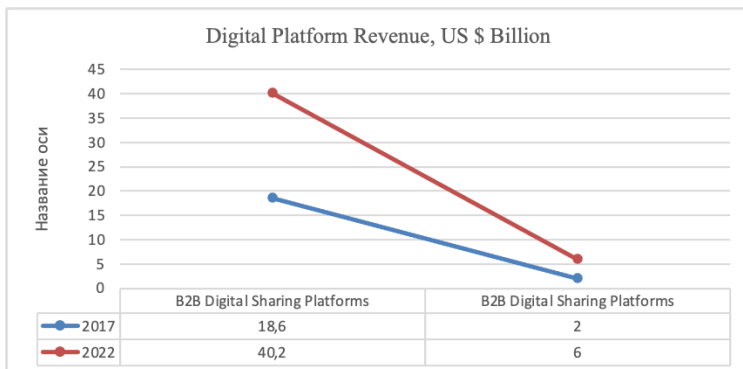


Figure 2. Revenue of digital platforms of the sharing economy, USD billion

The highest growth rates of the sharing economy are demonstrated by China. In 2025, more than 20% of GDP will come from the sharing economy, according to the National Information Center of China. However, even in the face of such active development, several popular car sharing services in China, Ofo and ToGo, faced bankruptcy and the withdrawal of key Chinese regions from the market. Their problems are similar to those of Lyft and Uber: competition leads to lower prices, higher marketing costs and risk investments [4].

The course taken in the country to implement the strategy of information development under the programs "Made in China 2025" and "Internet Plus" promotes not only the introduction of new technologies, but also the emergence of new industries and new forms of business, in particular the sharing economy, which have become new growth factors [2].

However, this type of economy has great potential for development in the PRC, and is an important way to promote economic transformation and modernization, and common development achievements, giving new impetus to the quality economic growth of China's economy. Thus, according to the "Annual Report of the Development of the China Sharing Economy (2019)", the amount of transactions in the sharing economy of China reached 2.942 billion yuan, an increase is 41.6% over the year.

The term "sharing economy" was included in the Chinese government's report for the period from 2016 to 2018, as well as in the "13th Five-Year Plan" of the PRC until 2030. Currently, sharing business areas are concentrated mainly in the areas of transportation, rental, training, maintenance and service delivery. In 2019, researchers estimate that approximately 800 million people in China participated in joint economic activities, with 78 million service providers employing 6.23 million workers. This means that more than half of the Chinese population was employed in the sharing economy, while it showed a steady growth in market size (Figure 3) [4-5]. According to a report published by the State Information Center of China, China's sharing economy is expected to grow by 10-15% annually from 2020 to 2022 and will become one of the determining elements for the increasing of the competitiveness of the country. Coronavirus disease (COVID-19) outbreaks will affect the development of the sharing economy, making pressure on such sectors as households sharing, transportation and services, creating new opportunities in education, healthcare and delivery services.

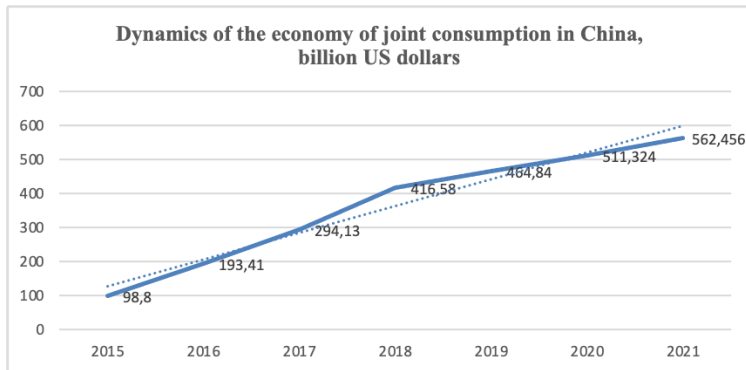


Figure 3. Dynamics of the sharing economy in China in 2015-2021, USD billion

The number of participants in the sharing economy providing services is about 75 million, and the number of platform employees is 5.98 million. By 2019, 34 out of 83 Chinese unicorn companies had typical attributes of the sharing capitalization exceeding 1 billion US dollars.

According to most experts, further changes in the conditions of the functioning of the sharing economy will create opportunities for accelerating the transition to more rational consumption patterns, which will increase the contribution of the sharing economy to the sustainable development of the entire global economy [6, 7].

The sharing economy model, created on the basis of a network platform, expands the exchange between consumers and sharing operators. In the process of developing the sharing economy, informatization has irreplaceable factor advantages for the rapid distribution of sharing products among consumers, expanding the base of mass participation, improving the quality and efficiency of the sharing. From the perspective of consumer perception, the theoretical foundations of the influence of the information mechanism of the sharing economy platform on the continuous readiness for sharing are confirmed by empirical data of the development of the sharing economy in China and in general in the world community.

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数字金融资产的风险
RISKS OF DIGITAL FINANCIAL ASSETS

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本文讨论了将加密货币作为金融市场工具进行投资的风险。经过对多方数据分析，金融资产存在高度波动性，市场参与者法律不安全，金融市场数字资产投资风险高。

关键词：投资，加密货币，交易，比特币，加密货币交换

Annotation. *This article discusses the risks of investing in cryptocurrencies as financial market instruments. After analyzing data from various sources, it is concluded that there is a high degree of volatility of financial assets, legal insecurity of market participants and high risks of investing in digital assets of the financial market.*

Keywords: *investments, cryptocurrency, transactions, bitcoin, cryptocurrency exchange.*

Considering the theoretical aspects of the topic of investments in digital financial assets, we concluded that the system of public relations affecting the distributed registry system is increasingly entering the daily life of the population. Therefore, the issues of investing savings in cryptocurrencies are becoming relevant and require in-depth scientific research.

At the same time, it should be noted that the problems of legal regulation of asset turnover were considered in the works of M. A. Golubitchenko, I. I. Kucherov, I. B. Lagutin, etc.

The cryptocurrency market from the standpoint of objectivity, timeliness and durability of the interaction of economic entities was considered in the studies of

M. Rothbard, H. U. de Soto, M. Friedman, F. Hayek, etc.

Generalization of scientific knowledge allowed us to conclude that investments in financial assets represent long-term investments in order to obtain economic benefits in the form of speculative income or profit from exchange rate differences.

However, we have considered the specific mechanisms of investing in cryptocurrencies in more detail.

We have considered the main concepts of qualitative transformations of the traditional financial market due to the emergence of digital financial assets and the development of new financial technologies.

One of the tools is trading, or trading on the stock exchange of financial assets, implying short-term speculation. But it is suitable only for professionals, since the analysis of the volatility of cryptocurrencies is only possible for professionals. But if an individual decides to invest in this sector of the economy, it is recommended to start better with a training account, which allows you to get acquainted with the exchange and its tools, get practice on a virtual balance sheet.

The next way to make a financial transaction is high-frequency trading, i.e. trading performed according to a certain algorithm. Its second name is algorithmic trading, i.e. automatic trading of financial assets through special [3].

Algorithmic trading systems are used by both professionals and amateurs. The programs vary in degree of complexity and principles of the device. There are three main categories of software for working with cryptocurrency exchanges.

Simple bots with pre-prescribed logic; Trainable trading robots based on AI and machine learning technologies; Expert Advisor robots (do not make deals, but give recommendations). This option is hardly suitable for beginners. The efficiency of the system is difficult to predict and impossible to guarantee. It is not necessary to completely give stock exchange operations to software, but you can try in the case of robot advisors and independently evaluate their effectiveness. According to experts, the price of cryptocurrencies will only increase. However, periods of «stagnation» are likely, when positions will not change in price, or the time of an uncritical fall. It is worth taking into account the fact that long-term investments from year to year bring huge benefits to the trader and literally do not burn out, while with a temporary decrease in quotations, short-term investments will turn out to be absolutely unprofitable.

Investing or «hold» as an alternative to trading is of a long-term nature and can be used by economic entities that do not have professional investment skills, but still requires knowledge in the field of technical analysis and entrepreneurial abilities.

It should be noted that investing has less potential than trading. The price of cryptocurrencies can change by tens of percent every day, and the investor, ac-

cordingly, misses the opportunity to make money on these fluctuations. «Hodla» has another significant nuance. It is extremely important to choose the right moment to purchase an asset, it is better to wait for a strong decline in its rate.

For example, users who invested in bitcoin in 2017-2018 at a cost above \$14,000 have not yet had the opportunity to close the transaction with a profit [2].

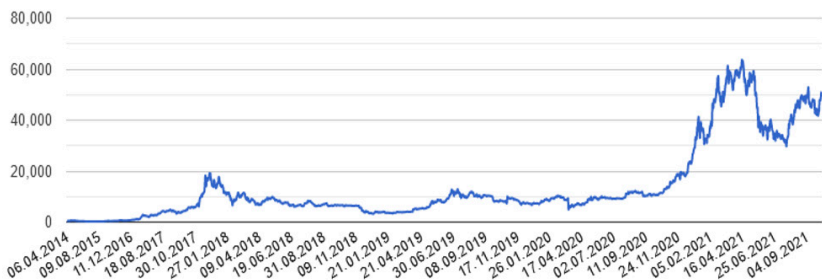
To confirm the above, an example is given of the Bitcoin exchange rate table for the period from 2015-2021.

Table 1 - The Bitcoin exchange rate in the period from 2014 to 2021.

Date	Course
2021	от 29 271 до 63 539 USD
2020	от 5 241 до 28 707 USD
2019	от 3 403 до 12 859 USD
2018	от 3 237 до 17 542 USD
2017	от 819.52 до 19 106 USD
2016	от 377.35 до 878.81 USD
2015	от 200.56 до 460.67 USD
2014	от 316.00 до 656.65 USD

Source: [5]

By simple calculations, it can be understood that from 2015 to this day Bitcoin has grown by $9262\% = 29271/316/100$, taking into account the minimum values for the year.



Source: [5]

Figure 1. Chart of the Bitcoin to dollar exchange rate in the period 2014-2021.

Data analysis demonstrates a significant growth of the cryptocurrency. How-

ever, it should be noted that this market of financial assets is practically not regulated by the state, does not depend on the exchange rate of other currencies and is most freely traded on the market, therefore makes this digital currency the most attractive.

At first glance, it may seem that cryptocurrency is one of the best ways to invest, but it is also subject to a number of risks inherent in the digitalization of the financial market.

The first of them are malicious programs that were created back in the days of the advent of electronic payment systems, contributing to the theft of funds. Currently, their analogues are adapted to the cryptocurrency market and can be activated everywhere, at the first opportunity. The most common methods of stealing cryptomonets are: ransomware; viruses; fake links (substitution); phishing (unauthorized access to personal information).

The next problem is hacker attacks or cyberattacks. They represent the second largest problem and a frequent phenomenon in the world of developing cryptocurrencies. Cases of hacker attacks are observed more and more often, and the methods of fraud are becoming more sophisticated. Bitcoin wallets and large sums that are traded on trading platforms have become especially attractive for scammers. Cryptocurrency exchanges have been repeatedly hacked, as a result of which many have closed due to bankruptcy.

The third, but no less important problem is the lack of a legislative framework, which entails legal risks. The situation is aggravated by the lack of an insurance system for investors who cannot claim damages despite the fact that some exchanges operating on digital platforms are increasingly advertised, positioned and acting as virtual banks.

The widespread payment system "Bitcoin" represents intangible digital codes for which ownership rights are not established. If they are stolen from a virtual wallet, the owner will not be able to identify the fraudster (due to anonymity and decentralization), nor confirm his right to the coins (due to the absence of a law on personal property). A similar situation occurs when transactions are carried out on behalf of an unscrupulous party. And if bitcoins are invested in a company that has gone bankrupt, the owner will also not be able to return them, since the contract has no legal force.

The loss of the access code to the bitcoin wallet implies the loss of all assets that are stored on the wallet. This can happen if the PC hard drive fails or the electronic media (flash card) on which the code is written is damaged. According to statistics, this happens to 25% of crypto wallet owners who have lost about \$18 billion. It is impossible to restore the code and return the money [4].

The main reason for bankruptcy for most cryptocurrency exchanges is insufficient working capital. These financial organizations, like all types of enterprises,

must be effective. Analysis of various sources has shown that their profitability should be at least 25%. But at present, with high competition, this condition is not always achievable.

Technical failures in the operation of sites where bitcoin wallets are stored are quite common. Investors who have suffered losses cannot claim a refund, regardless of what caused the problem: the unlawful actions of hackers or the negligence of the operator in the development of software.

An important problem is the lack of guarantees for damages by electronic trading platforms. When performing transactions through the exchange, the user does not actually own the funds that are stored on his account – the assets are owned and controlled by the exchange. The platform only provides access to them when logging in. Thus, the owner fully trusts his bitcoin wallet to a third party, relying on the security measures that it takes to protect the money.

Bitfinex exchange users lost 36% of their assets due to a cyberattack. Later, the platform was launched again, and in order to retain customers, reimbursed the victims with BFX tokens (the cost was relevant to bitcoin at the time of the hack), and then bought them back.

The conducted research proves that the cryptocurrency market is not stable, as it is at the stage of formation. It requires special knowledge and skills that are often incomprehensible to beginners.

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关于在现代俄罗斯预防税务犯罪的问题
**ON THE ISSUE OF PREVENTION OF TAX CRIMES IN MODERN
RUSSIA**

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这篇科学文章专门讨论与在俄罗斯联邦犯下的税务犯罪有关的热门话题。文章描述了逃税和保险费的方法和原因，提供了执法实践和统计数据进行分析。作为研究的结果，提出了俄罗斯联邦税务犯罪产生和发展的主要问题，以及解决这些问题的方法。

关键词：税务犯罪、立法、税收、经济、俄罗斯联邦税法、预算

Abstract. *The scientific article is devoted to topical issues related to tax crimes committed in the Russian Federation. The article describes the methods and causes of tax evasion and insurance premiums, provides an analysis of law enforcement practice and statistics. As a result of the study, the main problems of the emergence and development of tax crimes in the Russian Federation, as well as ways to solve them, were presented.*

Keywords: *tax crimes, legislation, taxes, economy, Tax Code of the Russian Federation, budget.*

Modern society cannot be imagined without such an economic element as taxes. They are the main source of replenishment of the revenue part of the state, influencing social production and the state of scientific and technological progress.

Crimes in the field of taxation (based on statistical data, tax evasion is the most common type of tax crimes) have a negative impact on the socio-economic development of the country. A distinctive feature of tax crimes is an organic connection with market relations, private property and entrepreneurship. This forces the legislator to take extremely harsh measures against violators of the law.

Analyzing the law enforcement statistics of tax crimes, we can draw the following conclusions: in 2019, 4,503 tax crimes were recorded, in 2020 - 4,872, which is 8.2% more than in 2019, and in 2021 the number of violations was 5 543, which is 13.8% more than the previous figures.

Based on law enforcement practice, we can say that now the most developed

fraud is in the tax area: many schemes and methods of tax evasion have been developed. At the same time, criminals are constantly improving existing schemes and methods of tax evasion, as well as developing new, more effective and relevant ones. Thus, tax criminals differ from ordinary criminals by high legal literacy, the presence of a stable social status and constant material wealth, as well as the presence of connections with various higher authorities.

To date, there are many ways to evade taxes and insurance premiums, they include: hiding real profits from taxation by changing the conditions specified in the contract; understatement of taxable income; concealment of profit; various types of illegal self-liquidation, staging of crimes, for example, theft, robbery, attempt, etc.

After analyzing, P.M. Gaudemet identified a number of reasons, combining them into groups in relation to various spheres of society:

The first group is socio-economic reasons that have the greatest impact on the taxpayer. Let's give an example, the tax sanction for hiding taxes is much less than the amount of these taxes, the taxpayer in this situation will be interested in hiding these amounts, because the amount of payment on them will be less than the tax rate. Unfortunately, in the Russian Federation, such situations are becoming more and more common. But socio-economic reasons affect not only the taxpayer, but also the state itself as a whole. After all, as previously noted, taxes are the main element of replenishing the revenue side of the budget.

The second group includes moral reasons. These include low legal literacy of the population, inconsistency of regulatory legal acts of tax legislation with the general principles enshrined in the Constitution, in connection with this, citizens find themselves in unpleasant situations, up to criminal liability.

The third group combines a variety of political reasons, which are primarily related to the fact that the state uses tax mechanisms not only to replenish budget revenues, but also to regulate social processes that arise in the process of implementing domestic and foreign policy. Tax deductions are the most important element of the internal economic policy of the state.

The fourth group includes political and legal reasons - "the tax legislation of the Russian Federation consists of a large number of legal acts, but, despite this, there are still gaps in the legislation and methods of tax evasion. It should also be noted that these legislative acts are changeable, they are regularly amended and supplemented, which are not always made public."

The last group includes technical reasons that indicate the shortcomings that exist in the methods and forms of tax control, in the absence of publicity regarding the most serious crimes against tax legislation.

Despite the fact that this classification was developed a long time ago, the

causes of tax crimes have remained either the same or have changed slightly.

In the vast majority of cases, tax criminals are driven by selfish motives, although there may be a desire to curry favor, to receive a kind of attention from the company's workforce, an inappropriate understanding of honor and duty, and other motives.

The main goal of the foreign policy of the state according to the Constitution of the Russian Federation is not only "protection of the rights and freedoms of man and citizen"¹, but also the right of the state to receive income in the form of taxes. It may be noted that Art. 57 of the Constitution of the Russian Federation also establishes that "everyone is obliged to pay legally established taxes and fees"². It follows from this that when refusing to pay taxes, firstly, the constitutional duty of a citizen is violated, and secondly, the right of the state to replenish the revenue side of the budget by receiving tax deductions.

The provisions of the Constitution are disclosed in various codes, laws, by-laws and other normative sources. In the field of state policy to combat crime, the provisions of the Constitution are designated within the framework of the Criminal Code of the Russian Federation.

But, despite the existence of these legal acts, the Tax Code of the Russian Federation occupies a dominant position, in accordance with which taxes are calculated and paid. It defines the main provisions of the tax policy. There are also a number of clarifying regulatory legal acts (various FKZ, FZ, Regulations, Instructions, etc.) that describe certain aspects related to tax legislation.

In accordance with tax legislation, "control over the receipt of mandatory payments to off-budget funds should be carried out by the same executive authorities that are entrusted with the functions of collecting taxes to the federal budget"³.

In the Russian Federation, the main executive body responsible for collecting taxes is the Ministry of Finance, but this is not the only body responsible for performing functions related to taxation. Thus, the system also allocates state off-budget funds, which are entitled to provide loans and deferrals to pay off tax debts.

Another body is the law enforcement agencies of the Russian Federation, which prevent and eliminate criminal encroachments. The leading role here belongs to the Main Directorate of Economic Security and Anti-Corruption.

Of great importance for maintaining tax discipline is the activity of the courts in connection with the consideration of tax disputes and criminal cases on tax crimes. Although our state belongs to the Romano-Germanic legal family, in which judicial precedent is not a source of law, the legislator still pays great attention to

1 The Constitution of the Russian Federation (adopted by a nationwide vote on 12.12.1993 with amendments approved during the nationwide vote on 01.07.2020).

2 Ibid.

3 Tax Code of the Russian Federation (part one) dated 31.07.1998 N 146-FZ (as amended on December 28, 2022) (as amended and supplemented, effective from 01.01.2023).

judicial practice. According to experts, "the formation of proper law enforcement practice is one of the conditions for a successful fight against tax crime."

One of the key tasks of the interaction of various bodies is complementarity to each other, the unification of those aspects of activity that are distinguished by competence and specificity of activity. Thus, the basis for interaction is, first of all, the subject of jurisdiction, a clear distribution of responsibilities for each department and legal integration. Obligations for interaction are precisely determined by the unity of the tasks facing the interested parties.

Currently, there is an increase in the interaction of subjects in the tax sphere: for example, the tax authorities are actively interacting with law enforcement. To ensure the quality and effectiveness of their joint work, it is recommended:

- take measures to expand the practice of conducting joint activities in relation to taxpayers who evade tax registration, do not submit reports to the tax authorities or submit "zero" balances in the presence of information on the economic activities of large taxpayers, organizations that present VAT on export and domestic transactions those who receive additional benefits on taxes and fees in countries with favorable economies, engaged in the production and sale of alcoholic products, and other categories of taxpayers who are at increased risk of committing tax offenses;
- consider complaints and disputes arising from joint inspections by both parties, provide mutual legal assistance in the preparation of materials for arbitration in respect of such inspection actions and ensure joint participation in litigation;
- to improve the quality of audits carried out through the widespread introduction of pre-audit analysis into practice, which makes it possible to identify promising areas and objects of audit, methods of control based on a system of assessments of indirect indicators of the tax base and analysis of information on the physical volumes of resources consumed and manufactured products. [2]

In accordance with Art. 32 of the Tax Code of the Russian Federation⁴, if circumstances are revealed that suggest that there has been a violation of tax laws, tax and law enforcement agencies must immediately send materials to initiate a criminal case.

To ensure and maintain economic security in the Russian Federation, the legislator needs to determine:

- the main priority directions in ensuring the economic security of the population;
- measures to prevent criminal encroachments;
- a system of criminal law measures to ensure the economic security of

⁴ Tax Code of the Russian Federation (part one) dated 31.07.1998 N 146-FZ (as amended on December 28, 2022) (as amended and supplemented, effective from 01.01.2023).

Russia;

- punishment for certain criminal acts related to violation of tax legislation.

[1]

Taking into account the above points, a number of measures should be taken to improve the efficiency of countering tax crimes.

First, it is necessary to strengthen the interaction of tax services with the internal affairs services and law enforcement agencies in order to reduce the proportion of taxpayers who evade this constitutional obligation.

Secondly, it is necessary to publicize especially large tax crimes, to conduct active interaction in the media, to increase outreach activities in order to educate future taxpayers in the correct culture of paying taxes. Practice has shown that it is impossible to educate good taxpayers without providing clear and correct examples of the application of tax laws.

Based on the foregoing, develop a project on the introduction of a new subject devoted to tax culture, tax legislation, responsibility for non-payment of taxes, etc., in secondary schools and higher educational institutions. [4] Interested departments should conduct educational work with potential taxpayers, organize meetings, open lessons, round tables, invite them to excursions.[3, 4]

It is also necessary to continue the implementation of joint operational and control measures [5] to identify crimes that entail liability in accordance with the Code of the Russian Federation on Administrative Offenses⁵ and the Criminal Code of the Russian Federation⁶.

Thus, the Russian Federation is gradually taking a number of measures aimed at changing the situation in the field of taxation, in particular, by improving the current legislation, creating new legal acts aimed at combating organized crime in the field of state economic policy.

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俄罗斯司法系统的变化。 巴什科尔托斯坦共和国宪法法院和宪法委员会权力分析

CHANGES IN THE RUSSIAN JUDICIAL SYSTEM. ANALYSIS OF THE POWERS OF THE CONSTITUTIONAL COURT AND THE CONSTITUTIONAL COUNCIL OF THE REPUBLIC OF BASHKORTOSTAN

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分析和一般工作的重要性，是由于司法改革已经在我们国家实际进行。这些变化主要是为了改变公共权力机构运作的各个方面，但也影响了司法系统。此外，本研究还对宪法修正案影响司法机关活动的内容和司法机关进行了部分分析。这篇文章系统化和评估了俄罗斯联邦的一个地区 - 巴什科尔托斯坦共和国宪法程序中发生的变化。

关键词：俄罗斯联邦主体宪法（宪章）法院，俄罗斯联邦主体议会宪法（宪章）委员会；司法系统；宪法控制；司法改革

Abstract. *The importance of the analysis and, in general, the work, is due to the fact that the judicial reform has actually taken place in our state. The changes were aimed primarily at changing aspects of the functioning of public authority, but also affected the judicial system. In addition, this study also carries out a partial analysis of the content of constitutional amendments that affect the activities of the judiciary and the judiciary. The article systematizes and evaluates the changes that have taken place in constitutional proceedings in one of the regions of the Russian Federation - the Republic of Bashkortostan.*

Keywords: *Constitutional (charter) courts of the constituent entities of the Russian Federation, constitutional (charter) councils at the parliaments of the constituent entities of the Russian Federation; judicial system; constitutional control; judicial reform.*

In the Republic of Bashkortostan, the constitutional court was established and began to function on March 27, 1996.

At the end of 2022, from December 31, it ceases to function, its powers are terminated.

This change, or rather even the abolition of constitutional and statutory courts in the regions, is provided for by the federal law “On the Judicial System”. According to the amendments made to it by the State Duma of the Russian Federation in 2020, regional constitutional courts and courts of the constituent entities of the Russian Federation should be liquidated from January 1, 2023. The transformations were adopted in the continuation and development of the new edition of the Constitution of the Russian Federation. During the adoption of these amendments, constitutional and statutory courts continued their work in sixteen constituent entities of the Russian Federation, 13 of which were republics.

The ongoing changes to some extent change the very structure and, accordingly, the system of judicial bodies in the Russian Federation. In general, the issues of the typology of our judicial system are not well developed, in particular, Yarovaya M.V. dealt with this issue, highlighting certain features of judicial systems and compiling their main typification.

Thus, she singles out and formulates the signs of four types of judicial systems that have arisen in European states that have gone through a long history of development and have come to unite in the European Union in their state-legal development, but at the same time have retained their special, characteristic features in national judicial systems. The main ones, in her opinion, are Romanesque; German; English and mixed. According to Yarovaya M.V., the Russian judicial model belongs to the last type - mixed. At the moment, in connection with the liquidation of regional constitutional courts and courts of subjects, in Russia, de facto, there is a change in the entire judicial model. It essentially becomes more centralized and unitary. Regional constitutional courts cease their functioning and are replaced by bodies whose functions remain the implementation of interpretation and clarification, and all their work is built mainly in a recommendatory manner. In general, this is rather a positive change, the judicial system is becoming more integral, centrifugal tendencies are ceasing in it.

Instead of the Constitutional Court of the Republic of Bashkortostan, a Constitutional Council will be created under the regional parliament, the formation of which should be completed by the beginning of 2023. From January 1, the council should start working. The law regulating the formation and terms of reference of the council was adopted by the deputies of the Kurultai of the Republic of Bashkortostan. The law also establishes the requirements for applicants and the procedure for their entry into office. Candidates are proposed by the head of the republic and submitted for consideration to the Kurultai (State Assembly of the Republic of Belarus). The Board will consist of up to five people. For the time being, their term of office is expected to be five years. In the future, apparently, this issue will be clarified.

For a complete understanding of the changes taking place, let's consider what powers the Constitutional Court of the Republic of Bashkortostan had (Article 7 of the Law of the Republic of Bashkortostan dated October 27, 1992 No. BC-13/7 "On the Constitutional Court of the Republic of Bashkortostan" (as amended on April 29, 2014):

First, it was and had the status of a judicial body;

Secondly, it was part of the judicial system of the Russian Federation;

Thirdly, he had to ensure the observance of the rights and freedoms of man and citizen, and their justice, guaranteed by the national legal order;

Fourthly, on issues within the jurisdiction of the Republic of Bashkortostan, carried out legal protection of the highest legal force of the Constitution of the Republic of Bashkortostan

Fifthly, it was pointed out that it deals exclusively with questions of law.

It was also said that he has the right to resolve issues of the constitutionality of normative legal acts on petitions, written requests and complaints and give interpretations of the Constitution of the Republic of Bashkortostan.

It was pointed out that in its work the court should be guided by the fundamental principles of legal proceedings and the principle of fidelity to the federation.

Possessed the Constitutional Court of the Republic of Belarus and the right of legislative initiative.

It is especially worth paying attention to the indications contained in Article 7 of the Law "On the Constitutional Court of the Republic of Belarus" on the obligatory nature of legal decisions, demands, instructions, calls and other appeals that the Constitutional Court of the Republic of Bashkortostan has the right to issue. So, in article seven, their compulsion and rigor of execution for all, without exception, state authorities, public organizations, local governments, officials, legal entities and individuals on the territory of the Republic of Bashkortostan were especially highlighted.

It was noted the impossibility of reviewing the acts of the court by another court, their direct effect (they do not require confirmation by other officials and bodies). Those acts or their separate parts recognized as unconstitutional by the court lose their force.

Now we turn to the powers of the Constitutional Council of the Republic of Bashkortostan (Article 4, 12 of the Law of the Republic of Bashkortostan dated November 21, 2022 No. 625-z "On the Constitutional Council of the Republic of Bashkortostan"):

Article 4 of the above Law describes, states and enumerates the powers of the Constitutional Council. A separate article (Article 12) refers to the opinions issued by the Constitutional Council. It is worth noting that they are advisory in nature.

Let's compare powers.

So, the Constitutional Court of the Republic of Bashkortostan had the status of

a judicial authority in the Republic of Bashkortostan and was an integral part of the judicial system of the Russian Federation, while the Constitutional Council is not a judicial body. Its activities are mainly related to the implementation of preliminary constitutional control, it is rather an expert body.

The Constitutional Court of the Republic of Bashkortostan was established in order to provide justice for the universally recognized rights and freedoms of man and citizen, guaranteed by the national legal order, and exercised legal protection of the supreme legal force of the Constitution of the Republic of Bashkortostan on issues within the jurisdiction of the Republic of Bashkortostan. The Constitutional Council also acts to protect the constitutional order of the Republic of Bashkortostan, the rights and freedoms of man and citizen, to ensure the highest legal force of the Constitution of the Republic of Bashkortostan on issues within the jurisdiction of the Republic of Bashkortostan. Thus, the declared goals for these items are the same and coincide.

The abolished body (court) resolved cases on the constitutionality of laws and other normative legal acts adopted by public authorities, through the implementation of abstract and concrete control on written requests, petitions and complaints of applicants. The newly created (council), in turn, has the right only to give an opinion on the compliance (or non-compliance) of the Constitution of the Republic of Bashkortostan with the normative legal act of the Republic of Bashkortostan, the municipal normative legal act on complaints of violation of the constitutional rights and freedoms of citizens. At this point, there was a reduction in the functions of the newly created body.

Both bodies have the right to interpret the Constitution of the Republic of Bashkortostan, but the Constitutional Court of the Republic of Belarus carried out the interpretation of the Constitution of the Republic of Bashkortostan, while the Constitutional Council - at the request of the State Assembly, prepares a draft interpretation of the Constitution of the Republic of Bashkortostan. That is, in this case, the functioning is more narrowly focused.

On the next point, the functions of the organs coincide. Both bodies, the Constitutional Court of the Republic of Bashkortostan and the Constitutional Council, have the right to come up with a legislative initiative.

The Constitutional Court of the Republic of Bashkortostan considered other constitutional and legal issues, by their legal nature, nature and consequences, which are constitutional and referred to its competence by legal provisions and applied in its jurisdiction the fundamental principles of legal proceedings, the principle of fidelity to the federation. The Constitutional Council promotes constitutional values among citizens and exercises other powers in accordance with the legislation of the Republic of Bashkortostan.

Decisions of the Constitutional Court of the Republic of Bashkortostan, as aimed

at protecting constitutional democracy, at increasing confidence in the actions of the state and self-restricting its regulatory and organizational and administrative power, could not be reviewed by another court, acted directly, did not require confirmation by other bodies and officials. Acts or their individual provisions, recognized by the court as unconstitutional, lost their force.

The Constitutional Council's Opinions must be based on the Constitution of the Russian Federation, the Constitution of the Republic of Belarus, the Law "On the Constitutional Council of the Republic of Belarus" and materials examined by the Constitutional Council in accordance with its competence. The conclusions of the Constitutional Council are advisory in nature.

Thus, when comparing the terms of reference of the abolished Constitutional Court of the Republic of Bashkortostan and the newly created Constitutional Council under the Kurultai of the Republic of Bashkortostan in its place, the trend towards an actual reduction in the competence and functions of the newly created body becomes apparent. Paragraph two of article twelve of the Law of the Republic of Bashkortostan dated November 21, 2022. No. 625-z "On the Constitutional Council of the Republic of Bashkortostan", which says that the conclusions of the Constitutional Council are advisory in nature, directly indicates that this body is becoming more of an advisory structure.

The analysis of Article 125 of the Constitution of the Russian Federation leads to the same conclusion, which, in essence, seriously limits the constitutional jurisdiction of the subjects of the Russian Federation, in particular, the role of their constitutional and statutory courts (councils) is actually abolished, since from now on the Constitutional Court of the Russian Federation, at the request of the president, checks the constitutionality of the laws of the subjects before their publication by the highest official of the subject of the Russian Federation.

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基于 GAOU VO "NGGTI" 的联邦州高等教育标准实施后元能力的形成
**THE FORMATION OF META-COMPETENCIES AS A RESULT OF
THE IMPLEMENTATION OF THE FEDERAL STATE EDUCATIONAL
STANDARD OF HIGHER EDUCATION ON THE BASIS OF THE GAOU
VO "NGGTI"**

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本文讨论了在实施联邦州高等教育标准的背景下，在 44.03.01 教育方向学习的学生元能力形成的基础和教学条件。定义了“元能力”的概念，并在初级教育培训方向的框架内描述了它们的结构。

关键词：元能力，“软技能”，专业能力，“超学科知识”，教育环境。

Abstract. *The article discusses the foundations and pedagogical conditions for the formation of metacompetences among students studying in the direction of training 44.03.01 Pedagogical education, in the context of the implementation of the federal state educational standard of higher education. The concept of «meta-competences» is defined and their structure is described within the framework of the direction of training Primary education.*

Keywords: *meta-competencies, «soft skills», professional competencies, «over-subject knowledge», educational environment.*

The introduction of the federal state educational standard of higher education (FGOS HE) has put forward new requirements for the professional competence of a higher school teacher, including the need to develop supra-professional competencies - meta-competencies and skills so that teachers, and, consequently, university graduates (future teachers), are competitive in the labor market and in demand as specialists.

"Meta-competence" is a fairly broad term and contains many key points. It is

believed that the source of metacompetence research is the "Metaphysics" of Aristotle (IV century BC). He believed that: "Bodily things do not simply and not only change: the existence of things is essentially their formation, and only during this development – formation do they constantly and naturally realize their essence in a separate individual" [5].

There is no unambiguous interpretation of "meta-competence". "Meta-" (from the Greek "meta" - between, after, through) is a part of a complex word meaning following something, going to something.

Since the early 1990s, foreign authors (D. Bourantas, M.T. Morpurgo, R.K. Nielsen, I.L. Potgieter) have focused mainly on the impact of meta-competencies on the success of a specialist's career, considering leadership qualities, communicative and managerial skills, the ability to work in a team, purposefulness, perseverance as key personality characteristics, entrepreneurship, striving for career growth, the ability to self-organize, critical and analytical thinking, the ability to find employment, emotional intelligence, etc.

For example, in the competence model of higher education developed by a team of researchers from the University of Deusto (Spain) and the University of Groningen (the Netherlands), meta-competencies are understood as the structure and combination of competencies that identify a specific subject area. Metacompetencies are a "core" consisting of a group of general professional, professional and universal competencies in a compressed form, i.e. they combine them by synthesizing close and similar aspects of knowledge, skills and abilities.

The key provisions of the Bologna Process defined "metacompetence" as the development of creative abilities and the development of new discovery techniques, a systematic representation for orientation in cognition, inter- and trans-disciplinary abilities for professionally and socially integrated thinking and work, a predisposition to knowledge about the limits of their action and as a prerequisite for the possibility and necessity of going beyond the system. These intellectual abilities should be complemented by personal qualities that support the necessary social interactivity of the processes of cognition and realization.

A review of Russian-language publications on psychological and pedagogical topics since 2012 indicates the growing interest of Russian scientists (teachers and psychologists) in the problem of the development and formation of meta-competencies in higher education.

Domestic scientific researchers A.V. Khutorskoy, E.V. Rezchikova define meta-competencies as a factor contributing to the formation of professional competencies [3]. (Fig. 1).

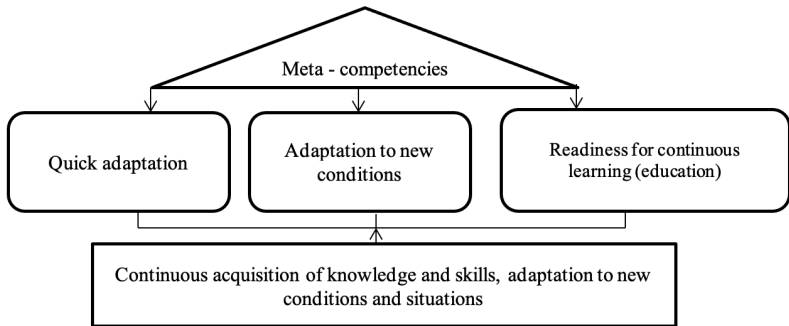


Figure 1 – Meta-competencies as a factor contributing to the formation of professional competencies

According to the formulation of M.N. Gordeev, metacompetence is considered as "standing higher in relation to other competencies, on the basis of which it is possible to acquire and develop new abilities and qualities" [4]. Figure 2 shows the key conditions for the development of meta-competence.

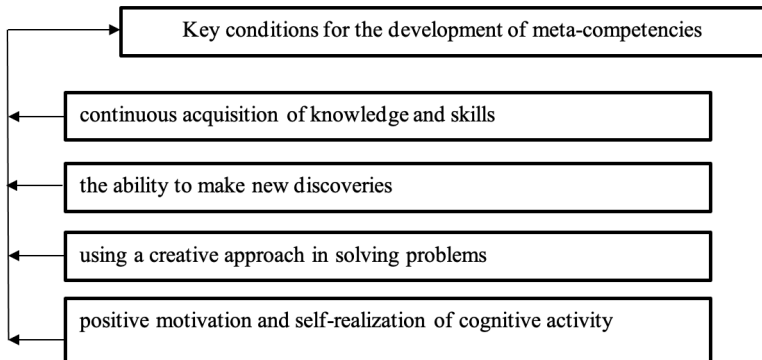


Figure 2 - Key conditions for the development of meta-competencies

The above indicates the urgency of the task of forming students' meta-competencies such as self-knowledge and self-development, they are the motivational aspect of the organization of the educational process. From this point of view, metacompetencies can be considered as a core formed from professional competencies.

Since 2018, the Nevinnomyssk State Humanitarian and Technical Institute (hereinafter NGGTI) has been developing and implementing curricula in various

areas of vocational training based on Federal State Educational Standard No. 121 dated February 22, 2018 and then underwent adjustments in connection with the order of the Ministry of Education and Science of the Russian Federation dated February 22, 2018 N 121 "On approval of the federal state educational standard of higher education. Revision with amendments N 1456 of 11/26/2020" [2].

In this regard, the teaching staff faced quite capacious tasks: the fulfillment of a social order (harmonization of the requirements of the Federal State Educational Standard), the preservation of cultural values, the formation of a different kind of intelligence (the development of "over-subject" knowledge), a different way of thinking associated with the formation of professional competencies and the acquisition of interdisciplinary knowledge.

In these realities, it became possible to talk about the process of forming meta-competencies among future teachers.

Metacompetence should be considered as "soft" skills (from the English soft skills), which allow students and teachers to quickly develop new and adjust existing skills and skills that are in demand in the modern world and in the labor market.

On the basis of the Department of Pedagogical Education, Psychology and Defectology of the NGGTI, an analysis of curricula was carried out, which made it possible to identify key components in the structure of metacompetence of future teachers. Table 1 presents the components of meta-competencies based on the data of the curricula of the Department of Pedagogical Education, Psychology and Defectology of the NGGTI.

Table 1- Types of meta-competencies and their components

Metacompetencies	Components of media competence
General humanitarian	The ability to carry out spiritual and moral education of students on the basis of basic national values (OPK-4).
Scientific research	The ability to perceive the intercultural diversity of society in socio-historical, ethical and philosophical contexts (CC-5); ability to carry out pedagogical activity on the basis of special scientific knowledge (OPK-8); the ability to provide pedagogical support and support of students in the process of achieving educational results (PC-4).

Software and methodological	The ability to carry out professional activities in accordance with regulatory legal acts in the field of education and professional ethics (OPK-1); the ability to participate in the development of basic and additional educational programs, to develop their individual components (including the use of information and communication technologies (MIC-2); the ability to interact with participants in educational relations within the framework of the implementation of educational programs (OPK-7); ability to use theoretical and practical knowledge of modern sciences for the implementation of the educational process in educational organizations (PC-1); ability to participate in the design of the educational environment (PC-3).
Social and communicative	Ability to carry out business communication in oral and written forms (CC-4); ability to organize joint and individual educational and educational activities of students, including those with special educational needs (OPK-3); the ability to understand the principles of modern information technologies and use them to solve the tasks of professional activity (OPK-9).
Tutor 's	Ability to carry out social interaction and realize their role in the team (CC-3); ability to monitor and evaluate the formation of educational outcomes of students, identify and correct learning difficulties (OPK-5); the ability to use psychological and pedagogical technologies in professional activities necessary for individualization of training, development and upbringing (OPK-6).
Professional and personal	The ability to manage your time, build and implement a trajectory of self-development based on the principles of lifelong education (CC-6); the ability to carry out educational activities based on the use of methods and modern educational technologies (PC-2).

The formation of meta-competencies is influenced by various objective factors, such as: the development of working curricula and their purposeful implementation in the educational process of the university; the educational environment of the university; the presence of previous education (vocational training, retraining); experience in higher education, continuing (additional) education; the presence of previous professional and life experience, diligence, responsibility, the ability to self-organize and self-development.

In order to form and develop meta-competencies, as well as successful socialization and effective self-realization of students in the modern labor market, the Nevinnomyssk State Humanitarian and Technical Institute conducts systematic work on:

- creating conditions to meet the needs of various categories of the population in vocational education;
- educational, program and methodological materials on planning and organization of the educational process have been prepared;
- inclusion in the professional educational programs implemented by the edu-

educational institution of academic disciplines and special courses on effective behavior in the labor market, as well as professional disciplines (modules) aimed at the formation and development of students' qualifications;

- use of modern educational technologies and active teaching methods;
- development of the practice of identifying and supporting talented youth among students;

- increasing the prestige of teaching activities (participation in competitions, international conferences). Within the framework of this area of scientific research, 32 monographs, chapters in monographs, 4 teaching aids, 28 articles have been published in international journals indexed in the Web of Science, SCOPUS database, more than 140 articles in publications recommended by the Higher Attestation Commission for publication, more than 340 publications in the RSCI [1].

The analysis of international and domestic educational practices shows that the formation of meta-competencies in higher education can be effectively carried out on the basis of existing educational standards both within the framework of academic disciplines based on general institute modules of specialized training of specialists, and in extracurricular activities in the system of continuing education.

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新闻业中的人工智能：定义

ARTIFICIAL INTELLIGENCE IN JOURNALISM: DEFINITION

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技术进步影响着人类生活的方方面面：它帮助我们轻松应对许多日常任务、监测我们的健康状况、找到各种问题的答案，以及接收有关世界上发生的事件的信息。随着机器智能的提升，信息空间正在转型发展。人工智能（AI）作为一种全球趋势，已被新闻业所采用。人工智能长期以来一直致力于内容创作。今天，人工智能已经将记者的活动自动化到如此程度，以至于已经很难想象媒体在不同环境中的运作。

本文介绍了新闻业人工智能概念的定义方法，总结了人工智能在媒体中的应用领域。

关键词：人工智能，智能媒体，大数据，算法，内容。

***Abstract.** Technological progress affects all spheres of human life: it helps us to easily cope with many everyday tasks, monitor our health, find answers to various questions, and also receive information about events taking place in the world. With the improvement of machine intelligence, the information space is being transformed and developed. Artificial intelligence (AI), as a global trend, has been picked up by journalism. AI has been working on content creation for a long time. Today, AI has automated the activities of a journalist to such an extent that it is already difficult to imagine the functioning of the media in a different context.*

This article presents approaches to the definition of the concept of artificial intelligence in journalism, summarizes the areas of application of AI in the media.

***Keywords:** artificial intelligence, intelligent media, big data, algorithms, content.*

According to the definition from the dictionary of S.I. Ozhegov, intellect is a thinking ability, a mental beginning in a person [1].

Intelligence (from Latin intellectus - sensation, perception, understanding, understanding, concept, reason), or mind, the quality of the psyche, consisting of the

ability to adapt to new situations, the ability to learn and remember based on experience, understand and apply abstract concepts and use their knowledge to manage the environment. Intelligence is a general ability to learn and solve problems, which combines all the cognitive abilities of a person: sensation, perception, memory, representation, thinking, imagination [2].

Artificial intelligence (AI) (English: Artificial intelligence (AI)) is a field of computer science that deals with the development of intelligent computer systems, that is, systems with capabilities that we traditionally associate with the human mind - language understanding, learning, the ability to reason, solve problems, etc. Such a definition was proposed in the early 1980s by computational scientists Barr and Feigenbaum [2].

Artificial intelligence (AI) is a technology that allows a system, machine or computer to perform tasks that require intelligent thinking, that is, to imitate human behavior for gradual learning using the information received and solving specific questions [3].

So, artificial intelligence (AI) is software algorithms that can perform human tasks.

The concept of AI in journalism is associated with the emergence and implementation of such concepts as “smart media”, “intelligent media” in the media sphere. The ability of programs to know, understand and decide can be the basis for creating intelligent media. AI development trends are such that the improvement of algorithms and their implementation in media practice can lead from understanding to decision-making and, ultimately, to a breakthrough - from decision-making to creativity [4].

In the article "Artificial Intelligence in Journalism as a Modern Media Trend" Bogatyreva V.N. cites research by Reuters Senior Journalism Research Fellow Nick Newman, who conducted a survey in January 2019 of 200 digital leaders (chief editors, CEOs and digital leaders) from 29 countries. According to the survey, 78% of respondents noted the importance of investing more in AI to secure the future of journalism. At the same time, respondents noted that editors still matter more than machines: it is necessary to combine artificial intelligence with human intelligence [5].

Now algorithms create texts, generate information, instantly analyze, suggest topics, conduct reconciliation and fact-checking, and determine audience preferences. That is, the algorithms "understand" the content and interest of users. In journalism, AI seeks to “understand” time, space, and events. Thanks to the current level of implementation of intellectual programs in the media, many functions of journalistic activity are automated, but it is still far from realizing the potential of strong artificial intelligence and self-creation.

Firstly, journalism is a socioeconomic profession associated with interaction with people. Algorithms capable of instantly collecting and generating information from

the Internet are not capable of replacing live human communication, conveying emotions and feelings. At present, not a single intellectual system can come close to the psycho-emotional level of a person. The robot has no humanistic beginning. The generation of news by the robot is based on a given algorithm for the production of template text, but behind it is always a chain of cold numbers and codes. Not only does he lack human emotional judgment, but he also lacks the sense of mission and responsibility found in professional journalists. The assembly line model for the production of stereotyped news can lead to news losing its humanistic potential. Human needs human.

Secondly, journalism is designed not only to inform, but also to provide guidance, argue, confirm facts, provide answers to pressing questions and contribute to solving problems. AI can describe an event according to the criteria given by the program, but in order for programs to write articles, they need well-structured data: for example, graphs and spreadsheets. But what concerns the logic of intellectual media, which consists in knowing and understanding things and people, analyzing trends, comparing facts, forecasting - this is possible only in the process of "live" human journalism. Programs are not capable of deep analysis.

The essence of AI today is to build machine learning models with many hidden layers and a huge amount of data in order to learn more different characteristics and thereby improve the accuracy of inferences, classifications or predictions.

For media, AI is a fundamental technology for collecting data, user information, and scenarios for future stories.

"Intelligence" in the media industry is associated with the concepts of "big data", "big data analysis", "linked data" and "algorithms", and is also associated with "personalized recommendations". Algorithms perform two main functions: predict demand and create content. A necessary condition here is a correct understanding of the content.

It is important to focus on the media behavior of the user, which means that it is necessary to study the audience. Big data consumer insights are a great way to uncover the characteristics and preferences of consumers both in the virtual and real world. The speed with which the data is updated ensures that customer insights are up-to-date. Data appears in the process of social communication. Social media is a great way to get information about users and their needs.

The goal of artificial intelligence is to enable computers to mimic human perception, decision making and execution. Today, algorithms in the media industry are capable of:

- create texts using a specific language (eg sports vocabulary) and statistics;
- plan and select content;
- process and analyze data;
- generate news feed, summaries and factual data;

- quickly collect the necessary data, highlight unusual data patterns worthy of the attention of journalists;
- count the frequency of the use of certain terms and determine the main topics in the messages;
- translate information from other languages and decipher audio and video recordings;
- to give recommendations on topics;
- distribute traffic;
- develop media products, scripts;
- create memes;
- make collages and drawings;
- disseminate information;
- personalize content;
- to determine the probability of registration of a subscription by the reader;
- interactively interact with the audience;
- recognize images;
- check the facts for reliability (fact-checking);
- organize information;
- replace the TV presenter with a digital presenter capable of covering breaking news and broadcasting live (experience of South Korea and China).

The media industry, which is in the process of digitalization, convergence and datafication, is becoming an experimental platform for the progress of AI.

Now, thanks to technology and the power of machine learning, machines can learn. With the development of machine learning, artificial intelligence is also improving. The real breakthrough of artificial intelligence probably lies in achieving a level of creativity - originality and originality in generating content. Perhaps in the future it will be impossible to distinguish texts written by AI and human. At the present stage, texts are also recognized because the vocabulary and style of AI differ markedly from human speech and presentation. People don't talk the way AI generates sentences.

But there are also dangers in using AI in journalism, because the program can recognize something incorrectly or in a different context. Sometimes machine-generated articles lack context, which can leave the reader with a distorted understanding of what is happening.

It cannot be denied that the development of artificial intelligence in the field of journalism and communication is a manifestation of progress, but the negative impact behind it cannot be ignored. The study of AI in journalism is of great importance. The introduction of AI in the media contributes to the progressive development of the media industry, frees the journalist from routine and long work, and makes it easier and faster for users to receive content.

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在教育大学的条件下培训学龄前儿童的专家

**TRAINING OF SPECIALISTS TO WORK WITH CHILDREN OF
EARLY PRESCHOOL AGE IN THE CONDITIONS OF PEDAGOGICAL
UNIVERSITY**

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本文讨论了在现代教育范式中学习学龄前儿童的教育学、心理教育学和缺陷学概况的本科生培训的主要领域

关键词：学龄前儿童，学龄前儿童工作专家，师范大学专家培训

Abstract. *The article discusses the main areas of training for bachelor students studying in the pedagogical, psychological-pedagogical and defectological profile with children of early preschool age in the modern educational paradigm*

Keywords: *children of early preschool age, specialists in work with preschoolers, training of specialists in a pedagogical university*

The realities of economic and social reality in the last few years indicate that more and more parents with children of primary preschool age, for one reason or another, send their children to preschool educational institutions. If in the Russian Federation most mothers, in recent decades, have been on parental leave for three years, then in Europe and America, such leave was not provided at all. In this connection, young parents were forced, after the child reached the age of one (somewhere a little less, somewhere more) to solve problems where and with whom the child would be, while his parents were fulfilling their duties at work. Each family, depending on social status, material wealth, religious characteristics, solved and solves this problem on its own - someone finds a nanny, someone switches to a new format of work (part-time work, remote work, etc.). Most of the parents, our compatriots, used the

conditions that the state provided them, that is, they used a three-year parental leave. However, recent years show that a certain part (it cannot be called insignificant) of parents goes to work after the child reaches the age of one. This is due to economic problems (when both parents are forced to work to solve certain material problems of the family), and social conditions (career growth and, accordingly, unwillingness to waste years at home), as well as other circumstances. In this regard, the question arises, where and with whom will the child be? As a rule, the question that the older generation of the family (grandmothers, great-grandmothers) will sit with him is removed by itself, because most of them work and cannot, for various reasons, sit with their grandchildren. Due to the fact that this problem is becoming very relevant for many young families, there is a social order associated with providing this age category of children with places in preschool educational organizations.

If in our country during the Soviet period there were nurseries where children of primary preschool age were sent, then since the end of the last century, nursery groups have been practically eliminated. There were very few of them, not in all educational institutions. As a rule, kindergartens took children from the age of three, and only a small part of them made it possible for younger preschoolers to attend these educational institutions. The second decade of the twenty-first century, one of the urgent tasks facing the education system of the Russian Federation, has set the task of creating and opening groups in preschool educational organizations for younger preschoolers everywhere. However, when implementing this task in educational organizations, a problem arose with personnel who would have certain competencies in working with this age category of children. According to the latest educational standards, these competencies should be formed from the first years of students' education at a pedagogical university. The younger preschool age has its own specific features associated with a high level and intensity of both physical and mental development, which has a significant impact on the process of becoming a small person's personality and forms in him those individual personality traits that affect its further formation and development.

In this regard, the training of specialists for preschool institutions should be carried out based on the specifics of this age category and the ability to provide qualified psychological and pedagogical assistance to both teachers and parents who send their children to a preschool organization. [2] Thus, the pedagogical direction, the profile "Preschool education", implemented in pedagogical universities, must be built based on a given age and form future teachers of preschool education the competencies that they need to work with children of this age category. [1] However, the pedagogical direction does not take into account these children in its plans, and the main emphasis is on working with children who have reached the age of three ("Game technologies at preschool age", "Methods for teaching mathematics to preschool children", "Teaching methods", "Theories and technology, etc.). Based

on the analysis of the curricula in this area, we can conclude that modern pedagogical universities practically do not pay attention to the training of specialists to work with children of primary preschool age in an educational institution. In this connection, certain problems arise for the fulfillment of the social order. I would like to draw attention to the fact that the younger preschool age, as well as other age categories, requires not only care and inspection, but is closely related to the process of formation and development of the child's personality. Therefore, it is necessary at the early stages of age development to use such methods and technologies that take into account the individual, psychological and pedagogical characteristics of the personality of each child and are aimed at his formation, development and personal formation. Unfortunately, the pedagogical direction in this regard is still lagging behind. And in this direction, there is still work to be done, aimed at the process of introducing new disciplines of the curriculum in the preparation of students of the profile "Preschool education".

A somewhat different situation has developed in the preparation of students studying in the direction of psychological and pedagogical education, the profile "Psychology of Education". When preparing future psychologists for the national education system, including preschool educational institutions, attention is paid to all age categories, including children of primary preschool age. For this category of students, the disciplines "Age-related psychological counseling", "Clinical psychology of children and adolescents", "Psychology of development and developmental psychology" have been developed and are being successfully implemented, which include modules related to this age. However, in our opinion, more attention should be paid to children of early preschool age and all issues of their adaptation to the children's team in particular and to the preschool organization as a whole should be considered. In addition, it is necessary to separately train psychologists who could not only work with these children, but also provide assistance, including advice, both to parents and to the entire teaching staff who are professionally associated with children of early preschool age. Since teachers who have both a long and a short experience of working with preschoolers need constant consultations with specialists precisely in early preschool age. In this regard, it is necessary to introduce into the curricula of pedagogical universities that train psychologists for educational institutions, more training modules that reveal the specifics and characteristics of this category of children, as well as to form skill competencies for working with children of early preschool age.

Working with children not only of early preschool age, but also with preschoolers, younger schoolchildren, specialists (teachers, psychologists, etc.) note that in recent decades the health status of the younger generation has somewhat worsened. This trend, unfortunately, has a global scale and is observed in all developed countries. In this regard, society and educational organizations need specialists in defec-

tological profile, which is in demand in the market of educational services.

And here it is necessary to pay attention to the fact that it is the defectological profile in the system of personnel training in pedagogical universities that is most "adapted" to the social order of society. Thus, in the curricula of the defectological direction, including the profile "Special Psychology", we see such disciplines as "Perinatal Psychology", which acquaints future special psychologists with basic psychological values that are laid down and formed even during the period the child is in the womb and introduces them with those basic national-cultural archetypes that help in the process of further formation and development of the individual. In addition, it is during the period of early preschool childhood that those features and problems in the personal development of the child are revealed that can be successfully corrected in a timely manner in the early stages. For the sooner this or that problem is revealed, the easier it is often to solve it. Therefore, to work with children of early preschool age, it is necessary to involve really those specialists who have knowledge related to this particular age in order to successfully help solve the problems that arise. In addition, special psychologists must also have knowledge in the field of such sciences as neurophysiology, neuropsychology, etc. Curricula of this profile have these disciplines in their arsenal. So students of the profile "Special Psychology" receive knowledge in the following disciplines "Perinatal psychology", "Psychology of children with delayed mental development".

Of course, having acquired professional competencies in certain basic disciplines, including disciplines related to early preschool age, a university graduate cannot always solve this or that problem that a child has in early preschool age, due to objective reasons, but what the sooner a specialist in this area identifies it and informs the parents, the more chances there will be to solve it or eradicate it, or create conditions for the positive development of the child's personality.

In connection with the opening of early development groups in preschool educational institutions, it is necessary for pedagogical universities that provide training for these educational institutions to partially revise their curricula in order to add disciplines related to the development of children of early preschool age. It must be remembered that this refers to the realities of the modern education system and as the economic and social conditions in our country change, early development groups will be relevant and in demand in society. And for effective and high-quality work with this group of children, it is necessary to involve those specialists who have certain competencies specifically for working with such children, who have knowledge and skills in the field of pedagogy, psychology, defectology, special psychology, and in the field of medicine and physiology, for these sciences are closely connected with this age category of children and are important both in the process of studying children of early preschool age and in the process of working with them..

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中国对西藏的现代国家政策
CHINA'S MODERN NATIONAL POLICY TOWARDS TIBET

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1267-1279 年间，忽必烈为真正征服全中国而战。首先，忽必烈发现自己是蒙古的总司令，然后他决定将他的王国的首都从喀喇昆仑迁到中国，即迁往旧都达信的地方，后来就是现在的北京。在大新的郊区，正在建设一座新城，在中国大都被称为大都或汗八里克。忽必烈没有宗教狂热，但有民族狂热。从这个意义上说，更有趣的是确定与忽必烈心理相关的常见行为刻板基础，更重要的是与无意识的本质相关，这允许建立不同秩序的种族结构，其基本基础可以成为一种内在的统一感。

关键词：国家、导师、佛教、王朝、政治、宗教、合法性、皇帝

Annotation. *In 1267-1279 Khubilai fought for the real conquest of all of China. To begin with, Khubilai found himself the commander-in-chief of the Chinese Shetanktse, then he decided to transfer the capital of his kingdom from Karakorum to China, namely, to the place of the old capital Dasin, later and now it is Beijing. In the suburbs of Dasin, a new city is being built, which is called the great capital or Khanbalik, in Chinese Dadu. Khubilai did not have religious fanaticism, but there was ethnic fanaticism. In this sense, it is much more interesting to identify common stereotypical foundations of behavior associated with the psychology of Khubilai, and more so with the nature of the unconscious, which allow building an ethnic structure of a different order, the basic basis of which can be an immanent sense of unity.*

Keywords: *state, mentor, Buddhism, dynasty, politics, religion, legitimacy, emperor.*

Since Tibet by that time was an independent state de facto and de jure, the invasion of the PLA into the territory of Tibet was contrary to international norms and violated the principles of sovereignty, independence and territorial integrity

of the state. **On May 23, 1951, the so-called "17-Point Agreement" was signed between the governments of China and Tibet.** "The task of completing the liberation of Chinese territory, including Tibet, was announced as early as September 1949, when the People's Daily newspaper published the official point of view of the CPC leadership that "Tibet is part of China's territory," which was subjected to aggression by UK and USA. The Central Committee of the CPC in the second half of 1948 decided that "it is better to bring troops into Tibet sooner rather than later."¹. Further, it is known that Stalin decided to support Mao Zedong during his visit to the USSR in late 1949 - early 1950, Mao Zedong decided to send troops to the borders of Tibet (6, 343-344). The mission was entrusted to the 18th Army under the command of Zhang Guohua. "At the same time, Lhasa was asked to send a delegation to Beijing for negotiations, the basis of which was to be the General Program of the C.P.P.C.C., which provided for the granting of regional autonomy as a way to solve the national question."².

In order for the peaceful resolution of the Tibetan problem to take place, but since non-military means did not bring results, the CPC Central Committee returned to the tactics outlined back in May 1950: "to resolve the Tibetan issue through negotiations, while the army will lead the offensive."³. On October 7, 1950, PLA units from Qinghai, Sichuan and Xinjiang launched an offensive into Tibet. On October 19, Chamdo was taken.⁴

The US was preoccupied with the Korean War, and in Chinese affairs its main ally was the Kuomintang, which considered the sovereignty of China over Tibet the only legal political status. The representative of the USSR declared that the People's Republic of China has the legal right to solve the problem of Tibet at its own discretion within the jurisdiction of its country.

"After the Western powers (Great Britain and the United States) refused to accept the Tibetan mission, and the UN declined to consider the complaint of Tibet, the situation in Lhasa became hopeless. The Tibetans had no choice but to enter into negotiations with the Beijing government and accept the terms proposed by them."⁵

On April 22, 1951, Lhasa decided to send a delegation to Beijing headed by the governor of Kama Ngapo Ngawang Jigme. Negotiations began on April 29,

1 Klinov A.S. The political status of Tibet and the position of the powers (1914 - the end of the 20th century) / A.S. Klinov – Maykop, 2000., – P. 279

2 Ibid, – P. 284

3 Zhongguo gongchandan minzu gongzofazhang yanjiu. [Research on the Development of the National Policy of the CPC]. At 3 and. Vol. 2 / Chapter. Ed. Jin Bingao. – Beijing: Publishing House of the Central University of Nationalities, – P. 282

4 Ibid, – P. 295

5 Andreev A.I. Tibet in the policy of tsarist, Soviet and post-Soviet Russia / A.I. Andreev. – St. Petersburg: Publishing House of St. Petersburg. un-ty, 2006., – P. 347

but after the second draft of the treaty was rejected by the Tibetan side, the Chinese representatives clarified that "the conditions they put forward are final." Then, unable to consult with Lhasa, on May 23, 1951, the Tibetan delegation signed the Agreement concluded between the Central People's Government of China and the local Tibetan government on measures for the peaceful liberation of Tibet - the 17-point Agreement.⁶

On November 17, 1950, the National Assembly of Tibet transferred all secular and religious power to the 14th Dalai Lama, who was then 15 years old. His foreign secretary stated:[100] "Tibet is uniting as one man around the Dalai Lama, who has assumed full power, and there is no chance for a fifth column operating in Tibet proper. We turned to the world for peaceful intervention (in the face of) this unprovoked aggression, but in the absence of help, we decided to fight for independence. If necessary, we are even ready to move the government and the Dalai Lama to other areas to continue the fight. Tibet is a large and inaccessible country in terms of relief, and if we have people and ammunition, we can continue military operations indefinitely.

On November 24, 1950, the Chinese established the first Tibet Autonomous Region of Xikang Province in Kham. The city of Dartsedo (Kangding) became its center. This area extended from Yangtze in the west to the river Daduhe in the east. In May of the same year, the Tibetan Autonomous County of Tianzhu (Pari) was established in Gansu Province.

The PRC has been gripped by a propaganda fever. Massive rallies were held for the "liberation" of Tibet. The "backward" Tibetans, who often saw nothing but their village, suddenly showed miracles of political literacy. Throughout these rallies, they "fully supported" the central government, denounced US imperialism, "demanded the peaceful liberation" of all Tibet, and so on. Moreover, they opposed the American aggression in Korea, the plans of American imperialism in the Far East, the remilitarization of Japan, and the signing of the Peace Pact by the five powers. Here is a typical example. A senior Chinese asked a peasant what he thought of the new regime. The peasant replied that he was perfectly happy. "Only if it weren't for one thing - a new tax." "What new tax?" — "Clap tax. Every time a Chinese visits us, we should all get together and clap."

Samples of Chinese propaganda appeared even in Nepal. For example, the Sino-Tibetan weekly, which consisted of numerous photographs in which the "liberated" Tibetan people got to know the Chinese: lines of smiling girls cleaned cars, processions of young people with banners greeted the leaders, etc. "He impotunately reminded me that the giant called 'materialism' was already at the very doorstep."

6 Andreyev A.I. Tibet in the policy of tsarist, Soviet and post-Soviet Russia / A.I. Andreev. – St. Petersburg: Publishing House of St. Petersburg. un-ty, 2006, – P. 304

Even some leaders of the recalcitrant Golok tribe in 1951 came into contact with the Chinese authorities. Since 1952, with their consent, "working groups" began to arrive, which formed a whole network. Created "people's governments", began to build schools, hospitals, veterinary stations, post office. However, the Goloks began to fear the growing influence of the Chinese and after six years joined the uprising.

On December 19, 1950, the 14th Dalai Lama, on the initiative of those close to him, left Lhasa for Dromo near the Indian border with an escort of several hundred soldiers under the command of Tsarong. He arrived there on January 5, 1951. The Tibetan government also settled here. The Dalai Lama made Donkar Monastery his residence. From Lhasa to the border with Sikkim, they took out a certain amount of gold sand and silver bars. In nine years they turned out to be extremely necessary. The Dalai Lama's departure caused panic in Lhasa.[107] Wealthy people loaded their goods on mules and left for safe places. The Indian representative in Lhasa reported that the spirit of resistance had faded there.

Meanwhile, Ngapo Ngawang Jigme and other Tibetan officials who were captured were undergoing "re-education" in Chamdo. They saw that the Chinese troops were behaving quite correctly there. According to Ngapo's memoirs, the troops were accommodated only in tents, they never stopped at the monasteries and houses of the Tibetans, they did not take "even needles" from them, they helped in every possible way in the work, provided medical assistance, etc. As a result, the captive governor sent two letters to Lhasa, calling for negotiations in order to avoid a military invasion. But he was able to send a secret letter as well. In it, he reported that he could no longer act independently, agreed with those who took him prisoner, that the Tibetan government should do as it saw fit without worrying about him and other captured officials. After long discussions, the Tibetan government appointed a delegation of 3 people (including Ngabo) for talks in Chamdo.

The Dalai Lama and the Kashag gave Ngabo the authority to negotiate. The letter stated that he should insist on the independence of Tibet and refuse to station the PLA there. He was also handed a five-point statement with which to start the discussion: (1) there is no imperialist influence in Tibet; there was only tenuous contact with the British as a result of the 13th Dalai Lama's trip to India; relations with the USA are only commercial; (2) if foreign imperialist influence arises in Tibet, he will turn to China for help; (3) the Chinese troops stationed at Kama must be withdrawn; (4) the Chinese government should not be influenced by the Panchen Lama and the Reting faction; (5) the territories captured by Manchu China, Kuomintang and new China must be returned to Tibet.

When Ngapoi informed the Chinese of these points, they, in fact, rejected all but the fourth and offered regional autonomy to Tibet. Since the positions of the parties could not be brought together, Ngapoi suggested that the Tibetan govern-

ment hold talks in Lhasa or Beijing.

It was discussed in Tibetan government circles whether the Dalai Lama should go abroad or start negotiations in Beijing. The latter opinion prevailed. In January 1951, the Dalai Lama withdrew Shakabpa's delegation from India. In February, a delegation was sent to Beijing for negotiations, consisting of two groups: one was sent from Tibet, and the other from India. The delegation was headed by Ngapoi Ngawang Jigme. In addition to him, it included the commander of the armed forces of Tibet, the personal secretary of the Dalai Lama, and 18 other officials and representatives of monasteries; The Panchen Lama left Qinghai Province for Beijing.

The delegation headed by Ngapoi was given a written document with a list of participants. She was instructed not to accept Beijing's sovereignty over Tibet, on all important issues to seek advice from Dromo, and to establish radio contact between Beijing and Dromo. Although Ngapoi was appointed head of the delegation, he did not have the right to make decisions without consulting the Kashag and the Dalai Lama. Members of the other part of the delegation, who came through India, received new instructions from the Kashag. At the outset, the delegation was to uphold the independence of Tibet, and if the negotiations reached an impasse, to agree that Tibet would become part of China on the following terms: (1) Tibet should have complete internal independence; (2) there should be no Chinese troops there; (3) the Tibetan army should be responsible for defense; (4) the Chinese representative in Lhasa, his staff and security should not exceed 100 people; (5) The Chinese representative must be a Buddhist.

Ngapoi telegraphed to Dromo that the Chinese would not accept these terms. He received the answer that Chinese troops could not be deployed in Tibet, but the Tibetan army could be included in the Chinese for defense. On March 29, part of the delegation headed by Ngapoi left Chamdo. Deng Xiaoping and other communists carried out "educational work" with them all the way. Phuntsog Wangyal also participated with his Chinese assistant.

P. Wangyal (Pungwan) is famous as the founder of the Tibetan Communist Party. In the mid-1940s, he, together with Ngawang Kesang, created a small group in Nanjing, calling it the Tibetan Communist Revolutionary Group, from which they later made the Tibetan Communist Party, which in 1949 entered the CPC. In the 1950s he became the main guide and supplier (grain and animals) of the Chinese invasion forces in Tibet, persuaded the Tibetan command in Chamdo and Markham to go over to the side of the enemy. In addition, he was responsible for the public relations of the Chinese 18th Corps. Unlike the delegates, including the captured Ngapoi, Wangyal cooperated with the Chinese voluntarily. With their help, he wanted to "liberate from backwardness" his homeland, because he considered the Tibetan government ineffective. During the negotiations, he served as an interpreter for the Chinese. This work was very important to them: at that time, almost no

Tibetans spoke Chinese. Subsequently, Wangyal regretted the methods of democratic reform that led to the rebellion, regretted that the central government did not want to understand Kam's ties to Tibet. As a result, he was arrested and spent 18 years in prison. But he did not lose his Marxist views. Subsequently, his memoirs were published in China. Part of the delegation that left Chamdo arrived in Beijing on April 22. On April 26, another unit arrived there, arriving from Dromo. At the railway station the delegates were greeted with the solemnity of a foreign mission.

On April 28, the Tibetans were given a 10-point document that the Chinese had outlined for discussion. The basis was the one that the Chinese side stated earlier. Negotiations began the next day. The Tibetans rejected the Chinese document and offered to move on to their own five-point document. The Chinese refused. Negotiations resumed on 2 May. The Chinese stated that the sovereignty of the PRC over Tibet is not a subject for discussion, only the 10 points proposed by them can be discussed. The entry of the PLA into Tibet is beneficial for its people and the entire PRC, it was carried out to liberate the "national minorities" and counter the aggression of the imperialists, this is an internal affair of the PRC, decided by the central government. If the Dalai Lama goes to India, he will be "removed from office".

As the Tibetans continued to insist on their own, the Chinese statements became more and more ominous. On May 2, the Tibetans were told that 10 points was the unanimous decision of the Party, adopted when the PRC was founded. On May 7, they were not allowed to speak at all, but were forced to listen to threatening monologues from the Chinese. On May 10, they were told about Beijing's decision to create a military-administrative commission in Tibet, which would become the highest political and military authority there. The Tibetans were told that they could return home any day before or after the "liberation" if they did not agree to what was offered to them. Chinese troops are already on the ground in Tibet. One telegram from Beijing is enough to put them into action. The delegates were asked to decide whether they wanted a peaceful or armed "liberation".

During the negotiations, the Chinese repeatedly asked Ngapoi if he had the authority to sign the agreement. He answered in the affirmative. If he answered in the negative, the negotiations could be interrupted. It is not clear why he responded this way, as he later said that he could sign the document only after consulting with the Kashag and the Dalai Lama.

For three weeks after the arrival of the Tibetans in Beijing, they were prevented from contacting their government on the pretext that the negotiations were very sensitive and such communication would compromise their confidentiality. The Chinese said that the possibilities of communication with Lhasa were inadequate. As a result, the delegates did not even know if the Dalai Lama was in Tibet or had already left it.

At the May 14 meeting, it became clear that if the Chinese terms were not

accepted, the PLA would immediately move into Tibet. The Tibetans had to agree to the Chinese demands as preliminary. In turn, they set a condition: if their government and the Dalai Lama did not accept the Agreement, and if the Dalai Lama left Tibet, then they needed guarantees for the restoration of his power and position if he returned within 4-5 years. The Chinese proposed to make this part a separate secret agreement. At the same time, they made a new proposal: to include in the Agreement the differences between the views of the Tibetan government and the Panchen Lama. Ngapoi said that this is an internal affair of Tibet, he is ready to break off negotiations, the Tibetan delegation can return. In the days that followed, the Chinese, through Wangyal, were able to negotiate with him on the status of the Panchen Lama. This is included in the Agreement.

On May 21, the Chinese prepared a draft of the Agreement and a secret 7-point document. It was about the same as the 10 points they had proposed earlier. Some of the provisions of the secret document, judging by the statements of the Tibetan delegates, were as follows: if the Dalai Lama leaves Tibet and returns in 4-5 years, his power and position will be preserved; during this period, the Tibetan government will provide everything for him; 20 thousand PLA soldiers will be stationed on the borders of Tibet; there will be 1-2 Tibetan ministers in the rank of deputy commanders with the PLA troops in Tibet ; the Tibetan government will retain 500 Dalai Lama bodyguards and 1,000 security forces. in different parts of Tibet; The Tibetan Foreign Ministry will merge with the Chinese Foreign Ministry's office in Tibet. The Chinese made it clear that the conditions worked out were final and tantamount to an ultimatum.

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PMC 在设计新世界秩序中的作用：俄罗斯和国际经验
**THE ROLE OF PMCS IN THE DESIGN OF A NEW WORLD ORDER:
RUSSIAN AND INTERNATIONAL EXPERIENCE**

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在文章中，作者分析了 PMC 对建立新的全球秩序、纠正地缘政治野心的影响以及对目标部队影响的各种解决方案以及通过各种军事外包和内包保护相应区域的影响 以及在有争议的领土和冻结的冲突中执行“智能”和“硬”力量任务的特殊形象专家。作者预测，非政府行为者参与公司统治力量与主权国家结构之间的对抗以及特种服务和武装部队的袭击的趋势将会增加。

关键词：PMC、地缘经济学、公司统治、俄罗斯、美国、中国、ADF、ICT 行业、人工智能、大数据、进口替代。

Abstract. *In the article, the authors analyze the influence of PMCs on the establishment of a new global order, on the correction of geopolitical ambitions and on all sorts of solutions for targeted force impacts and the protection of the corresponding zones through outsourcing and insourcing of various military and special profile specialists performing the tasks of "smart" and "hard" power in disputed territories and frozen conflicts. The authors predict an increase in the trend of involving non-governmental actors in the confrontation between the*

forces of corporatocracy and sovereign state structures, as well as attacks by special services and the armed forces.

Keywords: *PMCs, geoeconomics, corporatocracy, Russia, USA, China, ADF, ICT industry, AI, Big Data, import substitution.*

Since the end of the 1950s, when a transnational octopus of local ambitions and desires to use more consciously and less harshly the fruits of the agonizing colonial policy, states and entrepreneurs have become clearly understand that international law and many adopted conventions and law enforcement doctrines with the concepts of national security cannot give any security structures the powers of a layer cake: to solve problems on behalf of private individuals and not to substitute sovereign actors in these disassemblies and conflicts with a bunch of restrictions and social moral obligations to their population, living in the legal and constitutional field of possible challenges and legitimate solutions; to hide from outsiders the true actions of countries and big capital from the world community in building cascades of mutual interests and insoluble contradictions of class and ideological orientation, which make it impossible to understand who is the true beneficiary of the activities carried out by PMCs; support the activities of armies and special services outside their own territories, which build a network of infrastructures for the current agenda of superpower domination in their joint confrontation and preparation for global conflicts of the future, including nuclear, as well as any other effective weapons of mass and local destruction.

All over the world, military patriotic clubs, centers of technical and informational competencies and sports improvement in extreme and adventurous campaigns of the scout movement, in veteran communities and in professionally created guilds of a national orientation for fulfillment of the tasks of personal duty to civil society, subsequent conscription and service in the ranks of the legionnaire-security detective or military movement of retirees and former operatives of the services of the corresponding profile and police and counterintelligence support.

After the collapse of the USSR in Russia, they also began to think about legitimizing the processes of educating young people outside the criminal framework, using the existing specialized regional public organizations (RPO) of a patriotic orientation, they always have the opportunity, through work with RAAFVNS or with military-patriotic clubs, to fall under the status of some kind of paramilitary or security detective agency, which then legally limits the range of their possible areas of responsibility and regulates the work of all members of these circles of interest. This partly amateurish view could be recognized as quite subjective, because not all of the previously mentioned associations and formations reached their non-national status, were allowed to solve problems on behalf of the state, but without the appropriate legal prescription, from the point of

view of performing subtle functions in certain sensitive areas, as actors of "soft", "smart", and, sometimes, "hard" power [1], but it allows us to discuss the creation of the personnel base of private security and law enforcement agencies, which in Russia today have up to 5 million of their employees.

These forerunners and points of potential growth of the so-called private military companies (PMCs) have become widespread in the world, they perform a wide range of commercial and security services for customers of different levels of competence (from organized crime groups to representatives of big business - corporatocracy and banksters, manipulating the consciousness of the masses and solving subtle issues of dividing state and private interests into disputed and often extremely hostile forces and territories. Their status is registered in most countries and have their origin from compatriots or fighting brotherhoods, veteran guilds, as well as from the security services of various mesoactors, such as banks or corporations of various profiles involved in the processes of protecting the interests of sufficiently developed networks of hydrocarbon and military-defense, security and the detective sectors, as places or even ecosystems of various hierarchical groups: from agglomerations of various businesses to upholding the private-proprietary ambitions of medium and large capital in the imperialist world-shaping [2]. These police-military companies operate under various masks and pretexts in various regions of the world, helping to solve collection functions with jewelry and tough and protecting the property and sources of income / raw materials of their owners. Obviously, they are a kind of lightning rod in the big political game of states in the international arena, hedging the risks of full-scale wars or uncontrollable intercountry and even continental conflicts [3]. Namely, PMCs, like some kind of Charlie's Angels, are solving criminal zones of gray state uncertainty that fall under the concept of creeping somalization. The demand for them is especially high, therefore, in places of "color revolutions", as well as frozen or partially thawed conflicts, where demand for them grows and there is a need to hide the legendary "ears" of the bureaucratically formed, state-criminal octopus, which has already replaced more than 60% of the planet official financial and credit relations by traffic of an uncontrolled and officially unaccounted share of "gray schemes" in energy, prostitution, slave trade, drug and arms trade, migration of personnel of various qualifications, partially falling under the concept of "brain drain" or the dissolution of competitors in waves of mergers and acquisitions, most often custom-made and unfriendly. Therefore, the lands under redistribution are always the most vulnerable and toxic, and therefore are known to everyone today as territories of variable ownership or temporary holding in areas of criminalized conflicts: the Middle East, Africa, Latin America, Southeast Asia, etc. [4].

The legal status of the activities of PMCs and their employees is the subject of serious legal and law-making discussions of various schools of law. Moreover,

it is not always possible to clearly and completely distinguish between PMC employees and mercenaries, “soldiers of fortune”, from the point of view of the jurisprudence itself, which causes serious concerns for responsible politicians, as well as structures officially involved in protecting the national security of countries, intelligence and counterintelligence agencies [5].

In the mid 1990s. the development of a system for protecting the property of objects of a mixed profile (state and private property) was received by the US Department of Defense program for the use of private organizations for the logistic support of the Armed Forces - LOGCAP. The first stage of the program operated from 1994 to 1997. with a total cost of activities of USD 811 million. Estimates by American military experts indicate that by engaging the civilian local population of Bosnia and Herzegovina and neighboring countries by private military companies, the entire scope of work related to the logistics of troops was completed. At the same time, the costs amounted to 462 million US dollars, while only the transfer, deployment and use of logistic support units of the US Armed Forces in this region would have cost 638 million US dollars.

The successful offensive operations carried out by the Croatian and Bosnian troops in the spring and autumn of 1995 against the Serbs can be largely considered the merit of the experts of the American PMC MPRI (Military Professional Resources Incorporated). It was this company that continued its work with the so-called Kosovo Liberation Army (1998-1999) (KLA) in Albania and later in Macedonia (2000-2001). PMCs from America took an active part in the formation and combat training of units of the Kosovo Liberation Army (KLA), engaged in its armament and training in reconnaissance and sabotage activities of the local population.

In the summer of 1999, the leadership of the US Department of Defense, in order to reduce the number of its grouping in the Balkans, attracted the company KBR (Kellogg, Brown & Root Services) to solve a wide range of logistics tasks: the construction of temporary, and then permanent bases with all the infrastructure; technical, engineering and food supply; bath and laundry facilities; extraction and purification of water; delivery to fuel and lubricants units, etc.

After the end of active hostilities that accompanied the disintegration of the federal Yugoslavia, mine clearance in the territory of the former SFRY, participation in the work of international police missions in Kosovo, Bosnia and Herzegovina (International Task Police Force) became a new area of application for PMCs.

And this scale of use of PMCs became unprecedented by the early 2000s. Reliance on PMCs and the centers of their training bases and training grounds became an integral part of military sabotage preparations, and were also taken into account in the national military strategy of the United States and the North Atlantic Alliance, in general, which is actively observed today in the same Ukraine, during

the Russian ADF on denazification and demilitarization of the Ukronazis. With the participation and under the control of special services, the global network of PMCs began to develop. They, as world non-governmental actors, began to be created in many countries, especially in the countries where the American Armed Forces and pro-Western coalition forces led by the United States are present.

War without a declaration of war has become the foundation of the current US military strategy, the essence of which was expressed in his speech to Congress in 2006 by US Secretary of Defense Donald Rumsfeld: “We are trying to determine how to wage war against what is not a nation state, and how to wage war in countries with which we are not at war.

The characteristic features of the involvement of PMCs at the present stage are:

- the permanent presence of PMCs in zones of low-intensity armed conflicts initiated or unleashed by the U.S. military and its allies;

- participation in post-conflict settlement of situations with a high level of danger in the places of engagement;

- expansion of the range of tasks solved by PMCs, incl. and intelligence activities commissioned by the intelligence services of the United States and other NATO countries;

- the use of PMCs on the territory of the CIS countries as part of the expansion and strengthening of its influence by the West, etc.

From 2000 to 2006, federal contracting in the United States more than doubled, and the number of private company employees on government contracts outnumbered civil servants. According to the Brooklyn Institute of the United States in 2006, there were more than 3,000 PMCs in the world. By the end of the first decade of the 21st century, according to the same Brooklyn Institute of the United States, PMCs were already operating in more than 60 countries, and their annual income reached more than \$ 180 billion. Today, these figures have tripled and are of a closed nature, especially after the Iraqi and Afghan adventures of the United States and their allies.

An analysis of the cooperation of PMCs with the US Armed Forces in Iraq and Afghanistan showed that the degree of dependence of troops on private companies is so high that the active military was not able to carry out even a limited-scale operation without the involvement of contractors in numbers comparable to the size of the deployed group. From the analysis of the results of operations in Iraq and Afghanistan, a number of military experts conclude that the US Armed Forces are not ready for a possible high-intensity large-scale war of the 21st century, due to the transfer of an increasing (excessive) range of functions to PMCs, the growing confusion in contract tenders and the active participation of lobbyists from the Capitol hill and from all representatives of 104 US special services.

According to military experts, there is a danger of undermining the foundations of national security due to the transfer to the private sector of functions that are so related to state interests that they can only be carried out by state structures (for example, activities related to strategic planning, etc.). However, the “deep state” does not disdain any monitoring of funds, channels and “thinking centers”, the so-called tanks, which give a real picture of current events and, through AI and Big Data systems, issue algorithms for dynamic systems of current and medium-term goal setting. Previously, only analysts and officers of the Joint Staff Committee of the US Armed Forces and operations centers known as “oh-pee centers” were allowed to do this, having hundreds of scenarios of non-linear responses to address toxic, for the US, impacts from America's enemies.

In fact, not a single US military campaign after the end of the Cold War was complete without the widespread involvement of private commercial structures. Separate components of logistical, technical and operational support, combat and operational training, reconnaissance, preparation of military headquarters games, simulation of combat operations, etc. began to be transferred to private companies. Today, this trend has continued at NASA: there are already dozens of private space companies.

For the period from 1991-2013, the involvement of PMCs to solve problems of ensuring national security, in conjunction with other activities, made it possible to reduce the size of the US armed forces from 2.1 million to 1.6 million people while expanding the US military presence abroad.

The sharp increase in the number of PMCs is the result of US foreign policy, especially during the preparation and conduct of military campaigns in Iraq and Afghanistan. The scale of application and the dynamism of the development of PMCs are the result of a targeted policy to encourage and promote outsourcing in various areas of activity of state and, first of all, military bodies.

According to modern estimates, if in the early 1990s, there was only one “private trader” per 50 military personnel, now this ratio is 10:1 and tends to further decrease. Now there are several hundred private military and security companies operating in Afghanistan and Iraq alone, employing more than 265,000 private contractors.

To solve the problem of attracting the necessary civilian specialists, both on a permanent and temporary basis, special personnel departments have been created in the US intelligence agencies, which determine the needs in accordance with emerging needs, ensure the search for the necessary candidates, estimate the volume of required financial resources, etc.

The importance of using PMCs in the plans of the US military-political leadership is also evidenced by the fact that high-quality training of employees of private military companies is provided at the training centers of the US Armed

Forces. Among such centers where PMC personnel are trained are the bases in San Diego, Mount Carroll, Moyok, etc., where training programs for PMCs have been developed and are operating to study weapons and tactics, master the skills of combat use of weapons (alone, as part of strike groups, at night, to destroy ambushes, etc.).

Next, we will briefly consider the experience of attracting PMCs to provide military services in France. In the 1990s in France, the only metropolis that retained a military presence in Africa, a reduction in the number of armed forces began, which predetermined the need to assign a number of tasks to civilian structures. French PMCs were created for short periods under clearly defined tasks, they were led by former officers of the task force of the National Gendarmerie Corps and retired intelligence officers (DST). So, PMC employees in 1992 trained the personal guards of the President of Cameroon for 3 months, Service & Security in 1995 prepared units to fight the rebels in Togo, Eric SA intercepted the contract for the protection of oil pipelines in Algeria from the British PMC DSL.

The British-American PMC Halo Trust (Hazardous Areas Life Support Organization Trust) was registered in 1988 in the UK and is funded by the governments of the UK, USA, Germany and Canada. This company is associated with the American and British intelligence agencies. The number of contract personnel is up to 4800 people. The company's employees (mostly former military personnel and regular officers of the intelligence services of Western countries) have professional engineering and sapper training. Professional profile - demining and disposal of unexploded ordnance, mapping of minefields, training of local personnel (professional saboteurs-bombers) in sapper business in zones of armed conflicts in various regions of the world.

Analyzing information sources about PMCs in the People's Republic of China, it should be noted that in accordance with the Law on Weapons, the activities of private military companies in China are prohibited. At the same time, private security companies are involved in carrying out the tasks of ensuring the protection of infrastructure facilities, transportation, and the protection of employees on the territory of other states characterized by an unstable domestic political situation and a difficult crime situation.

Some of them, without advertising their activities for political reasons and due to the lack of an appropriate legal framework, also take part in the provision of military services while ensuring the security of projects implemented by Chinese enterprises in a number of countries in Africa and Latin America. Thus, the private security company Shandong Huawei Security Group recruits and trains former military personnel of the Armed Forces and the Ministry of Public Security, employees of special units with experience in hot spots, and aircraft security specialists to work in foreign countries. Currently, the company provides

protection for the facilities of the Chinese oil industry in Iraq, Afghanistan and South Sudan.

Israeli PMCs can be roughly divided into three groups:

- companies operating in Israel;
- companies operating outside the country;
- companies, for various reasons, registered in other countries in order to facilitate access to customers.

In Israel, where the threat of terrorist attacks is a daily reality, government structures are physically unable to ensure the security of every school, mall or hospital, concentrating efforts on strategic and government facilities. The remaining facilities are run by PMCs, the largest of which are Modiin Ezrahi and Amishav.

The process of introducing private military companies into conflict zones that has begun in the world has also touched Israel. The IDF transferred some checkpoints in Judea and Samaria to the responsibility of private traders. The purpose of this process was an attempt to reduce friction between soldiers and civilians at checkpoints through which tens of thousands of Palestinians enter Israel every day to work.

In addition to guarding the checkpoint, employees of private companies ensure the security of joint Israeli-Palestinian industrial zones. Usually, the army keeps order in the territory surrounding the industrial zone, and civilian employees guard the perimeter and the interior.

PMCs were actively used by the West in expanding their influence in the post-Soviet space. In the second half of the 1990s. PMCs actively carried out activities in Chechnya and Georgia. Also, PMCs were involved in the training of the Armed Forces of Kyrgyzstan, today's defense sector of Kazakhstan and Uzbekistan.

In Chechnya and Georgia, the British-American PMC HALO TRUST (Hazardous Areas Life Support Organization Trust) trained professional saboteurs-bombers from among the militants, was engaged in reconnaissance and the creation of a network of local informants, as well as topographic and geodetic survey of potential theaters of military operations.

The geographical structure of the PMC market is very heterogeneous. The data of the Association for International Peacekeeping Operations in 2011 indicate the following placement of the largest PMCs: 55% - in the United States, 27% - in the EU countries (mostly in the UK), 9% each - in the Middle East and Africa. Most of the "work" and orders they carry out in Iraq, Afghanistan, Jordan, Kuwait, the United Arab Emirates and Colombia.

The US and UK governments are the biggest clients of the military outsourcing industry in the world. Further, among the customers of private military services are private companies, mainly TNCs, followed by individuals, in last place are

international intergovernmental organizations, their branches and networks for exercising their powers in all states. Thus, one of the customers of private military and security services is the UN itself. For example, the logistic support of the UN mission in Darfur is carried out by the American PMC. The British PMC Aegis, under contract with the UN mission in Iraq, provided security for the staff of the UN department during the elections.

In the structure of private military companies by type of activity, the largest part is occupied by military consulting companies that carry out strategic planning, reform of the armed forces, training of army units, retraining of officers and technical personnel, as well as military logistics companies engaged in logistic support for troops and the construction of military facilities on the territory of other countries.

There are also private security companies on the market, or security problem solving companies involved in the field of anti-crisis management, risk assessment, security consulting, protection of facilities, providing various levels of bodyguard protection, demining, training of army and police units.

In connection with the development of piracy in the Gulf of Aden, a new line of activity has appeared for PMCs - escorting ships, negotiating the transfer of ransoms and captured ships and crews. The striking helplessness of the US and EU fleets off the coast of Somalia has prompted private military companies to create their own armed fleets, direct contracts with oil and gas TNCs, joint raids with their security services, if it is impossible to outsource control systems and defensive measures on ships and tankers.

There is experience in attracting employees of private companies to solve certain problems in emergency situations of a natural and man-made nature. So, in 2005, a number of companies were hired to clean up the aftermath of Hurricane Katrina. About 200 PMC employees were sent to the regions affected by the hurricane, 160 of them provided protection for state facilities.

An important feature of PMCs is that, being, in fact, ordinary commercial companies, they can hide the nuances of their specific activities under the pretext of protecting trade secrets.

The status of Russian PMCs is still in the "grey zone", which is outlined by their influence within the existing moral and legal norms and preferences, in terms of choosing the most significant ways to achieve goals in the legal field. Andrey Klishas, Chairman of the Federation Council Committee on Constitutional Legislation and State Building, has repeatedly spoken about the "lack of a request from civil society" for the regulation and legal status of such structures, referring to their extreme closeness and high, compared to state structures, efficiency in dealing with toxic problems on behalf of the state and the oligarchic stratum. Their activities are not regulated by law, but in fact several PMCs are officially

registered and operate on the territory of the Russian Federation, large in number and significant in terms of their contribution to the ADF and to the defense of the state. To do this, they are registered not as private security companies, but, for example, as consulting companies. The largest are Moran Security Group, RSB-Group and Antiterror-Orel [6].

The main customers of PMCs in Russia are private companies, ship owners and large enterprises such as Tatneft, Gazprom, Lukoil or, earlier, Inter RAO UES. Information on the use of PMC data by Russian government agencies could not be found, because the list of their tasks is very wide and coverage of such real activities can damage the business reputation of parent companies and undermine their goodwill on the world stage.

At the moment, the Russian state does not have its own official experience of using PMCs, judging by open sources of information. However, such an interest in the political leadership of the country clearly exists. The example of large Western countries, and for some time now China, demonstrates to us that PMCs are playing an increasing role in politics and in the military construction of the countries of the world, solving the problems of zoning private and state interests, preventing sparks of potential armed confrontations. However, in order for this tool not only to be effective, but also not to harm the interests of Russia, it is worth comprehending, studying and creatively processing the experience that already exists. Therefore, a special decision of the Security Council of Russia and the will of the political leadership of Russia are needed to create bodies for regulating their activities and reporting on the steps taken in state building. Here, of course, there is a danger of highlighting the real schemes for solving the tasks facing domestic PMCs, and the flexibility of their use is based on personal devotion to the structures that finance them, the cleaning and verification of which is being intensively carried out with the beginning of the NWO by Russia in Ukraine [7].

It is quite obvious that in such a large and extended country as Russia, PMCs will not be able to replace the traditional army and navy, to replace the activities of special services, therefore, politicians, when further considering the issue of attracting PMCs, need to clearly define the goals and objectives that can be solved by these structures, so as not to become dependent on them, not to create a secret contour of the influence of personal competencies of various representatives of law enforcement agencies through mutually beneficial cooperation in matters of a clearer and more balanced, and most importantly, timely and targeted solution to issues of maintaining the sovereignty of our state.

There are quite a few reasons why most countries in the world are increasingly and aggressively resorting to the use of PMCs, but two main ones can be distinguished from them:

the first is related to the fact that the very image and nature of the war is

changing, and with it the strategy, tactics and concepts of its conduct, the transfer of threats from three conventional environments to cyberspace, the analysis of factors of internal opposition to the authorities and illegitimate actions of foreign agents on the territory of Russia;

the second is determined by the attitude of society to the losses, especially to the wounded and the disabled, that the army and state structures bear in the war - while the very reasons for such armed actions remain outside the brackets of the ongoing measures to protect the interests of civilian and military contingents. This is also relevant for our country, whose society often reacts painfully and not always adequately to the participation of its own army in military conflicts, which is associated with the tragic experience of Afghanistan and Chechnya, some African operations, and the Yugoslav events.

Considering in more detail the first reason for the widespread use of PMCs, one cannot but take into account the growing nature of multi-level confrontation, which falls under the definition of “hybrid war”. This type of war is represented by a whole range of multifunctional systemic actions, a mixture of the classical and irregular nature of warfare, a combination of military and non-military, permitted and prohibited methods of struggle, the use of "conventional war, small war, cyber war, information war." These are “war against the rules” and “attacks on the vulnerabilities of the enemy”, the use of diplomacy, political pressure, economic sanctions, military force (and the threat of its use), including sabotage, political assassinations and imposed blockades in science and in the economic spheres [8].

The West knows very well how hybrid wars are made, and the term itself was coined along with “color revolutions” and the theory of “controlled chaos” by Gene Sharp. "Hybrid wars" have been tested in Iraq, Syria, Afghanistan, Yugoslavia, and now in Ukraine. According to the political beau monde of Western philosophers and strategists, Russia today is waging a hybrid war against Ukraine of the 7th level. The mass of objective signs that fit into our definition confirm that Russia is not alien to modern methods of state confrontation, it is familiar with the methods of Soviet special services and analytical departments that dealt with variants of indirect answers.

A similar war was waged by the West 30 years ago in Afghanistan during the presence of a limited contingent of Soviet Union troops there. It is quite obvious that such a war is being prepared against Russia. Understanding the content of this term, this category, we see ongoing full-scale preparatory work. For the purpose of our potential intimidation, we see ongoing testing, training, accumulation of resources, the cultivation of infrastructures within our country of all those “growth points” that are tied to the further colonization of our industries by global multinationals are also covered in order to potentially intimidate us. A mild and related form of hybrid warfare is the already well-known "color"

revolutions, which are always justified by the "leader of the democratic world", the United States.

Thus, it turns out that hybrid warfare is a modern evolutionary form of warfare as such. The newest forms of war include a number of wars: information, network, cognitive war, cyber war, distant war in Yugoslavia, war in the first phase in Iraq. And then came the hybrid war.

In hybrid wars, intelligence plays a much greater role than in typical or classic wars, when "army against army", because here you need to know well what is happening on the territory of a potential enemy. You need to know all its internal capabilities, and most importantly, you need to know the layout of social forces in this country: opposition, pseudo-opposition structures, as well as structures that can stir up the masses when necessary. And here the role of PMCs in such a country is difficult to overestimate.

The phrase "hybrid war", on the one hand, is understandable, that is, it is something mixed - military, non-military actions, and so on, on the other hand, it is a holistic thing. The concept of the integrity of what is called a hybrid war is increasingly capturing the minds of the military, analysts, political scientists, but, first of all, of course, military personnel. In support of this, one can cite the words of the Chief of the General Staff of the Armed Forces of the Russian Federation, General of the Army V.V. Gerasimov, at the military scientific conference of the Academy of Military Sciences in January 2014: I emphasize - they are significantly superior to military means. They are supplemented by covert military measures, including information confrontation measures, the actions of special operations forces, and the use of the protest potential of the population."

It is clear that today this concept - "hybrid war" is used against Russia. It is clear that this concept was introduced in order to say that Russia is an aggressor and that she is waging war. But Western countries do the same. Both the Americans and the British do not seem to be participating in the war, but there are instructors, there are so-called private armies, and so on. It seems that they are not a belligerent, but they take a full-scale participation in the war.

In general, it should be noted that the level and number of threats in recent decades have been growing and becoming more unpredictable. To counter them, one cannot do without the use of military force. Among other things, to solve this complex problem, the states found such a non-standard way: the use of PMCs. Its originality lies in the fact that it is not a traditional method of attracting mercenaries, and not an attempt to create a structure along the lines of the Foreign Legion. By and large, this is a purely commercial path based on the provisions of liberalism: PMCs can exist without contracts from the state, fulfilling orders from individuals, companies and corporations or international organizations; states resort to their services only when such a need arises. And this is another important

lesson for Russia: one should resort to the services of PMCs only in case of real need and, as in the case of outsourcing, to free employees from functions that are unusual for them [9].

A special example of an exemplary PMC of the future, which today is not inferior to the best examples of the West, such as Black Rock or Black Waters, can be considered a group of people united by a single cause of supporting Russia's national interests in various parts of the world, E. Prigogine, who equipped his fighters not only with modern weapons and equipment, but also gave the best medicines and care to the wounded fighters, helped to amnesty after six months of participation in the ADF prisoners as part of his Wagner PMC [10]. And here this experience will obviously be scaled up, because the NMD begins to be protracted with elements of a hybrid war, and the involvement of NATO at all levels in solving the tasks of preserving the integrity of Ukraine and bringing the theater of military operations to the absurdly criminal postulate of "life and struggle to the last Ukrainian" . The closeness of E. Prigozhin himself with the country's leadership makes his activities as head of the Wagner PMC relevant and focused on targeted results, because the previous mass layoffs of the 1990s of military and special profile specialists from the Russian national security structures led to a professional vacuum, partial reorientation of personnel to commercial activities and to serving sectoral departmental and oligarchic interests, which dealt a heavy blow to the prestige of law enforcement agencies, and caused a systemic transformation, and led to discreteness and interruption of the traditions of mentoring between different generations of operatives and analyst practitioners [11].

Therefore, A. Klishas is right, our society, which is re-ripening in its patriotic insight, thinks and wants to make an objective and timely decision to create PMC structures in such a way that it becomes an element of state cementing the security of the new Russia, and not a narrow-profile detachment to clean up the field of private oligarchic groups and leveling the zones of our losses before the united West, which has set as its goal our physical and total destruction. This means that our spiritual renewal will also affect the PMCs of a new type, mobilizing on all fronts and concentrating in their unity the resources of the imperially revived Motherland [12].

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烧伤毒血症致死过程中白细胞反应的年龄相关特征
**AGE-RELATED FEATURES OF THE LEUKOCYTE REACTION IN
THE THANATOGENESIS OF BURN TOXEMIA**

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RRCEMC收治的40例重度烧伤患者病情加重并死亡的原因是烧伤面积2-3a、3B级、IF指数在各年龄组中占主导地位，复合伤55%。在受伤后的第1天，所有年龄组的中等分子量肽（MMW）水平都有所增加，尤其是在儿童时期，白细胞增多正常或升高（第1组和第2组）没有差异，除了60.1岁以上的人。由于老年人和高龄烧伤面积明显较小，因此IF指数明显高于其他年龄组。仅在烧伤第1天，41-60岁患者的血液中白细胞数量与EHS浓度呈显著负相关（-0.64），第2组呈强负相关（-0.98）烧伤后第10-12天的重症监护。

关键词：烧伤毒血症，死亡发生，白细胞。

Abstract. *The reason for the aggravation of the severity of the condition and the death of 40 patients admitted to the RRCEMC with severe burn injury was the predominance of the burn surface area of 2-3 a, degree 3B, the IF index in all age groups, combined injury in 55%. On the 1st day after the injury, an increase in the level of medium molecular weight peptides (MMWs) was found in all age groups, especially in childhood, with no differences in normal or elevated leukocytosis (in groups 1 and 2), except for persons over 60.1 years old. With a significantly smaller burn area in the elderly and senile age, the IF index turned out to be significantly higher than in other age groups. A significant negative correlation was found between the number of leukocytes in the blood and the concentration of EHS (-0.64) in patients aged 41-60 years only on day 1 of the burn injury and a strong negative correlation in group 2 (-0.98) on days 10-12 intensive care after a burn.*

Keywords: *burn toxemia, thanatogenesis, leukocytes.*

Relevance. The problem of treatment of burn disease and its complications does not lose its relevance to the present day. In the structure of mortality of severely burned patients, the leading place is occupied by an infection leading to

the development of pneumonia and sepsis. The development and generalization of infection in severely burned patients is realized due to the influence of thermal injury on the immune system; in particular, the phagocytic link of immunity suffers. Dysfunction of phagocytes is manifested in a violation of the destruction of bacteria, changes in the level of secretion of interleukins and cytokines by macrophages, activation and degranulation of neutrophils with the development of oxidative stress. The described mechanisms cause systemic tissue damage, leading to the development of multiple organ failure and death of the patient. Therefore, the assessment of the function of the phagocytic link of immunity is appropriate at all stages of burn disease [1-3].

Objective. To study the features of the leukocyte reaction in thanatogenesis in burn toxemia.

Material and research methods. The division into groups is based on the indicator of the number of leukocytes in peripheral blood. A favorable outcome was observed in 142 patients (group A), an unfavorable outcome was observed in 40 patients (group B). Monitoring of the dynamics of the state of 40 patients admitted to the combustiology department of the Republican Scientific Center of Emergency Medical Care with a fatal outcome was carried out in groups: group 1 - the number of leukocytes $4-9 \times 10^9/l$ (normal) in 14 patients; group 2 $>9 \times 10^9/l$ – 26 patients. The research results were processed by the method of variation statistics using the Excel program by calculating the arithmetic mean values (M) and the errors of the means (m). To assess the significance of differences between the two values, Student's parametric test (t) was used. The relationship between the dynamics of the studied indicators was determined by the method of pair correlations. The critical level of significance in this case was taken equal to 0.05.

Results and its discussion

The reason for the aggravation of the severity of the condition was a combined injury in 55% (22 out of 40): 15 patients with carbon monoxide poisoning, 1 - STBI, 3 - diabetes mellitus, 1 - amputation of both limbs, the condition was complicated by the addition of pneumonia -14, acute renal failure -4 , liver failure due to liver cirrhosis 8 and toxic/viral 19/4 hepatitis , MODS in 40 patients.

Table 1. Aggravating factors in thanatogenesis of burn toxemia

Groups		7,1-18 years old	18,1-40 years old	41-60 years old	>60,1 years old	Totally
1	CO poisoning		14% (2)	21% (3)	7% (1)	42% (6)
	electrical injury		7% (1)	14% (2)		21% (3)
2	CO poisoning	4% (1)	19% (5)	12% (3)		35% (9)
	electrical injury	4% (1)	8% (2)	4% (1)		15% (4)
	Diabetes				11% (3)	11% (3)

Table 2. Characteristics of deceased patients by age and sex

Groups	m	f	3,1-7 years old	7,1-18 years old	18,1-40 years old	41-60 years old	> 61 years old	Totally
1	57% (8)	43% (6)			14% (2)	64% (9)	22% (3)	35% (14)
2	84% (22)	16% (4)	4% (1)	11% (3)	23% (6)	54% (14)	8% (2)	65% (26)

Table 3. Evaluation of the severity of burns in patients with a fatal outcome, the area of burn damage to the skin surface in % 2-3A (3B) degree

	3,1-7 years old		7,1-18 years old		18,1-40 years old		41-60 years old		>61 years old	
	1 gr	2 gr	1 gr	2 gr	1 gr	2 gr	1 gr	2 gr	1 gr	2 gr
S 2,3 A ct, %	0	70,0	0	84,5±7,3	75,0±15	80,8±13,3	71,3±22,5	71,4±14,5	26,7±7,8**	33,3±2,2
S 3 B ct, %		65,0		50,0±7,5	27,5±7,5	46,4±11,9	38,1±21,6	34,3±7,8	13,3±7,8	21,7±4,4
IF, un.		230,0		214,5±14,8	148,8±36,9	191,3±39,3	169,0±72,0	159,3±25,1	53,3±21,1	110,7±7,1*

* - the difference is significant relative to the indicator in group 1.

Table 4. Dynamics of the leukocyte reaction in burn toxemia with a fatal outcome depending on age

original years old	6,1-18 years old			18,1-40 years old			41-60 years old			>61 years old						
	M±m, years old	1 day	5-6	10-12	M±m, years old	1 day	5-6	10-12	M±m, years old	1 day	5-6	10-12				
1	0	0	0	9,8±1,9	36,3±2,4	8,0±0,7	6,7±1,1	9,8±1,9	53,0±4,3	8,6±1,1	10,6±3,9	11,1±4,6	76,3±9,8	8,1±1,5	14,3±6,4	12,2±5,6
2	10,8±3,3	22,7±9,1	8,8±4,0	11,3±3,1	27,3±6,3	16,1±3,2	12,4±2,7	13,6±3,3	46,4±7,5	15,4±2,7	10,3±2,5	13,9±2,3	83,5±1,5	11,9±1,9	12,7±5,7	13,7±5,7
Table 5	7,1-18 years old			18,1-40 years old			41-60 years old			> 60,1 years old						
G	1 days	5-6s	10-12s	1 days	5-6s	10-12s	1 days	5-6s	10-12s	1 days	5-6s	10-12s				
1				0,37±0,03	0,60±0,31	0,32±0,09	0,64±0,22	0,46±0,20	0,42±0,16	0,22±0,11	0,33±0,13	0,36±0,06				
2	0,80±0,32	0,78±0,23	0,42±0,20	0,58±0,25	0,49±0,24	0,55±0,30	0,69±0,26	0,69±0,27	0,42±0,16	0,31±0,06*	0,50±0,34	0,68±0,15				

* - the difference is significant relative to the indicator of the indicator at the age of 18.1-40 years

The prevalence of injured males (75%) at the age of 41-60 years was noted (Table 2).

The area of the burn surface of 2-3A degree in elderly patients older than 61 years was significantly less than at the age of 18.1-40 years by 64% in 1, by 58% in the second and at the age of 41-60 years in 1 by 62%, and 2 groups by 53% ($p < 0.05$). As shown in Table 3, a significantly significant difference in the IF index was found only in patients over 61 years old, where, with a trend towards an increase in the area of the 3B burn, the degree of IF turned out to be 107% ($p < 0.05$) higher relative to the indicator in group 1.

In group 2, on day 1 of burn disease, the level of leukocyte reaction was significantly higher in group 2 at the age of 18.1-40 years by 100% ($p < 0.05$), at the age of 41-60 years by 79% ($p < 0, 05$), over the age of 61 by 46% (< 0.05). The findings allow us to conclude that as the age increases, there is a tendency to a decrease in the leukocyte response to burn injury. On the 5-6th day in the age groups of 18.1-60 years there is a tendency to decrease leukocytosis in group 2, then on the 10-12th day there is a slight upward trend, which is most likely due to the ineffectiveness of anti-inflammatory and antibacterial therapy. In group 2 older than 61 years, already on the 5-6th day and then on the 10-12th day, there was a tendency to further increase the leukocyte reaction (Table 4).

In group 1 at the age of 18.1-40 years, a slight decrease was revealed on days 5-6 and a tendency to increase on days 10-12. While in the first groups older than 40.1 years there was a slight tendency to increase the number of leukocytes in the blood (Table 4). Thus, even with a significantly smaller burn area in the elderly and senile age, the IF index significantly increases, the effectiveness of complex drug therapy decreases, which is most likely due to the failure of the immune system, which is caused by age-related mitochondrial insufficiency, high vulnerability of cellular structures, lack of adaptive resources, which reduces the body's survival during severe stress reactions.

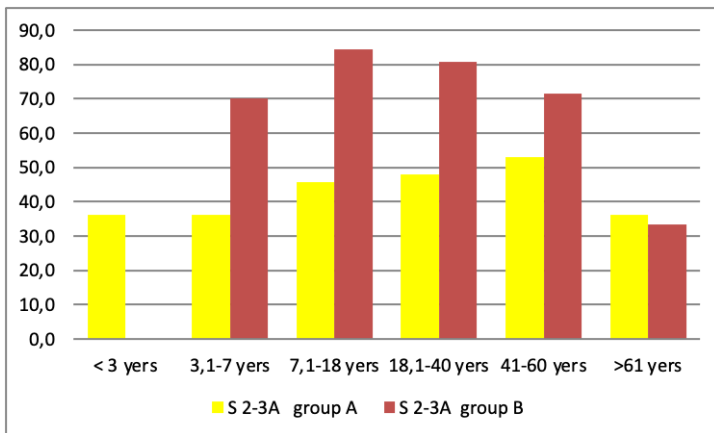


Fig.1. Comparative assessment of the burn area 2-3A degree in% in group 2

Comparative assessment revealed the predominance of the burn surface area of 2-3 degrees in all age groups with a fatal outcome in group 2 (Fig. 1).

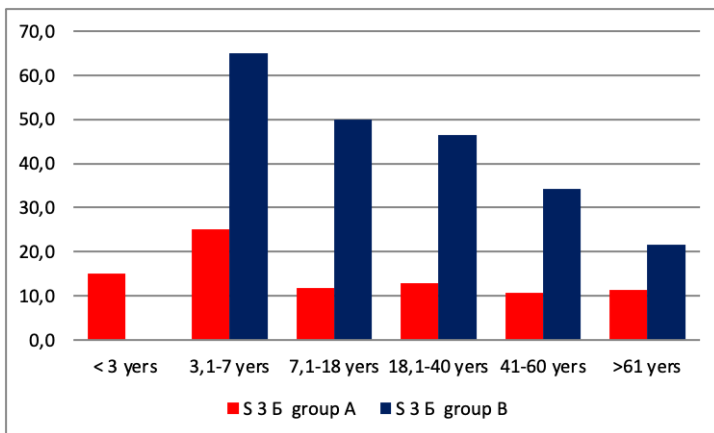


Fig.2. Comparative assessment of the burn area 3B degree in% in group 2

Also noted was the predominance of the area of deep damage of 3B degree, which caused a lethal outcome in all age groups (Fig. 2).

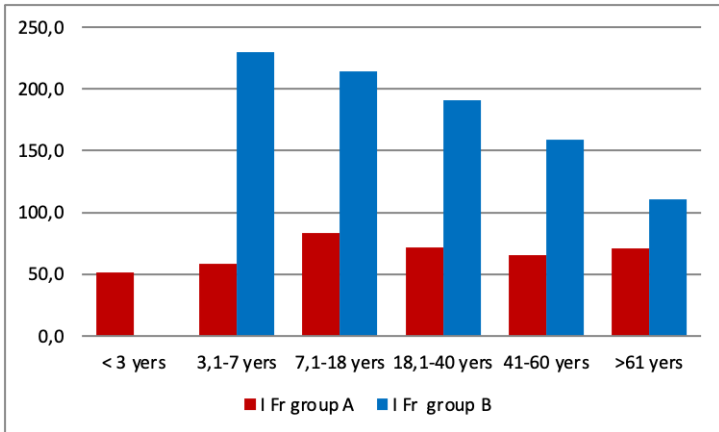


Fig.3. Comparative assessment by IF in units in group 2

The severity of the burn injury in the 2nd group in the deceased according to the IF was also more significant in the group with a fatal outcome (Fig. 3).

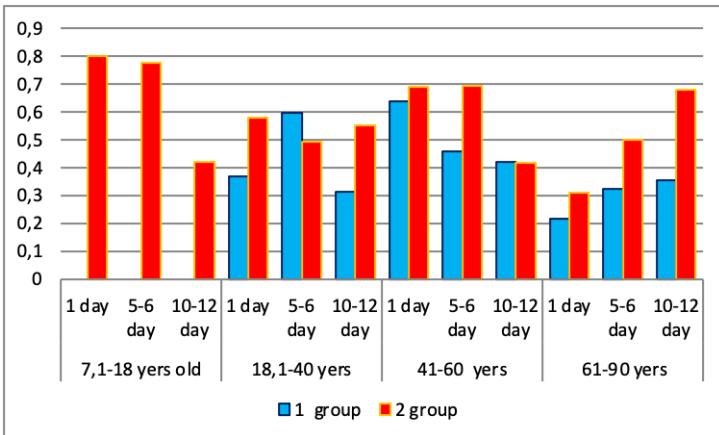


Fig.4. EHS of the dead in groups 1 and 2 (normal and elevated leukocytes more than 9)

Upon admission to the clinic, the level of EHS was the highest in childhood, amounting to 0.80 ± 0.32 , not significantly changing up to 12 days (Table 5).

On the 1st day after the injury, an increase in the level of EHS was found in all age groups, especially in childhood, with no differences in groups 1 and 2, with the exception of persons over 60.1 years old. So, in burnt old people, a significantly significant lower level of EHS by 46% in 1 day was revealed. In groups 1 and 2, no significant dynamics was observed on days 5 and 10 (Fig. 4). A significant negative correlation was found between the number of leukocytes in the blood and the concentration of EHS (-0.64) in patients aged 41-60 years only on day 1 of the burn injury and a strong negative correlation in group 2 (-0.98) on days 10-12 intensive care after a burn. The results obtained may be evidence of the manifestation of the protective function of leukocytes, based on phagocytosis and other methods of maintaining hemodilution in severe burn injury at the age of 41-60 years. However, due to the lack of resources of compensatory mechanisms, this effect turned out to be futile.

Conclusion. The cause of the aggravation of the severity of the condition and death was the predominance of the area of the burn surface of 2-3 a, 3B degrees, the IF index in all age groups, combined injury in 55%. On the 1st day after injury, an increase in the level of EHS was found in all age groups, especially in childhood, with no differences in normal or increased leukocytosis (in groups 1 and 2), with the exception of persons over 60.1 years old. With a significantly smaller burn area in the elderly and senile age, the IF index turned out to be significantly higher than in other age groups. A significant negative correlation was found between the number of leukocytes in the blood and the concentration of EHS (-0.64) in patients aged 41-60 years only on day 1 of the burn injury and a strong negative correlation in group 2 (-0.98) on days 10-12 intensive care after a burn.

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7岁以上儿童严重伴发颅脑损伤急性期基础药物治疗的相关性
**CORRELATIONS OF BASIC DRUG THERAPY IN THE ACUTE
PERIOD OF SEVERE CONCOMITANT TRAUMATIC BRAIN INJURY
IN CHILDREN OLDER THAN SEVEN YEARS**

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通过计算年龄剂量给药的多样性进行比较分析，使我们能够研究、比较评估儿童 SCTBI 急性期矫正治疗的有效性。第 1 组的药物麻醉量小于第 2 组和第 3 组的儿童。最强烈的抗炎治疗覆盖了第 1 组和第 2 组的前 9 天，而第 3 组为 12 天。需要加强镇痛，镇静伴随着在最严重的患者中引入血管扩张剂的权宜之计。1组和2组输血量相对较大是由于颅外损伤占主导地位，失血量大于3组。2组有凝血功能障碍倾向，决定了采取措施预防出血的权宜之计。综合征。

关键词：基础治疗，儿童严重合并创伤性脑损伤。

Abstract. *Comparative analysis with the calculation of the multiplicity of administered drugs in age doses allows us to study, give a comparative assessment of the effectiveness of corrective therapy in the acute period of SCTBI in children. The volume of drug anesthesia in group 1 was less than in children of groups 2 and 3. The most intensive anti-inflammatory therapy covered the first 9 days in groups 1 and 2, while 12 days in group 3. The need to enhance pain relief, sedation was accompanied by the expediency of introducing vasodilators in the most severe patients. A relatively larger volume of blood transfusion therapy in groups 1 and 2 was due to the predominance of extracranial injuries with greater blood loss than in group 3. In group 2, the tendency to coagulopathy prevailed, which determined the expediency of taking measures to prevent hemorrhagic syndrome.*

Keywords: *basic therapy, severe concomitant traumatic brain injury in children.*

Relevance. *Intracranial hypertension in isolated or combined traumatic brain injury (CTBI), along with extracranial extreme factors, is a key pathophysiological*

cal variable in the development of secondary injuries. Allocate emergency and basic therapy for intracranial hypertension. Emergency therapy - with an increase in intracranial pressure of more than 20 mm Hg. Art. it is recommended to eliminate all factors that can worsen or accelerate a further increase in intracranial pressure, to exclude intracranial injuries requiring emergency surgical intervention (epi-, subdural, intracerebral hematomas, occlusive hydrocephalus, development of dislocation syndrome). Basic (preventive) therapy is aimed at the timely elimination and correction of life-threatening disorders, prevention and elimination of factors that can worsen or accelerate the development of intracranial hypertension. Specific factors that can lead to an increase in intracranial pressure include a violation of the venous outflow from the cranial cavity (incorrect position of the patient's head, psychomotor agitation), respiratory disorders (airway obstruction, hypoxia, hypercapnia), hyperthermia, arterial hypo- and hypertension, convulsive syndrome. However, there is not enough information in the literature about the features of intensive basic therapy for severe concomitant craniocerebral injuries in children older than seven years, which prompted us to study this issue [1-4].

Objective. To study and evaluate the quality and volume of basic intensive care in the acute period of severe concomitant traumatic brain injury at the age of 7.1-18 years.

Material and research methods. The parameters of a comprehensive examination of 36 patients of school age (7-18 years old) with severe combined traumatic brain injury (SCTBI) admitted to the intensive care unit (ICU) of the neurosurgical department of the Republican Scientific Center of Emergency Medical Care (RSC EMC) in the first hours after road traffic accident (RTA) - 33, cat- trauma - 3 patients. Continuous hourly monitoring of hemodynamic parameters, including SBP, was carried out for 30 days after SCTBI. According to the indications, patients were started on invasive mechanical respiratory support (MRS) at admission. Mechanical respiratory support was started on artificial lung ventilation (ALV) for a long time, with subsequent transfer to SIMV. Restoration of adequate spontaneous breathing and reflexes was an indication for extubation. The severity of the condition was assessed using the methods of scoring on the scales for assessing the severity of combined injuries - the PTS scale (pediatric injury scale - PediatricTraumaScore (PTS) (Tepas J.J. et al. 1985), assessment of the severity of injuries on the ISS scale, the severity of acute cerebral insufficiency Glasgow coma. At admission, impairment of consciousness in 14 injured patients was assessed on the Glasgow coma scale (GS) of 8 points or less. Group 1 with the duration of intensive therapy (7.1 ± 1.8 days) included 11 children aged 11.5 ± 2.4 years, 2 - duration of stay in the ICU 13.9 ± 1.9 days included 9 patients, mean age 12.5 ± 2.5 years, 3 - 16 patients 11.2 ± 2.3 years, duration of treatment in the ICU from 21 to 30 days.

Results and its discussion. Complex intensive therapy included timely correction of deviations: mechanical respiratory support (MRS), analgesic, anti-inflammatory, hemostatic, antibacterial, infusion therapy, compensation for BCC deficiency, correction of protein, water and electrolyte balance disorders, correction, stress-limiting, cytoprotective therapy. Sedatives, hypnotics, anticonvulsants, relaxants in patients with mechanical respiratory support were also included in the section of anesthesia + sedative therapy due to the synergism of the pharmacological action.

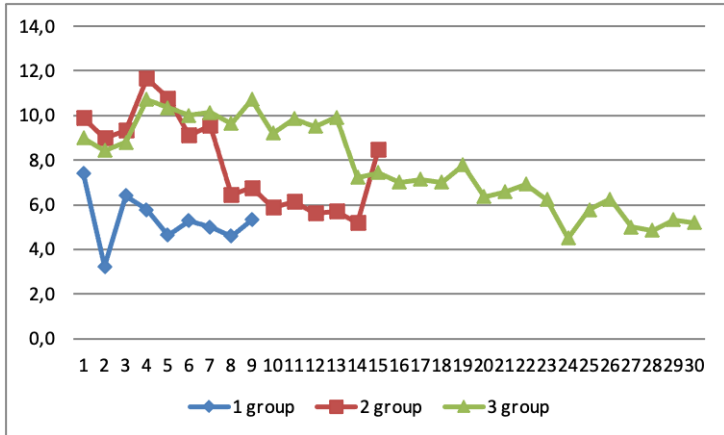


Fig.1. Pain relief + sedative therapy

The drugs were administered in age dosages for the purpose of identification for a comparative assessment, the frequency of drug administration was taken into account, which made it possible to give an objective assessment of drug therapy in different age groups. As shown in Fig. 1, the volume of drug anesthesia in group 1 was less than in children of groups 2 and 3. The average frequency of administration of sedatives was 5.3 ± 0.8 in group 1, 7.9 ± 1.8 in group 2, and 7.7 ± 1.6 in group 3 during the observation period. Attention is drawn to the gradual limitation of the drug load in group 3 to 4, in group 2 to 6 on the 8-9th day. Anti-inflammatory drugs included both nonsteroidal and steroidal agents. The most intensive anti-inflammatory therapy covered the first 9 days in groups 1 and 2, while 12 days, amounting to an average of 2.4 ± 0.3 in the acute period in group 1; in 2 - 1.7 ± 0.5 and in 3 - 1.8 ± 0.6 (Fig. 2). Antibiotic therapy was carried out in accordance with existing recommendations, the empirical choice was made in accordance with the severity of the injury, the patient's condition. On average, for the acute period of SCTBI, the frequency of administration in group 1 was 2.1 ± 0.3 ; in 2 - 2.7 ± 0.3 and in 3 - 3.0 ± 0.3 , that is, in the most severe group, significantly more was injected by 43% than in group 1 (Fig. 3). Hemostatic therapy was the most active

in the first 6 days of treatment, averaging in group 1 - 1.1 ± 0.2 ; in 2 - 0.9 ± 0.7 and in 3 - 0.9 ± 0.4 (Fig. 4).

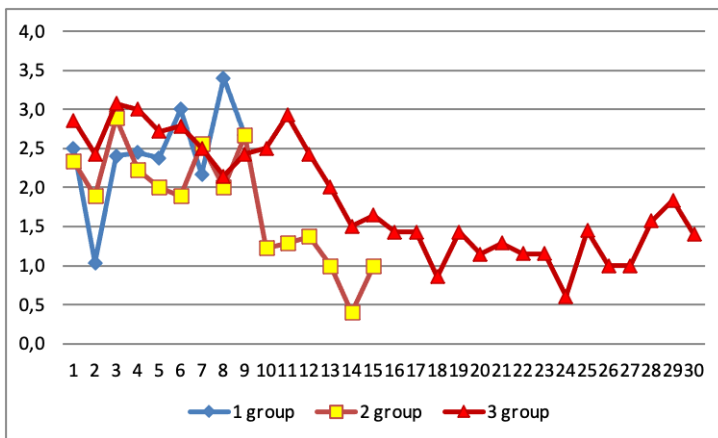


Fig.2. Anti-inflammatory therapy (frequency of administration)

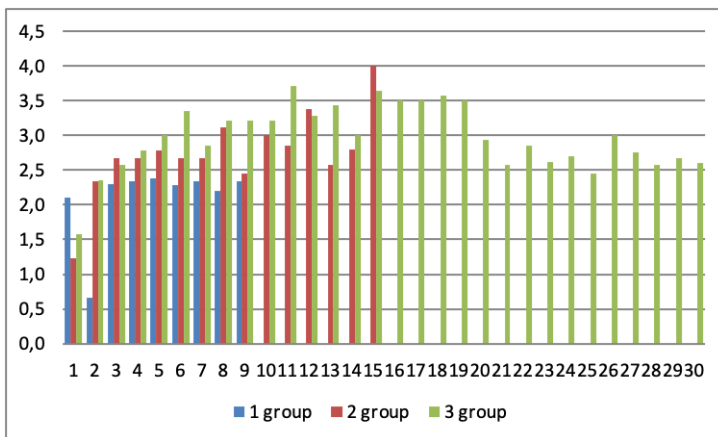


Fig.3. Antibiotic therapy

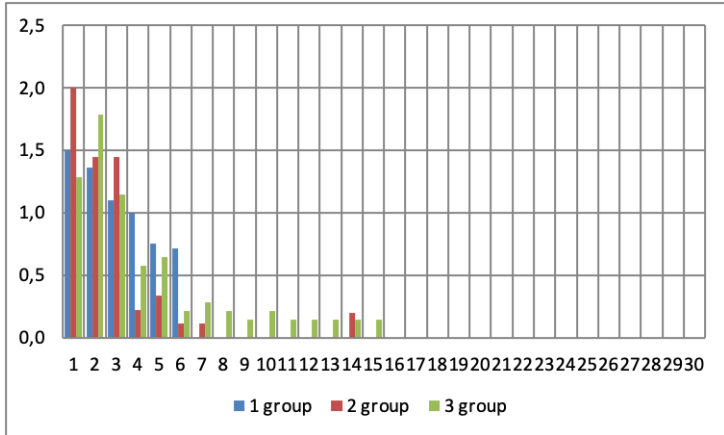


Fig.4. Hemostatic therapy

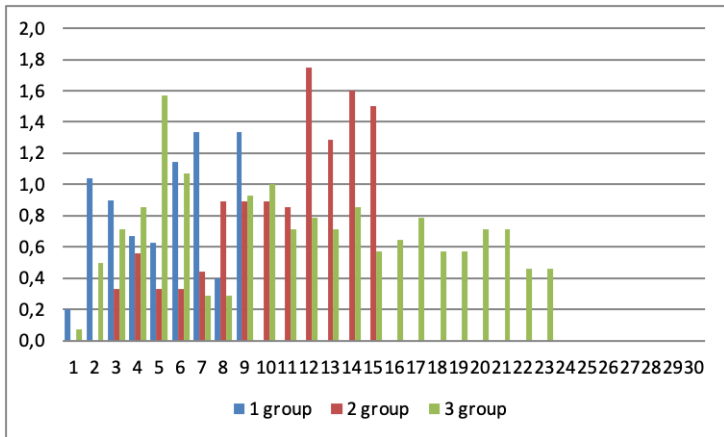


Fig.5. Anticoagulant therapy

Heparin was administered in group 1 for 9 days to all patients with a tendency to increase on days 7-9, which averaged 0.8 ± 0.3 per day. In group 2, heparin was not administered in the first two days, the average in the following days was 0.9 ± 0.3 . For children of the 3rd group, the introduction of anticoagulants was indicated from the 1st to the 23rd day, amounting to 0.7 ± 0.2 (Fig. 5). Thus, there were no significant differences in anticoagulant therapy in terms of the severity of the condition.

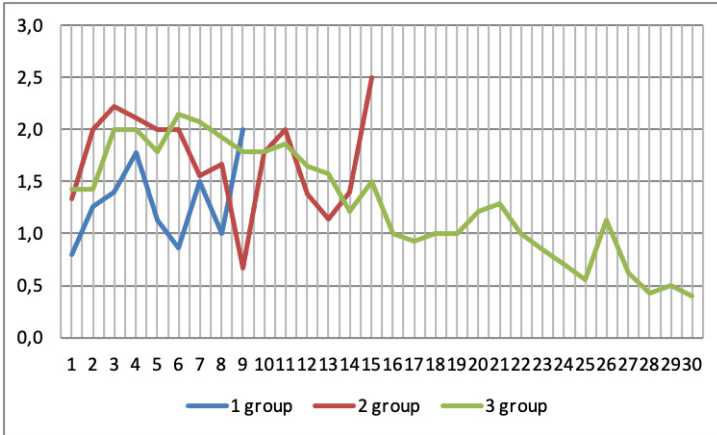


Fig.6. Vasodilators.

As can be seen from the data presented in the figure, patients received vasodilators during the acute period of SCTBI, there were no significant differences in the activity of vasodilator therapy by groups (Fig. 6).

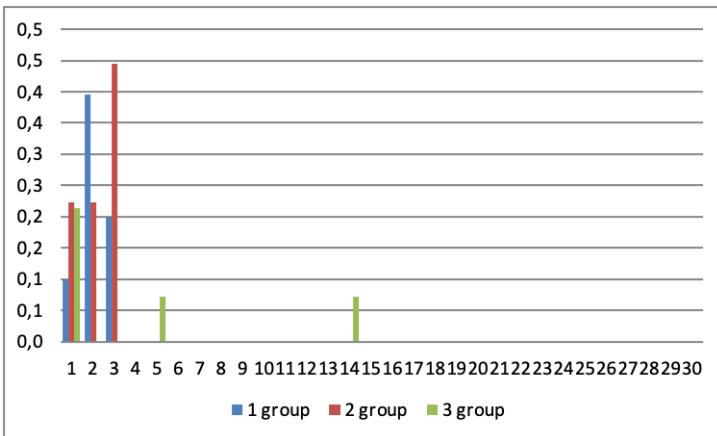


Fig.7. Introduction of vasopressors

The introduction of vasopressors was noted in the first three days in groups 1 and 2, in group 3 they were administered only on day 1 (Fig. 7).

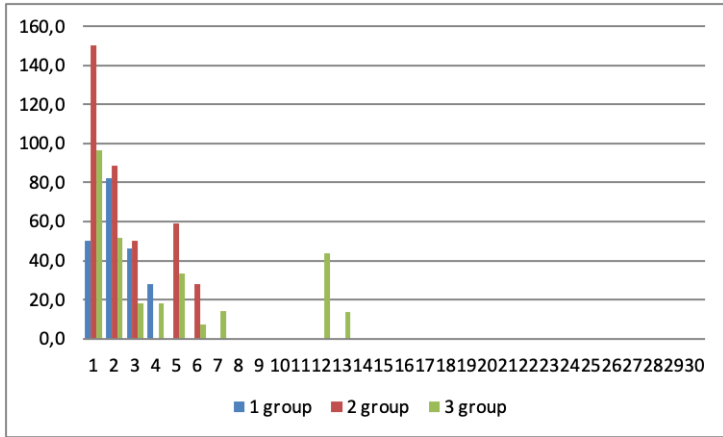


Fig.8. Protein media (including erythrocyte mass)

In group 1, erythrocyte mass, fresh frozen plasma, on average 51 ± 15 ml, were administered in the first 4 days; in group 2, for 6 days in the amount of 62 ± 37 ml; On the 13th day, according to the indications, an average of 28 ± 15 ml was re-introduced (Fig. 8). A relatively larger volume of blood transfusion therapy in groups 1 and 2 was due to the predominance of extracranial injuries with greater blood loss than in group 3.

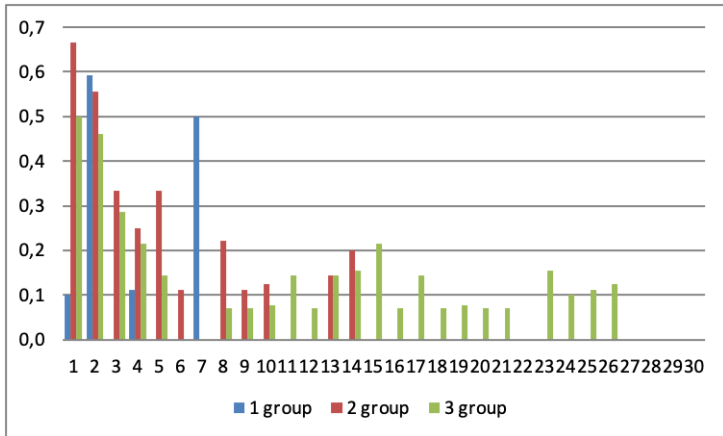


Fig.9. Diuretics

The fight against a traumatic increase in ICP decongestant therapy includes drug forcing of the excretory function of the kidneys. The most active was carried out in the first two and then maintenance for 7 days (Fig. 9).

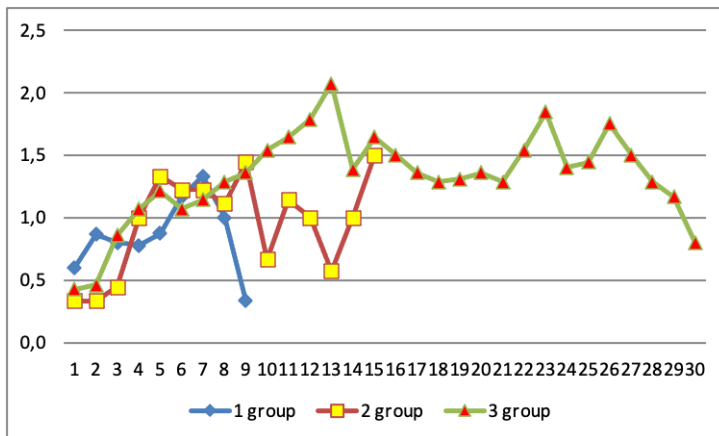


Fig.10. Nootropic Therapy

In the first three days, nootropic drugs were administered in a minimum amount to all children. On average, 0.8 ± 0.2 was prescribed in group 1, 0.9 ± 0.3 in group 2, and 1.3 ± 0.2 in group 3 (Fig. 10).

As can be seen from the data presented in table 1 and fig. 11, a direct strong correlation was found between painkillers and anti-inflammatory drugs in group 3 (0.83), as well as vasodilators (0.92), that is, the need to increase pain relief, sedation was accompanied by the advisability of administering vasodilators in the most severe patients. A direct strong correlation between the introduction of protein media with hemostatics (0.79) in group 3, (0.81) in group 2, (0.82) in group 1 characterizes a high risk of coagulopathy in injured children older than 7 years. At the same time, there was a positive correlation between the administration of diuretics and hemostatic therapy in 2 (0.88) and 3 (0.84) groups. A combination of hemostatic therapy and diuretics was found, which at first glance creates an unfavorable combination of drugs with a high risk of thrombosis. However, given that patients of group 3 suffer the most severe degree of traumatic disease, when almost all adaptive resources are quickly exhausted, then this combination of drug therapy can be considered an adequate preventive measure for the development of thrombohemorrhagic syndrome.

The foregoing is confirmed by a direct correlation between the administration of vasopressors and protein preparations (0.75) in children of the 3rd group (Fig. 11). In group 2, a strong inverse relationship between pain relief and the frequency of heparin administration was found (-0.73). That is, the less medication loaded the child, the more heparin had to be administered, which fully explains the need to prevent hypercoagulation caused by a more pronounced sympathotonic reaction. At the same time, the strengthening of anti-inflammatory therapy contributed to

Table 1. Correlations of corrective intensive care

Preparations	1 group anesthesia		2 group anesthesia + sedative therapy		3 group anesthesia + sedative therapy		Preparations		1 group		2 group		3 group		
	1	2	1	2	1	2	1	2	antibacterial	antibacterial	antibacterial	antibacterial	antibacterial	antibacterial	
anti-inflammatory	0,40	0,62	0,83	hemostatics	-0,46	-0,69	-0,49	vasodilator	0,54	-0,23	0,64	heparin	0,54	-0,23	
antibiotic therapy	0,58	0,62	0,27	heparin	-0,07	0,68	0,47	vasopressor	0,04	-0,52	0,00	heparin	0,04	-0,52	
hemostatics	0,28	0,45	0,42	vasodilating	0,13	0,41	0,26	protein	-0,20	-0,70	0,05	heparin	-0,20	-0,70	
heparin	-0,38	-0,73	0,67	dopamine	-0,88	-0,43	-0,51	diuretic	0,36	-0,67	0,07	heparin	0,36	-0,67	
vasodilating	-0,09	0,47	0,92	squirrels	-0,77	-0,74	-0,53	nootropic therapy	0,19	0,37	0,11	heparin	0,19	0,37	
vasopressors	-0,29	0,32	0,17	diuretic	-0,70	-0,74	-0,41	Preparations	vasodilating						
protein media	0,00	0,49	0,39	nootropic	0,02	0,57	0,59	vasopressor	-0,11	0,23	0,09	heparin	-0,11	0,23	
diuretics	-0,50	0,45	0,28					protein	-0,11	0,06	0,30	heparin	-0,11	0,06	
nootropic	-0,34	-0,02	-0,09					diuretic	0,10	0,02	0,26	heparin	0,10	0,02	
Preparations	anti-inflammatory			hemostatics			Preparations			hemostatics			vasopressors		
antibiotics	0,77	-0,45	-0,06	heparin	-0,42	-0,66	0,15	Preparations	vasopressors						
hemostatics	-0,50	0,43	0,62	vasodilating	-0,35	0,11	0,42	squirrels	0,91	0,64	0,75	heparin	0,91	0,64	
heparin	-0,28	-0,71	0,46	vasopressors	0,63	0,87	0,46	diuretic	0,56	0,64	0,58	heparin	0,56	0,64	
vasodilating	-0,19	-0,04	0,79	protein	0,82	0,91	0,79	nootropic therapy	-0,11	-0,69	-0,44	heparin	-0,11	-0,69	
vasopressors	-0,78	0,49	0,28	diuretic	0,12	0,88	0,84	Preparations	protein media						
protein media	-0,73	0,37	0,53	nootropic	-0,22	-0,74	-0,71	diuretic	0,47	0,90	0,74	heparin	0,47	0,90	
diuretics	-0,80	0,34	0,40					nootropic therapy	-0,25	-0,59	-0,54	heparin	-0,25	-0,59	

a decrease in the need for the introduction of an anticoagulant (-0.71). A direct strong relationship between the frequency of administration of vasopressors and hemostatics (0.87), as well as protein drugs (0.91), diuretic (0.88) indicates that in group 2 the tendency to coagulopathy prevailed, which determined the feasibility of taking measures to prevent hemorrhagic syndrome. This is confirmed by the inverse correlation between heparinization and blood transfusion therapy (-0.7) in group 2 (Table 1). A direct strong correlation between the administration of protein drugs and diuretics (0.9) in group 2 corresponds to decongestant therapy aimed at combating an increase in ICP (Fig. 11). The absence of the above characteristics in group 1 is noteworthy. Distinctive features in group 1 is a direct correlation of anti-inflammatory and antibacterial therapy (0.77), the amount of proteins administered with a vasopressor (0.91). The inverse correlation between the frequency of administration of antibiotics and the number of protein preparations (-0.77), vasopressors (-0.88), diuretics (-0.7) indicates the possibility of reducing vasopressor and diuretic correction, provided that adequate antibiotic therapy is provided.

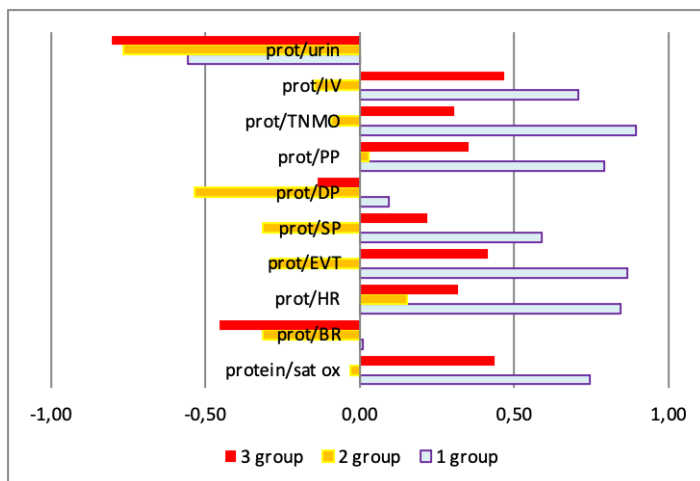


Fig.11. The most significant correlations

Conclusion. A comparative analysis with the calculation of the multiplicity of administered drugs in age doses made it possible to study, to give a comparative assessment of the effectiveness of corrective therapy in the acute period of SCTBI in children. The volume of drug anesthesia in group 1 was less than in children of groups 2 and 3. The most intensive anti-inflammatory therapy covered the first 9 days in groups 1 and 2, while 12 days in group 3. The need to enhance pain relief, sedation was accompanied by the expediency of introducing vasodilators in the

most severe patients. A relatively larger volume of blood transfusion therapy in groups 1 and 2 was due to the predominance of extracranial injuries with greater blood loss than in group 3. In group 2, the tendency to coagulopathy prevailed, which determined the expediency of taking measures to prevent hemorrhagic syndrome.

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动脉高血压和肥胖患者在他汀类药物治疗背景下的认知功能
**COGNITIVE FUNCTION IN PATIENTS WITH ARTERIAL
HYPERTENSION AND OBESITY AGAINST THE BACKGROUND
STATIN THERAPY**

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目的。 本研究的主要目的是评估他汀类药物对动脉高血压 (AH) 和肥胖患者认知功能的影响。

材料与方。 这项开放式临床试验包括 40 名患者 (平均年龄 46.25 ± 2.63 岁)。 20 名患者接受辛伐他汀治疗, 20 名患者接受阿托伐他汀治疗。 治疗支持持续 12 周。 在基线和初始治疗后, 对所有参与者进行神经心理学测试和认知诱发电位 (P300) 以评估认知功能。

结果。 辛伐他汀和阿托伐他汀 12 周治疗显著改善了 AH 和肥胖患者的认知功能 (神经心理测试和 P300)。

关键词: 动脉高血压, 肥胖, 认知功能障碍, 辛伐他汀, 阿托伐他汀

Abstract

Aim. *Main aim of this research is the assessment of statin therapy effects on cognitive function in patients with arterial hypertension (AH) and obesity.*

Material and methods. *This open clinical trial included 40 patients (mean age 46.25 ± 2.63 years). 20 patients received simvastatin and 20 received atorvastatin. Therapeutic support lasted 12 weeks. At baseline and after the initial therapy treatment, neuropsychological testing and cognitive evoked potential (P300) was carried out on all participants to assess cognitive function.*

Results. *12-week therapy with simvastatin and atorvastatin significantly improved cognitive function (neuro-psychological testing and P300) in patients with AH and obesity.*

Keywords: *Arterial hypertension, obesity, cognitive dysfunction, simvastatin, atorvastatin*

Introduction

Nowadays, statins are considered to be one of the most commonly prescribed medications. There is strong clinical trial-based evidence, that statin administration reduces cardiovascular and cerebrovascular morbidity and mortality. However, there are reports stating that statin therapy may lead to cognitive decline, especially in older and senile patients [1,2]. Two large prospective studies (PROSPER, MRC/BHF Heart Protection Study), published in 2002, showed, statin therapy did not have a positive effect on cognitive function in young patients with cardiovascular risk [3,4]. Randomized clinical trials have confirmed the absence of association and correlation between statin use and the dementia onset, including Alzheimer's disease [5-7]. A number of researchers believe that long-term statin therapy does not impair memory and cognitive function in elderly patients [8,9]. On the other hand, according to the results of meta-analyses, statins reduce the incidence of non-hemorrhagic stroke by 17% -21%, despite the absence of a direct relationship between this indicator and elevated cholesterol levels, which potentially contributes to the preservation of mental function [9,10]. Statin use in patients with diagnosed dementia, as well as with Alzheimer's disease, can reduce the rate of progression of cognitive dysfunction [11-14].

Additionally, the question regarding the influence of the type of statin (lipophilic or hydrophilic) on cognitive functions remains open. A number of researchers hypothesized that lipophilic statins penetrate the blood-brain barrier better and have a greater effect on the central nervous system [15,16]. All of the above provided the basis for this study.

Aim of the study

The purpose of this study was the evaluation of simvastatin and atorvastatin therapy effects on cognitive function in patients with hypertension and obesity.

Materials and methods

This randomized, controlled, open study included men and women aged 35 to 55 with a diagnosis of hypertension at least one year prior to enrollment in the study, and a newly diagnosed cognitive deficit. Target blood pressure levels were observed during antihypertensive therapy. The study did not include patients with severe hypertension, secondary hypertension, ischemic heart disease, with a history of acute cerebrovascular accident; rhythm disturbances requiring antiarrhythmic drugs; chronic heart failure (NYHA III-IV class); serious comorbidity; alcoholism, significant anxiety and depression; taking antidepressants; menopause; pregnancy or breastfeeding; the likelihood of non-compliance with the schedule of visits for any reason; diabetes mellitus; statin hypersensitivity; liver diseases; persistent increase in transaminases; skeletal muscle diseases.

Treatment lasted 12 weeks. A total of 4 visits were scheduled: at visit B-1, after the patient was acquainted with the goals and purposes of the study, compli-

ance with the inclusion/exclusion criteria was assessed and the informed consent was signed. At visit B0, randomization was carried out by the envelope method, patients were divided into one of the therapy groups; group I was prescribed with atorvastatin at a dose of 40 mg per day, group II received simvastatin at a dose of 20 mg per day. At the next visit B1 (28±5 days), the researcher assessed the overall tolerability of the drug, recorded possible side effects, checked the patient's compliance with the drug regimen, measured blood pressure and heart rate (HR), performed a biochemical blood test and lipid spectrum. If necessary, the dose was increased up to 80 mg of atorvastatin and 40 mg of simvastatin. The criteria for increasing the dose: the lack of targeted reduction in total cholesterol (TC) and low-density lipoprotein cholesterol (LDL-C).

At visit B2 (12 weeks), the overall tolerability of the drug, possible side effects, patient compliance with the drug regimen, blood pressure and heart rate were assessed. Blood pressure was measured with an accuracy of 2 mmHg. in a sitting position, after 5 minutes of rest, three times with an interval of 2-3 minutes.

All patients underwent a clinical examination with the assessment of anthropometric parameters (waist circumference (WC), hip circumference (HC), body mass index (BMI)). Blood sampling was carried out to determine the level of plasma glucose and lipid spectrum indicators (reagents from Abbott (Germany)) on a biochemical analyzer (manufactured by ARCHITECT C8000, Germany).

The Hospital Anxiety and Depression Scale (HADS) was used to rule out significant anxiety and depression. Cognitive functions were assessed using neuropsychological scales: Mini-Mental State Examination (MMSE), frontal dysfunction test battery, clock drawing test, Luria's 10 word test. Subjective complaints of impaired memory and attention were assessed using the CFQ (Cognitive Failures Questionnaire). The result of the CFQ<1 test was considered as an indicator of an insignificant number of complaints, the result of CFQ> 1 - a negative assessment of one's own cognitive functions.

To assess the speed of reaction and the ability to concentrate, the Schulte test was used. Memory was assessed using the Wechsler Memory Scale (WMS). The verbal association test was used to assess semantic memory.

Quantification of cognitive functions was determined by the CEP (cognitive evoked potential) method using EMG/EP Nicolet Viking Select.

Testing, registration of CEP, blood sampling was carried out at baseline and at the end of treatment. Atorvastatin (Liprimar, Pfizer, Germany) and simvastatin (Zokor, Merck Sharp and Dome (MSD), USA) were prescribed.

The results of the study were processed using the computer program Statistica 6.0. When systematizing and statistically processing the data, the differences were considered significant at a significance level of $p<0.05$.

The study included 40 patients, mean age 46.25 ± 2.63 years, arterial hyperten-

sion duration 5.86 ± 1.64 years. 19 people in the atorvastatin group and 19 in the simvastatin group completed the study according to protocol. In these groups, the reason for excluding patients from further study was triple increase in transaminases. Patients in both groups received continuous antihypertensive therapy.

Comparative analysis of groups after randomization did not reveal differences in sex, age, lipid metabolism, BMI, WC. In the group of patients treated with simvastatin and atorvastatin, the level of systolic blood pressure (SBP) was (137.58 ± 8.93 and 136.24 ± 8.73 mm Hg), diastolic (DBP) (86.19 ± 6.19 and 86.25 ± 6.27 mmHg), glucose level (5.56 ± 0.61 and 5.58 ± 0.64 mmol/l).

Results

During treatment with simvastatin and atorvastatin, lipid profile improved in both groups. During therapy with simvastatin and atorvastatin, the level of total cholesterol decreased (6.47 ± 1.14 and 5.92 ± 0.97 mmol/l; 6.64 ± 1.16 and 5.94 ± 1.17 mmol/l), LDL cholesterol (3.94 ± 1.06 and 3.48 ± 0.89 mmol/l; 3.99 ± 1.08 and 3.49 ± 0.91 mmol/l), TG (2.23 ± 0.8 and 2.06 ± 0.79 mmol/l; 2.6 ± 0.9 and 2.07 ± 0.81 mmol/l) and the level of HDL cholesterol increased (1.29 ± 0.28 and 1.44 ± 0.3 mmol/l; 1.26 ± 0.28 and 1.43 ± 0.3 mmol/l).

There was a decrease in C-reactive protein (CRP) in the group of patients taking simvastatin (3.59 ± 1.3 and 3.05 ± 1.01 g/l) and atorvastatin (3.63 ± 1.4 and 3.17 ± 1.03 g/l).

In both groups, better cognitive functions levels were revealed after testing.

The results of the MMSE test, the Luria 10 word test, the “drawing clock” test increased, but these indicators did not reach a significant difference.

During therapy with simvastatin and atorvastatin, short-term memory (5.45 ± 1.36 and 6.76 ± 1.11 ; 5.49 ± 1.36 and 6.88 ± 1.14 points), and long-term memory (118.17 ± 17.86 and 126.68 ± 17.34 ; 119.23 ± 17.54 and 128.44 ± 17.63), attention (45.08 ± 9.97 and 47.94 ± 9.28 ; 45.29 ± 9.84 and 47.86 ± 9.38 seconds), semantic fluency (14.06 ± 2.53 and 15.09 ± 2.58 , 14.06 ± 2.49 and 15.55 ± 2.53) were assessed. On therapy with simvastatin and atorvastatin, a quantitative improvement in cognitive functions was noted. Decrease in CEP was shown: simvastatin (-9.8 ± 3.43 ms, $p > 0.05$), atorvastatin (-9.2 ± 3.49 ms, $p > 0.05$), but not reaching significant values. As can be seen from the data presented, the dynamics of the duration of the CEP latency period was comparable in both groups.

When conducting a correlation analysis, it was revealed that the change in the latent period of the CEP during simvastatin therapy depended on the initial BMI ($r = 0.385$; $p = 0.012$), OB ($r = 0.528$; $p = 0.013$), total cholesterol ($r = 0.365$; $p = 0.013$), atorvastatin from baseline BMI ($r = 0.421$; $p = 0.012$), total cholesterol ($r = 0.394$; $p = 0.013$).

Conclusion

1. Lipid profile in patients with hypertension and obesity seemingly improve

against the background of statin therapy.

2. Additionally, cognitive functions test results turned out to be better than at baseline according to neuropsychological testing and CEP.

3. Cognitive functions level on lipid-lowering therapy with statins (both lipophilic and hydrophilic) makes their use justified in patients with hypertension and obesity with the development of cognitive deficit.

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纹身时皮肤的形态变化
MORPHOLOGICAL CHANGES IN THE SKIN IN TATTOOING

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近来，文身不再是社会性的，已经从犯罪环境转移到青年社会，成为深受年轻人喜爱的亚文化元素。我们早期的研究表明，这种现象有一个缺点，即由皮肤创伤和纹身染料的副作用引起的并发症。

该研究的目的是描述实验动物和人类在纹身影响下皮肤的形态变化。材料与方法。对 40 只白色非线性大鼠（30 只实验动物，10 只对照动物）进行了实验研究。实验组的动物用黑色颜料纹身。动物在第 7、14 和 21 天退出实验。该研究的临床组包括 52 例主诉不满意纹身类型、皮肤瘙痒和肿胀的患者。对 52 块纹身皮肤碎片进行了组织学检查。描述了获得的显微制剂，制作了显微照片。一些准备工作是使用显微镜（德国）和 Pixera 相机（日本）拍摄的。结果。结果分析表明，在实验纹身过程中，观察到皮肤宏观和微观解剖结构的阶段性变化：炎症阶段被不完全吞噬阶段所取代，随后色素整合到网状层中。真皮层。在临床实践中，纹身后并发症的发展可能发生在所有阶段：从感染过敏反应和肉芽肿性炎症的发展到肿瘤过程的发展。结论。对于简单的纹身，这个过程应该被认为是潜在的，其持续时间取决于人的个体特征。由于内源性和外源性因素的不利影响，可能会出现晚期纹身后并发症。

关键词：皮肤的宏观和微观解剖学、皮肤形态学变化、纹身、色素、纹身后并发症。

Abstract. *Recently, tattooing is not of a social nature, having shifted from the criminal environment to the youth society, becoming a popular subculture element among the youth. Our earlier study revealed that this phenomenon has a downside*

in the form of complications caused by both trauma to the skin and side effects of tattoo dyes.

*The purpose of the study is to characterize the morphological changes in the skin under the influence of tattooing in experimental animals and humans. Material and methods. An experimental study was carried out on 40 white non-linear rats (30 experimental, 10 control). Animals of the experimental group were tattooed with black pigment. Animals were withdrawn from the experiment on days 7, 14, and 21. The clinical block of the study included 52 cases of patients with complaints of an unsatisfactory type of tattoo, skin itching, and swelling. 52 tattooed skin fragments were subjected to histological examination. The obtained micropreparations were described, microphotograms were made. Some of the preparations were photographed using a Micros microscope (Germany) with a Pixera camera (Japan). **Results.** Analysis of the results showed that during experimental tattooing, a staged change in the macro- and microanatomical structure of the skin is observed: the inflammatory stage is replaced by the stage of incomplete phagocytosis, followed by the integration of the pigment into the reticular layer of the dermis. In clinical practice, the development of post-tattoo complications can occur at all stages: from the development of infectious-allergic reactions and granulomatous inflammation to the development of neoplastic processes. Conclusion. With uncomplicated tattooing, this process should be considered latent, the duration of which depends on the individual characteristics of the person. With adverse effects of endo- and exogenous factors, late post-tattoo complications may occur.*

Keywords: *macro- and microanatomy of the skin, morphological changes in the skin, tattooing, pigment, post-tattoo complications.*

Introduction

Recently, tattooing is not of a social nature, having shifted from the criminal environment to the youth society, becoming a popular subculture element among the youth. Our earlier study revealed that this phenomenon has a downside in the form of complications caused by both trauma to the skin and side effects of tattoo dyes.

The purpose of the study: to establish the presence of morphological changes in the skin under the influence of a tattoo in the experiment and on the basis of clinical cases.

Material and methods

An experimental study was carried out on 40 white non-linear rats (30 experimental, 10 control). Animals of the experimental group were tattooed with black pigment. Animals were withdrawn from the experiment on days 7, 14, and 21. The clinical block of the study included 52 cases of patients with complaints of an

unsatisfactory type of tattoo, skin itching, and swelling. 52 tattooed skin fragments were subjected to histological examination. The obtained micropreparations were described, microphotograms were made. Some of the preparations were photographed using a Micros microscope (Germany) with a Pixera camera (Japan).

When conducting a histological study of skin fragments of intact rats, it was found that it had a typical histological structure throughout the experiment and was represented by characteristic layers with clear boundaries. The stratum corneum, directly adjacent to the external environment, is formed by scaly keratinocytes, followed by a granular layer, represented by several layers of cells. The spinous layer flattened towards the granular layer and was formed by uneven cells, then the basal layer was visualized. The dermis itself consisted of papillary and reticular layers, the reticular layer had a typical structure and was formed by a dense, unformed connective tissue with a predominance of collagen fibers (Fig. 1A).

Histological examination of the skin of tattooed rats showed that all layers were preserved throughout the experiment, however, changes that were staged were determined. So, on the 7th day, the pigment was unevenly located in the reticular layer of the dermis, mainly near the vessels, a pronounced inflammatory reaction was detected in the area of tattooing, which was morphologically represented by the marginal standing of leukocytes in the vessels. In the reticular layer of the dermis, focal leukocyte infiltration was noted, represented by neutrophils with single eosinophils and a small number of lymphocytes (Fig. 1B).

This fact seems to us quite logical and is due to a microtrauma caused during the tattooing procedure, and can also be regarded as a reaction to the introduction of a pigment dye.

On the 14th day of the experiment, there was no edema, inflammation was insignificant, diffusely located pigment granules were determined in the tattoo area. At the same time, the tattoo pigment was determined not near the vessels, as on the 7th day of the experiment, but was intercellularly integrated in the papillary dermis (Fig. 1C).

On the 21st day of the experiment, edema and inflammation were absent, the layers were preserved and clearly demarcated. Accumulations of pigment were determined in the tattoo area, however, their location differed from that in the previous period of the experiment. The tattoo pigment migrated deep into the dermis and was located mainly in the reticular layer of the dermis, while only its single granules were determined in the papillary layer (Fig. 1D).

Thus, during the tattooing procedure in the experiment, it was found that the anatomical structure of the skin is transformed due to the incorporation of a tattoo pigment into its structure, while the identified changes are of a staged nature.

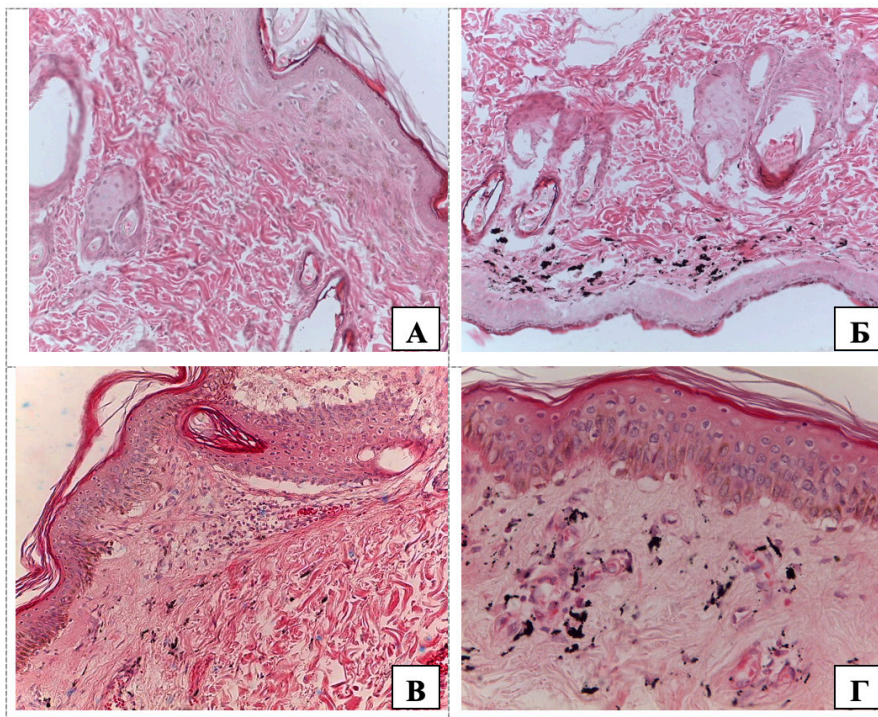


Fig.1. Skin of rats of intact and experimental groups. A. Intact rat skin: typical histological structure of the epidermis. Hematoxylin and eosin staining. Ob. 20; staining.10. B. The skin of a rat with a tattoo on the 7th day of the experiment. Hematoxylin and eosin staining. Ob. 20; staining.10. C. The skin of a rat with a tattoo on the 14th day of the experiment. Hematoxylin and eosin staining. Ob. 20; staining 10. D. The skin of a rat with a tattoo on the 21st day of the experiment. The layered histological structure is disturbed: the granular layer has practically disappeared. Redistribution of the location of the tattoo pigment, migration from the papillary layer to the reticular layer of the dermis. Hematoxylin and eosin staining. Ob. 40; staining 10.

When studying the clinical material obtained from patients who complained of skin changes in the tattooed area, the complications were extremely polymorphic. The range of identified changes in the anatomical structure of the skin fully corresponded to our earlier proposed classification of post-tattoo complications.

One of the most common anatomical transformations during tattooing, according to our clinical observations, is the appearance of a keloid scar in the area of

pigment injection in response to skin microtrauma, which was observed in 15 patients (28.8%). Histological examination in the papillary dermis revealed an uneven distribution of pigment, represented by granules of various sizes. There was a thickening of individual fibers of the connective tissue, defibrillation and de-structurization of the dermis fibers against the background of impaired maturation, which corresponds to the morphological characteristics of the keloid (Fig. 2A).

Granulomatous inflammation around the foreign body (tattoo pigment granules) was found with the same frequency in the tattoo area in 28.8% of cases (15 patients). Microscopically, they were determined by clusters of Langerhans cells of the skin (resident macrophages) and giant cells of foreign bodies with an admixture of plasma cells and eosinophilic granulocytes, near which tattoo pigment granules of various sizes were found: from conglomerates to dust particles (Fig. 2B).

In 25.0% of cases (in 13 patients), hyperkeratosis of various areas was found at the tattoo site. At the same time, in 15.4% of cases, the area of hyperkeratosis resulting from the tattooing procedure exceeded the area originally covered by the tattoo pigment. Microscopically, the following changes in the anatomical structure of the skin were determined: an increase in the thickness of the granular layer, a slight narrowing of the spiny layer, uneven acanthosis, and parakeratosis (Fig. 2C).

Somewhat less frequently - in 17.3% of visits (in 9 patients) the tattooing procedure was the cause of the nevus. Histological examination of the material revealed clusters of tattoo pigment and melanocytes of 5 cells or more, which were located on the border of the epidermis and dermis, with a tendency to migrate into the dermis. Nevus cells were characterized by moderate polymorphism: large cuboidal cells with a high content of cytoplasm and the presence of pigment were mostly located in the upper part of the papillary dermis, followed by an accumulation of pigmentless cells of medium size. In addition, a small number of spindle-shaped cells were found, which morphologically corresponded to the picture of a mixed nevus (Fig. 2D).

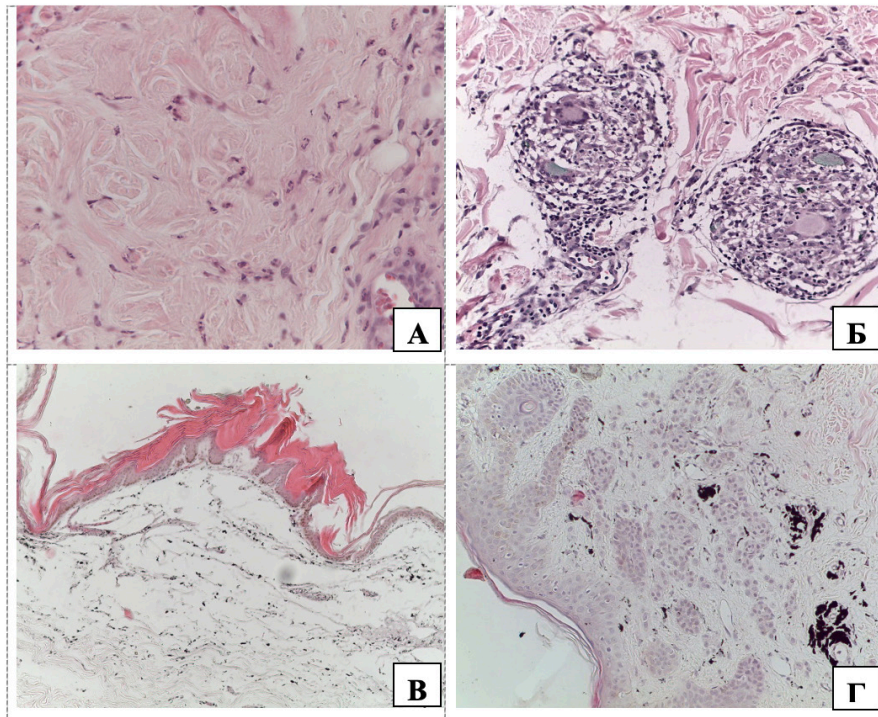


Fig. 2. Fragments of the skin obtained by puncture biopsy in the tattoo area: violations of the microanatomical structure of the skin (post-tattoo complications). A - keloid scar. Hematoxylin and eosin staining, Ob. 20; staining 10. B - granulomatous inflammation: accumulation of resident macrophages and cells of ion-bearing bodies with an admixture of plasma cells around the granules of the tattoo pigment. Hematoxylin and eosin staining, Ob. 20; Staining 10. B - hyperkeratosis, uneven acanthosis, parakeratosis. Hematoxylin and eosin staining, Ob. 10; staining 10. D - the occurrence of a nevus in the tattoo area. Hematoxylin and eosin staining, Ob. 20; Staining 10.

Thus, despite the fact that a tattoo is not regarded as a pathological condition, and post-tattoo complications are not included in the ICD-10, and therefore are not a disease, structural changes in the skin that has undergone a tattoo procedure, which we have identified at the macro- and microscopic levels, indicate about the violation of the anatomical structure of the skin and the occurrence of irreversible changes in it.

Conclusion. During experimental tattooing, a staged change in the macro- and microanatomical structure of the skin is observed: stage 1 - inflammatory (up to 7 days); stage 2 - incomplete phagocytosis up to (21 days); Stage 3 - integration of the pigment into the reticular layer of the dermis (over 21 days).

In clinical practice, the development of post-tattoo complications can occur at all stages. At the same time, in stage 1, the likelihood of developing infectious-allergic reactions and inflammatory reactions is greater. In the second stage, granulomatous inflammation is most likely with a tendency to chronicize the process. In the third stage, the formation of keloid scars, hyperkeratosis and the development of neoplastic processes are possible.

With uncomplicated tattooing, this process should be considered latent, the duration of which depends on the individual characteristics of the person. With adverse effects of endo and exogenous factors, late post-tattoo complications may occur.

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肝胆系统发育的个体发生特征
**ONTOGENETIC FEATURES OF THE DEVELOPMENT OF THE
HEPATOBIILIARY SYSTEM**

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人体肝胆系统是一个复杂的多层次系统，各部门的协调相互作用保证了消化和排泄。病理学发展的高频率及其各个结构的结构变异性需要对该区域的解剖结构进行彻底研究。对个体发育特征的研究将为理解各种结构特征的形成创造一个整体图景，这方面的知识肯定有助于该区域病理学的治疗。

Keywords: 肝胆系统, 肝脏, 胆囊, 个体发生

Abstract. *The human hepatobiliary system is a complex, multilevel system, the harmonious interaction of all departments of which ensures digestion and excretion. The high frequency of development of pathology as well as the variability in the structure of its individual structures necessitates a thorough study of the anatomy of this zone. The study of the features of ontogenetic development will create a holistic picture of understanding the formation of various structural features, the knowledge of which will certainly be useful in the treatment of pathologies in this zone.*

Keywords: *hepatobiliary system, liver, gallbladder, ontogenesis*

Variant anatomy is a branch of anatomy that studies interindividual variants of the shape and topography of the macroscopic structures of the body. Physicians' knowledge and understanding of the nature of normal anatomical variations is important in order to distinguish them from pathological conditions. Today, vari-

ant anatomy defines the boundaries of the norm, demonstrates its extreme forms, reveals variants of the abnormal structure of anatomical and physiological systems and their components, reveals the patterns of their development, and also complements the concept of an individual norm. Such normal anatomical differences are mainly due to genetic factors and the characteristics of individual ontogenetic growth.

According to statistical studies of recent years, the abdominal cavity occupies the leading place in surgical interventions on the operating table. Open, endovascular, laparoscopic operations all require high knowledge of the anatomical location of organs and vessels. Unfortunately, despite the high-tech capabilities, the percentage of iatrogenic complications still persists.

The growth of opportunities for surgical treatment of various diseases of the liver and biliary system requires an increasingly detailed study of the variant anatomy of the structures of the hepatobiliary system. For example, in transplantation, in addition to histological compatibility, the study of "anatomical compatibility" is becoming more and more relevant, suggesting the proximity of the variant anatomy of the structures of the hepatoduodenal ligament in the donor and recipient [1,3].

The possibilities of treating oncological diseases of the liver are expanding by means of redistributive embolization of vessels, which requires a detailed study of the vascular bed [3]. The relevance of surgical interventions, in particular cholecystectomy, for the treatment of diseases of the biliary system, and the fight against iatrogenic injuries associated with an insufficiently complete description of the possible features of the biliary tract and the arteries supplying them does not decrease [3, 5]. In addition, the relationship of the structures of the arterial bed of the liver with the arterial bed of the stomach, duodenum and other areas makes a detailed study of the variant anatomy of the arterial bed of the liver even more relevant. The priority task at present is a comprehensive study of the variant anatomy of the structures of the hepatobiliary system, because in practical surgery, the doctor is faced with variations not of individual structures, but with their combinations [3]. The constant discovery of new options shows that the study of this topic is relevant.

The human liver develops at the end of the 3rd - beginning of the 4th week of embryogenesis from the endoderm of the primary intestine. Initially, the endoderm of the anterior part of the future intestinal tube thickens and forms the so-called hepatic field, located caudal to the heart. After the formation of the intestinal tube from the intestinal endoderm, the hepatic field is part of the wall of the duodenum 12, which later forms a protrusion into the ventral mesentery, called the hepatic bay (hepatic diverticulum, also known as the liver rudiment). Then the epithelium of the hepatic diverticulum is divided into two sections: cranial and caudal. From

the cranial region, hepatocytes and cholangiocytes of the epithelium of the hepatic ducts (liver, intrahepatic and common bile ducts) develop from the caudal - the epithelium of the gallbladder and cystic duct.

The cranial region grows rapidly, and its cells form strands that anastomose with each other, which will later form the hepatic parenchyma. Sinusoidal capillaries appear between these strands, which are the terminal branches of the vitelline vein, which is formed from the mesenchyme and subsequently transforms into the portal vein. Sinusoidal capillaries acquire a radial direction and, when merged, form a central vein. The endotheliocytes that form the wall of capillaries carry out inductive influences on the cells of epithelial cords, and as a result, hepatocytes are formed from these cords. At this stage, a bifurcation occurs in the cranial part of the diverticulum, which ultimately leads to a doubling of the common bile duct. The germ on the side of the hepatic diverticulum turns into a gallbladder, which quickly lengthens, taking the form of a sac, the cell strands of these formations become extrahepatic bile ducts. In addition, another process appears on the hepatic stalk, which is the ventral rudiment of the pancreas.

With the development of the fibrous membrane and interlobular connective tissue, the structural and functional units of the liver, the lobules, gradually begin to form. Plates of hepatocytes gradually acquire a radial direction. They are located more rarely than in adults, since at this time the sinusoidal capillaries are wider. The developing liver and pancreas subsequently maintain a connection with the duodenum with the help of the future common bile duct and pancreatic duct. During the 2-3rd month of embryogenesis, the liver grows intensively and quickly reaches a mass of 10% of the total body weight of the embryo. During the 2nd month, bile capillaries are formed in the liver plates due to the invagination of plasmolemmas of hepatocytes that are in close contact in the plates. The walls of the bile capillaries are strengthened by a system of intercellular contacts. At the 4th month of embryogenesis, the liver begins to secrete bile and simultaneously stores glycogen. Although the formation of classical lobules is planned quite early, in general, the lobulation of the liver and the lamellar (beam) structure of the lobules are still not sufficiently pronounced at this time. Their final formation is completed in the postnatal period. [2]

The distal parts of the branching liver cells turn into secretory sections, and the axial strands of the cells serve as the basis for a system of ducts, through which fluid flows out of this lobule towards the gallbladder. A double afferent blood supply to the liver develops, which is essential for understanding its physiological functions and clinical syndromes that occur when its blood supply is disturbed. The beginning of bile secretion is observed already at the 12th week of intrauterine development. Intensively growing hepatic tissue in the form of an accumulation of epithelial strands surrounds the developing gallbladder on all sides, separating

from it with a layer of mesenchyme, from which the muscular and serous membranes of the gallbladder will subsequently form. During the embryonic period, the gallbladder is a solid formation. Its mucous membrane is lined with a single-layer cylindrical epithelium, which, as a result of intensive growth, completely fills the lumen of the gallbladder - physiological occlusion. On the 7-8th week, destruction of epithelial cells occurs, filling the lumen of the bladder with the formation of its cavity. At this stage, the gallbladder mucosa is lined with columnar epithelium. The process of gallbladder morphogenesis is completed by the 12th week - the gallbladder cavity is formed and free of epithelial plugs.

Simultaneously with internal structural changes, changes occur in the position of the organs. The initial ventral location of the proximal biliary structures changes due to a change in the position of the duodenum. Due to differentiation of growth or rotation of the intestinal wall, the duodenal end of the bile duct and the pancreatic rudiment are displaced posteriorly and to the left. In this case, the ventral rudiment of the pancreas is connected to the dorsal rudiment, which comes from the opposite duodenal wall, slightly cranial to the hepatic rudiment. In the process of connection, both pancreatic rudiments surround the common bile duct at different lengths. The ductal system of both buds joins, with the dorsal duct forming the main distal part of the duct, and the ventral duct forming the proximal duct of the pancreatic head. This is how the formation of the biliopancreatic system of the fetus ends in the embryonic period.

To date, there are a lot of reasons that can cause developmental anomalies. Viral infection, genetic mutations, vascular or metabolic disorders during the embryonic development of the biliary system, and much more can lead to the development of congenital anomalies of the biliary tract, the percentage of occurrence of which varies from low to fairly high numbers, respectively, knowledge and understanding of the individually correct location of organs and structures for doctors necessary for successful diagnostic and therapeutic procedures.

So, for example, "obstructive cholangiopathy of the newborn" which includes biliary atresia, cysts of the common bile duct and congenital hepatitis are quite common in the practice of pediatricians. Atresia of the bile ducts is less common - in one case per 10-20 thousand newborns [2]. In 30% of cases of congenital diseases, atresia is combined with other anomalies. Along with congenital diseases, there are various options for the development of the biliary system. Doubling of the gallbladder, left-sided location, congenital absence are extremely rare. A more frequent deviation from the norm (18-23% of cases) is a change in the anatomical relationship of the cystic and common bile duct. In 75% of people, the cystic duct opens into the middle third of the common bile duct, in 10% of cases into the distal part of the common bile duct. With typical topography, the cystic duct occupies a parallel right lateral position relative to the common bile duct. So, in 5% of people

there is an accessory bile duct, coming from the right hepatic duct and opening into the cystic duct or into the common bile duct. This anomaly is the cause of inadvertent intersection of the aberrant (accessory) duct instead of the cystic duct [2]. In 2-5% of cases there is a crossing of the cystic and common bile duct. In 2% of cases, a shortening of the cystic duct or, conversely, an elongation of the cystic duct is described. Also, cases are recorded where the common bile duct is absent, and the cystic and common hepatic ducts open directly into the duodenum.

Another important anatomical feature is the presence of an accessory hepatic artery. The cystic duct can have an anterior or posterior branch of the artery and, when performing cholecystectomy, become a source of bleeding if it is not completely ligated. In 5% of cases, the cystic artery may originate from the left or common hepatic artery.

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COVID-19 中内脏器官的结构变化
STRUCTURAL CHANGES OF INTERNAL ORGANS IN COVID-19

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迄今为止，对 COVID-19 的病理解剖学、发病机制和形态发生以及 COVID-19 的表现和并发症的研究仍然不够充分。 [1] 本文讨论了最脆弱的内脏器官：胰腺、肾上腺和淋巴结。 由于只有通过死后尸检才能获得有关 COVID-19 任何器官结构变化的可靠信息，因此在本研究中，从 20 名实验室确诊为新型冠状病毒感染 COVID 的死者身上收集了尸检材料 -19。

该论文介绍了 2022 年 1 月 1 日至 2022 年 2 月 7 日期间死于皮亚季戈尔斯克的 20 例尸检结果。 年龄 31 至 86 岁（平均年龄 58.5 ± 21.4 ），患有严重的 COVID-19，包括 7 名男性和 13 名女性。 以前，此经验未在其他来源中介绍。 根据世界卫生组织、俄罗斯卫生部和 Rospotrebnadzor 的监管文件，严格遵守生物安全规则，在改造后的病理部门进行病理和解剖尸检。 由于最近出现了在快速发展的 COVID-19 感染背景下与肺部同步受损的其他内脏器官的病例，这促使我们寻找 SARS-CoV-2 病毒与这些器官之间的关系。 值得注意的是，我们已经发现临床病例，在上述传染病的背景下，出现了高血糖的最初迹象，这使患有各种形式糖尿病的患者面临并发症的风险。 服用糖皮质激素会增加肾上腺形态变化的风险。 淋巴组织中的肺外并发症很有趣，因为淋巴结的支气管肺群非常靠近呼吸系统的器官。 以上所有方面决定了所选主题的相关性。

关键词：新型冠状病毒感染 COVID-19、SARS-CoV-2 病毒、COVID-19 中的胰腺、COVID-19 中的肾上腺、COVID-19 中的淋巴结、细胞因子风暴。

Abstract. *To date, the pathological anatomy, pathogenesis and morphogenesis of manifestations and complications of COVID-19 remain insufficiently studied. [1]*

This article discusses the most vulnerable internal organs: the pancreas, adrenal glands and lymph nodes. Due to the fact that obtaining reliable information about structural changes in any organ with COVID-19 is possible only through post-mortem autopsy, in this study, autopsy material was collected from 20 deceased patients with a laboratory-confirmed diagnosis of novel coronavirus infection COVID-19.

The paper presents the results of 20 post-mortem autopsies that died in Pyatigorsk from 01/01/2022 to 02/07/2022, aged 31 to 86 (mean age 58.5 ± 21.4) from a severe form of COVID-19, including 7 men and 13 women. Previously, this experience was not presented in other sources. Pathological and anatomical autopsies were performed in repurposed pathological departments in accordance with strict adherence to biosafety rules in accordance with the regulatory documents of the World Health Organization, the Ministry of Health of Russia and Rospotrebnadzor. Since recently there have been cases of damage to other internal organs synchronous with the lungs against the background of a rapidly developing COVID-19 infection, this prompted us to look for a relationship between the SARS-CoV-2 virus and these organs. It is worth noting that we have found clinical cases where, against the background of the previously mentioned infectious disease, the first signs of hyperglycemia occur, which puts patients with various forms of diabetes at risk of complications. Taking glucocorticosteroids increases the risk of morphological changes in the adrenal glands. Extrapulmonary complications in the lymphoid tissue are of interest, because the bronchopulmonary group of lymph nodes is in close proximity to the organs of the respiratory system. All of the above aspects determine the relevance of the chosen topic.

Keywords: *Novel coronavirus infection COVID-19, SARS-CoV-2 virus, pancreas in COVID-19, adrenal glands in COVID-19, lymph nodes in COVID-19, cytokine storm.*

The purpose of the study is to conduct a study of autopsy material of patients who died from a new coronavirus infection. Determine the presence and nature of morphological changes in internal organs: pancreas, adrenal glands, lymph nodes

Material and methods

The material for the study was 40 samples of the adrenal glands, 20 samples of the pancreas, 40 samples of the lymph nodes of the peribronchial group obtained from 20 patients with COVID-19. In all patients, the SARS-COV-2 RNA virus was identified by PCR. The material was fixed in a 10% formalin solution for 24 hours, then subjected to standard histological wiring, followed by sectioning, staining with hematoxylin and eosin, and microscopy. We performed an analysis of the patient's medical record. The biochemical and clinical parameters of blood, the dynamics of the patient's condition, the presence or absence of concomitant pa-

thology, laboratory and instrumental methods of research were taken into account.
results

In all patients (100% of cases) whose main cause of death was COVID-19, pronounced morphological changes in the lungs were found, however, it is worth noting that simultaneous bilateral damage to the adrenal glands, pancreas, and lymph nodes was also determined. It is known that the damage to the organs we studied is multifactorial in nature and, according to Zairatyants et al., is called the clinical and morphological “masks” of COVID-19 [1]. Among the factors contributing to the occurrence of morphological changes in the studied organs are present: specific viral damage, hypoxia, hyperergic immune response, autoimmune genesis of the lesion is not excluded. COVID-19 is characterized by morphological changes associated with comorbid diseases and their complications in older age groups. In a number of cases, deceased patients were diagnosed with sepsis involving bacterial and mixed flora, occurring with multiple organ purulent foci.

In our work, the lymph nodes were considered as an important component of the immune system. We have identified a wide range of changes, depending on such factors as: the duration of the disease, the presence or absence of comorbid diseases, the characteristics of therapeutic treatment. Similarly to the lungs in the lymph nodes of the bronchopulmonary group, the phenomenon of autocytophagy was found in the marginal sinuses. Phagocytosis of whole lymphocytes was also present.

Macroscopically, the peribronchial group of lymph nodes showed a gray-pink color; on the cut, pronounced plethora was noted. In contrast to the lymph nodes of patients from the comparison group, they had a larger size.

On histological preparations, the pattern was erased, the absence of visualization of lymphoid follicles and light germinal centers was determined. Clusters of cells morphologically similar to monocytes were found in the sinuses. A rarity was the presence of small lymphoid follicles, in which light germinal centers were not visualized, in the sinuses and cortex - large accumulations of large cells with the morphology of monocytes. [4]

Microscopic examination of the peribronchial lymph nodes revealed the phenomenon of autocytophagy with pronounced plethora of the microvasculature and sludge of erythrocytes, and in 3 cases an accumulation of lymphocytes and macrophages in the sinuses with the phenomenon of autocytophagy was found. [4]

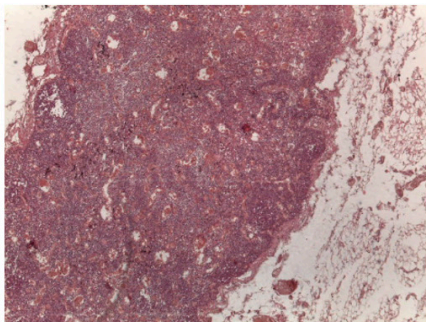


Figure 1. Peribronchial lymph node in COVID 19. Erased pattern of the structure, lymphoid follicles and light germinal centers are not visualized Hematoxylin and eosin staining. Zoom x40

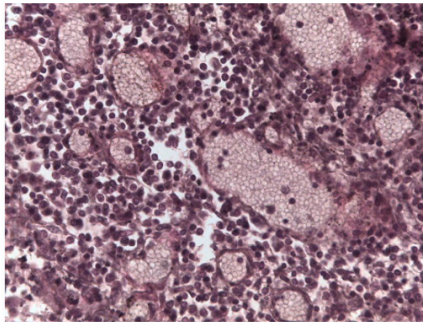
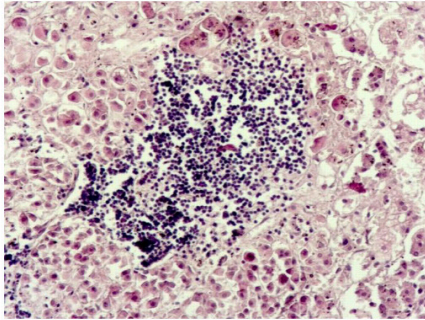


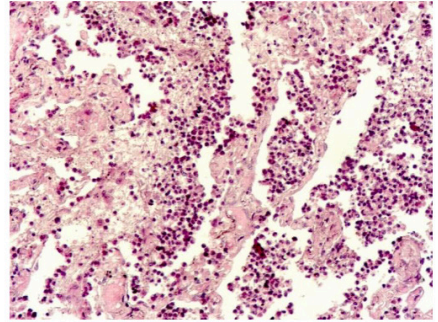
Figure 2. Peribronchial lymph node Pronounced plethora of the microvasculature and erythrocyte sludge. Hematoxylin and eosin staining. Zoom 400

The macroscopic picture of the adrenal glands is as follows: topographically, the adrenal glands were located upward and medially relative to the kidney. The right one was in the shape of a pyramid, the left one was a crescent. On the section, three zones were clearly defined: the outer one was bright yellow, the middle one was a thin layer of brown color, and the inner one was gray, represented by the medulla.

As a result of the study, pronounced morphological changes in the tissue of the adrenal glands at the microscopic level were established, which manifested themselves in the form of lymphocytic infiltration and areas of necrosis. Also, microscopic examination in sections of the right and left adrenal glands shows mainly the cortical layer. The structure and interposition of the components of the cortical layer is not disturbed. Microscopically, in some cases, necrosis of the cortical layer of the adrenal gland was detected. The degree of blood filling of the cortical substance is moderate. Delipidization is weakly expressed. [3]



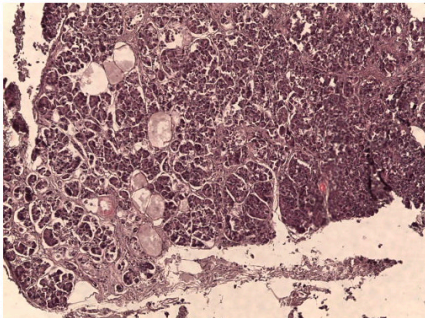
**Figure 3. Adrenal gland. Inflammatory infiltration in the adrenal cortex
Hemotoxylin and Eosin staining
Zoom x 200**



**Figure 4. Adrenal gland. Areas of necrosis in the adrenal cortex
Hemotoxylin and Eosin staining
Zoom x 200**

At the macroscopic level, in the study of the pancreas, in most cases, atrophy, focal or diffuse lipomatosis attracted attention. In a small number of cases, hemorrhages and hemorrhagic necrosis were found.

The microscopic picture of the pancreas is characterized by stromal and parenchymal lipomatosis, moderate atrophy of the exocrine parenchyma, plethora of the microvasculature with erythrocyte sludge. Quite rarely, there was necrosis of cells of the endocrine part of the pancreas with perifocal fibrosis. [2]



**Figure 5. Pancreas. Focal lipomatosis.
Hematoxylin and Eosin staining.
Zoom x 100**

Conclusion

The study revealed pronounced morphological changes in the tissues of internal organs in patients who died from laboratory-confirmed COVID-19 infection. The most common morphological manifestations in the lymph nodes were the absence of visualization of lymphoid follicles and light germinal centers, as well as the accumulation of cells with monocyte morphology. In the adrenal glands, main-

ly the cortical substance was affected, with a histological picture of lymphocytic infiltration and areas of necrosis. Characteristic changes in the morphological picture of the pancreas were lipomatosis, which is both focal and diffuse. Atrophy of the stroma, as well as the endocrine part of the gland. All of the above morphological changes confirm the hypothesis of synchronous damage to the internal organs associated with the cytokine storm, and bacterial complications may be associated with transient immunodeficiency due to the impact of the SARS-COV-2 virus on the tissues of the lymph nodes.

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确定人体体型的方法
METHODS FOR DETERMINING HUMAN SOMATOTYPES

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迄今为止，体型的定义有 100 多种，但还没有一个普遍接受的分类。人体结构问题是理论医学和实践医学都感兴趣的领域。对人类学方法的需求反映在“宪法学”一词的科学文献中，该术语通常被理解为旨在分析人类宪法各个方面的生物医学知识的一部分。本文提供了有关主要方法和途径的一般信息。

关键词：体型； 分类； 方法； 理论。

Abstract. *To date, there are more than 100 definitions of somatotypes, but there is no generally accepted classification. Questions of the human constitution are in the sphere of interests of both theoretical and practical medicine. The demand for the anthropological approach is reflected in the presence in the scientific literature of the term “constitutionology”, which is usually understood as a section of biomedical knowledge aimed at analyzing various aspects of the human constitution. This article provides general information about the main methods and approaches.*

Keywords: *somatotype; classification; methods; theory.*

By the end of the twenties of the last century, the constitutional concept of domestic medicine was formulated. The principle of integrity and the individual-typological approach in the study of various aspects of the development and

functioning of a person were the methodological basis of the doctrine of the human constitution. The founders of this scientific direction were domestic anthropologists V. V. Bunak (1931), Ya. Ya. Roginsky and M. G. Levin (1955), anatomists V. N. Shevkunenko (1925) and V. G. Stefko (1929), pathophysiologicalist A. A. Bogomolets (1926), therapist M. V. Chernorutsky (1925), pediatrician M. S. Maslov (1926), teacher M. Ya. Breitman (1924), who created a theoretical basis for practical medicine with their outstanding works, thanks to which the doctrine of the constitution acquired the status of a scientifically based medical methodology. After all, knowledge and understanding of the somatotypological characteristics of the individual created an opportunity for the practitioner to notice the strategic criteria for individual diagnosis, prognosis, therapy and prevention of somatic and mental diseases. The gradual accumulation of experience has led scientists involved in the human constitution to realize that this concept is very capacious, complex and necessary in practice.

Currently, there are a significant number of definitions of the constitution. So, P. B. Gofman-Kadoshnikov believed that the constitution is the result of the interaction of genotypic information with the environment, expressed in a particular individual. P. D. Horizontov and M. Ya. Maizelis understood the constitution as the state of the body and its reactive abilities, formed in the process of interaction with the environment on the basis of hereditary and acquired properties. A similar approach was taken by G. Grimm, who believed that the constitution is the result of the development of hereditary inclinations under the influence of the environment. D. Tanner based the constitution on persistent differences between people, that is, such aspects of structure, function and behavior that do not change significantly from day to day and even for several years. These should be morphological, physiological and psychological features that are inseparable not only in theory, but also in purely practical research. The term constitution combines the functional-energetic, functional-motor and psychological properties of an individual. The unity of these components and reactivity to external influences indicates the need for further study of the structure and function correlations. With this understanding of the constitution, functional and morphological parameters are considered as equivalent.

The somatotype can serve as a morphological characteristic of a person and, in turn, is a portrait of metabolic processes in his/her body. The relationship between body features and body reactivity, metabolism, endocrine immunological parameters, temperament characteristics proves that the somatotype can act not only as the basis for constitutional diagnosis and assessment of human health.

In the 19th century, the doctrine of the constitution was based on anatomical and morphological indicators (E. Rostand). Then anthropological, functional, psychological and combined signs were gradually added to the assessment.

Chernorutsky M.V., Shevkunenko V.N., Sheldon U.Kh., Bunak V.V., Galant I.B. [2], Bashkirov P.N. [1] Based on anthropometric indicators in their methods. For signs, various combinations of body sizes and indices were tested, reflecting the ratio of body composition components, its dimensions and shape. To date, one of the most popular methods of Chernorutsky M.V. - 3 constitutional types: asthenic, normosthenic and hypersthenic - based on the Pinier index.

Chernorutsky's work formed the basis of Sheldon's classifications. He singled out among men dolichomorphs, brachymorphs, mesomorphs. It is based on three components - mesomorphic, endomorphic and ectomorphic, evaluated by experts on a point scale.[1] The somatotyping method according to V.P. Chtetsov was based on anthropometric indicators, the results for women and men were evaluated on different scales.

In the XX century contribution to the development of theories about the human constitution was made by Galant I.B. and Bunak V.V. Galant I.B. singled out 7 somatotypes among women and combined them into three groups: leptosomic (predominance of longitudinal dimensions), mesosomal (predominance of transverse dimensions), megalosomal (average values). Bunak V.V. in turn, singled out among men dolichoplastic, mesoplastic, brachyplastic, subplastic types. The classification is based on Shevkunenko V.N. lies the calculation of the percentage of the longitudinal and transverse dimensions of the human body to its length. He identified 2 somatotypes: dolimorphic and brachymorphic. Pavlov I.P. distinguished 4 types according to the strength of excitation and inhibition: weak (based on the inhibitory type) - melancholic type; strong (based on balance) - phlegmatic; strong and unbalanced - choleric; lively, strong, balanced - sanguine. In the 1920s, Claude Sigo created a typology, where, depending on the predominance of one of the systems in the body, he distinguished four main body types (respiratory, digestive, muscular, cerebral). [3,4] The German scientist E. Kretschmer proposed to distinguish four constitutional types: leptosomatic, picnic, athletic, dysplastic. Also, his main idea was the belief that people with a certain body type have certain mental characteristics. R.P. Dorokhov approached a more detailed anthropometric study of somatotypes, among which he singled out 5 main (nanosomal, microsomal, mesosomal, macrosomal, megalosomal) and 2 transitional (micromesosomal and mesomacrosomal). To determine the group, it is necessary to calculate fat, bone, muscle mass.

For typing, the index of the ratio of chest circumference to body length was usually used, which made it possible to group individuals as relatively narrow-chested and broad-chested. Narrow-chested were characterized as weak-muscular, and broad-chested as strong-muscular. This, in turn, reflected the desire of scientists to use objective measuring signs for constitutional diagnostics. Thus, more than

40 anthropometric indicators have appeared that are involved in the calculation of the somatotype in humans, the set of which depends on the chosen calculation method.[5]

To date, there is no single, generally recognized system of somatotypes, so researchers choose the most convenient method for them on their own, or only the one they know about. According to the analysis of the literature of domestic and foreign authors, more than 30 methods for calculating somatotypes are now distinguished. An important feature is that different methods use different constitutional approaches, a different set of indicators, and as a result, a different interpretation, with an absolutely subjective division into subgroups. So, a person can have 2-3 types of somatotypes, and maybe 6-7, which significantly complicates external comparative analysis. For example, when assessing a somatotype using the Chtetsov method, the number of measured traits is 29 parameters, in addition to simple measurement, the results must be converted into scores and evaluated on special scales. As a result of the analysis, it is proposed to determine the type of somatotype, which will qualitatively and quantitatively differ in men and women. In men: asthenic, thoracic, muscular, abdominal, eurisomal. In women: asthenic, stenoplastic, pycnic, mesoplastic, euryplastic, subathletic, athletic. Along with the presented somatotypes, the author also identifies intermediate types. All of the above shows the significant complexity of the analysis and comparison of its results with the indicators of somatotypes of other authors. For example, Chernorutsky presented a classification of somatotypes from 3 groups and it is rather problematic to correlate them with 7 groups.[4]

The study of individual typological features of populations that contribute to the elucidation of the patterns of interaction of the organism with the external environment and the realization of the genotype in the phenotype is the main task in preventive medicine. The constitutional principle in studies of the physical development and functioning of the body allows us to study the individual characteristics of the course of physiological processes, and to determine the criteria that identify risk groups for various diseases, deviations and disorders in adaptation to the environment. Knowledge of constitutional features, anatomical components of the body (bone, muscle and adipose tissue) and dermatoglyphic and antigenic indicators provide an integrative detailed picture of the morpho-risk factors of a particular somatotype and hereditary predisposition to a particular pathology.

Conclusion. To monitor the level of health, taking into account regional characteristics, complex knowledge is needed about the levels of physical development of the population, its anthropological and environmental aspects in various climatic and geographical regions. Thanks to this, it becomes possible to correctly form and develop medical and social programs to promote health, prevent diseases, improve the quality and lengthen life expectancy.

Given the lack of a generally accepted methodology for determining somatotypes, we suggest using classifications based on anthropometric measurements to collect and analyze data.

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评估加纳医务人员工作条件和职业病的卫生方面
**HYGIENIC ASPECTS OF ASSESSING THE WORKING CONDITIONS
AND OCCUPATIONAL MORBIDITY OF MEDICAL WORKERS IN
GHANA**

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在加纳，大多数卫生设施卫生条件差，政府和设施管理部门没有对卫生工作者的健康和安全的重视。尚未制定针对卫生工作者的康复和预防措施。这些观察结果是我们研究的基础。数据是通过问卷在线收集的。研究对象是医务人员；工作环境；加纳的医疗机构。786名受访者参与了调查。使用SPSS分析响应。疟疾、乙型肝炎和肺结核是加纳医护人员的主要传染病，而心血管疾病是主要的非传染病。从2018年到2022年，2020年加纳医疗工作者中传染病病例最高（52.9%）和非传染性疾病病例最低（36.8%）。缺乏管理方法和技术、设备和法规工作条件的行为和评估，以及加纳缺乏记录和调查职业病病例的系统，这些都限制了研究。为挽救患者生命，确保医务人员可接受的工作条件，确保加纳卫生系统的效率和可持续性，鼓励政府制定和实施全面、明确和果断的职业健康和安全管理政策，以促进其健康工人。

关键词：职业危害；职业病；传染性疾病；非传染性疾病

Abstract. *In Ghana, most health facilities have poor sanitary conditions, and the government and administrations of the facilities do not pay due attention to the health and safety of health workers. Rehabilitation and preventive measures for health workers have not been developed. These observations are the basis for our study. Data was collected online, using a questionnaire. The objects of the study were medical workers; working conditions; medical institutions in Ghana. 786 respondents took part in the survey. The responses were analyzed using SPSS. Malaria, hepatitis B and tuberculosis are the leading infectious diseases among Ghana's healthcare workers, and cardiovascular disease is the leading non-infectious disease. From 2018 to 2022, the highest cases of infectious diseases (52.9%) and the lowest cases of noncommunicable diseases (36.8%)*

among medical workers in Ghana, were noted in 2020. The lack of methods and techniques, equipment, and regulations governing the conduct and assessment of working conditions, and the absence of a system for recording and investigating cases of occupational diseases in Ghana served as limitations to the research. To save patient lives, to ensure acceptable working conditions for medical personnel, to ensure the efficiency and sustainability of the health system in Ghana, the Government is encouraged to develop and implement a comprehensive, unambiguous, and assertive occupational health and safety policy for its health workers.

Keywords: *professional hazards; occupational diseases; infectious diseases; noncommunicable diseases*

Introduction

In every country, safe working conditions contribute to the mental well-being of workers, lead to increased productivity, as well as economic growth. Among the nearly 40,000 professions that exist globally today, a special social niche is occupied by medical workers. More than three million medical workers work in modern medical organizations in the world. However, it is known that the hospital environment is one of the significant factors that can affect the health of medical personnel. Medical personnel may be exposed to high nervous and emotional stress, forced working posture, overstrain of analyzer systems, exposure to harmful chemicals and biological agents, ionizing and non-ionizing radiation, noise, vibration, carcinogens, etc. Despite technical re-equipment, the use of high-tech equipment, a decrease in manual labor, a reduction in the number of personnel, the risk of occupational diseases in medical organizations remains at a high level [1,2].

A joint report by the World Health Organization (WHO) and the International Labour Organization (ILO) shows that in 2016, work-related illnesses and injuries were responsible for the deaths of 1.9 million people worldwide. 81% of these deaths were caused by noncommunicable diseases, including chronic obstructive pulmonary disease (450,000 deaths); stroke (400,000 deaths) and coronary heart disease (350,000 deaths). In total, deaths from occupational diseases accounted for 19% of all deaths worldwide in 2016. The COVID-19 outbreak has had a huge impact on health workers around the world. WHO estimates that between January 2020 and May 2021, from 80,000 to 180,000 health workers died from COVID-19 worldwide [3,4].

The lack of a comprehensive occupational health and safety policy, weak infrastructure and funding, insufficient number of qualified health and safety professionals, and a general lack of adequate information are some of the major shortcomings in the provision of effective enforcement and inspection services in most

African countries [5,6,7].

In Ghana, the Government has enacted several laws including the Labour Act, aimed at ensuring safe working conditions and preserving the health of workers in various industries.

The Labour Law has often been criticized for its lack of general standards regarding occupational health and safety in the country. The openness of the law allows employers to retain the decisions on the application of occupational health and safety rules at workplaces. For effective justification, as well as the choice of management decisions to regulate the impact of both production and individual factors on the health of employees of medical organizations, there is a need to create a concept of occupational health risks [1,2,8,9].

Unlike in China and Russia, Ghana lacks national and central systems for collecting data on occupational diseases. Health workers and workers in other fields do not have specialized health facilities to which they can turn when faced with diseases suspected of being related to professional activities. There are no national data on the epidemiology and registration of occupational diseases. Much of what is known about occupational diseases is scientific articles, most of which are conducted by individuals, and the results of such research is limited in scope and may not reflect the true state of occupational diseases in the country [8,10,11].

Methods

We conducted an online sociological survey among medical personnel living and working in 42 medical institutions in Ghana. In this regard, to identify the main risk factors that have adverse effects on the health of medical personnel, we conducted a comprehensive hygienic assessment of the working conditions of medical workers (severity, intensity of the labor process and the action of the biological factor) carrying out their labor activities in the main professions of medical organizations. This article is an excerpt from a larger study that targeted both medical professionals and allied professionals (1,083 respondents in total). Thus, 786 medical professionals are targeted in this article: nurses (406), midwives (142), pharmacist (74), general practitioner (53), physician assistant (27), dermatologist (20), gynecologist (18), pediatrician (19), surgeon (14), anesthesiologist (8), dietician (5). Ghana's health facilities are dominated by female staff, especially nurses and midwives. More than 70% of respondents between the ages of 18 and 35. The staff responses were analyzed using SPSS.

Results and discussions

Biological factor is one of the leading harmful production factors if we evaluate it from a hygienic point of view. In any medical organization, the presence of an aggressive microbiological environment is noted. Doctors, specialists in the field of nursing, who are involved in the medical, diagnostic, rehabilitation process, as well as junior medical personnel caring for patients, were in harmful

working conditions for this factor.

Intensity of labor process of medical personnel of multidisciplinary medical institutions was identified as one of the most harmful and specific factors of working conditions. Working conditions due to the intensity of labor process of doctors and middle medical personnel were assessed as harmful 1st-3rd degrees. The state of working conditions of these specialists is due to administrative and managerial activities. Harmful working conditions of the 3rd degree (3.3) were reported among resuscitation doctors, surgeons, obstetricians, gynecologists, emergency doctors, oncologists. The working conditions of middle medical personnel were classified as hazardous working conditions of the 2nd degree (3.2). This is due to the solution of complex problems with the choice of well-known algorithms, the perception of signals with the subsequent comparison of actual and nominal values of parameters, work in conditions of time deficit, that characterize the job of these personnel.

The average medical worker in Ghana, especially laboratory assistants and dentists work in severe labor processes, characterised by working in a fixed uncomfortable position, 50% or more during the working day. Severe working conditions is also characterised by a forced tilt, standing, lifting, and moving weight of 10 kg to 20 kg, regional and local load on the muscles of the shoulder girdle, hands, fingers (Figure 1).

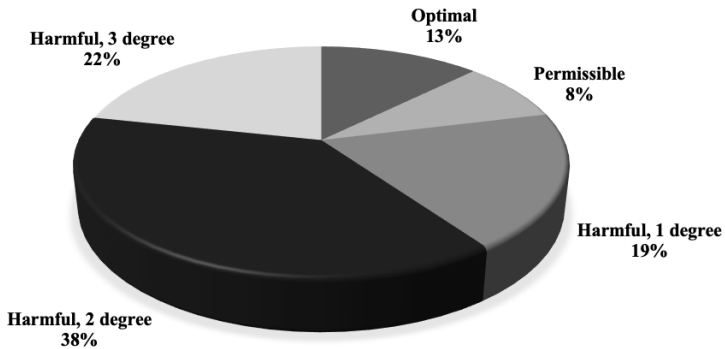


Figure 1. Characteristics of working conditions of medical workers of the main professions by degree of harmfulness

The results of the study show that from 2018 to 2022, the prevalence of non-communicable diseases among Ghana's medical personnel ranges from 36.8% to 47.2%. In general, infectious diseases are the leading causes of death and morbidity in Africa, and today the growing prevalence of noncommunicable diseases has become a matter of serious concern to governments and researchers. Previous

research has revealed a significant increase in the number of disability-adjusted years of life (DALYs) due to NCDs in sub-Saharan Africa from 90.6 million (95% uncertainty interval 81.0–101.9) DALY in 1990 year to 151.3 million (133.4–171.8) DALYs in 2017 [12,13].

In Ghana, the results of this study show an upward trend in the incidence of noncommunicable diseases among health workers from 2018 to 2019, but in 2020 the trend decreased from 49.2% to 36.8%, which may be due to the great attention paid to the COVID-19 pandemic, the first cases of which were registered in the country in March 2022 [14]. The attention paid to the pandemic and the associated restrictions on the movement of people, including total and partial lockdown in several cities in the country, led to a reduction in the testing and diagnosis of noncommunicable diseases.

A survey by the World Health Organization (WHO) found that three-quarters of European countries reported some disruption to noncommunicable disease services due to the pandemic. The consequences of these disruptions have been manifested in increased morbidity and mortality from many noncommunicable diseases, compounded by the fact that people with pre-existing NCDs are at higher risk of negative outcomes and deaths from COVID-19, as seen in Ghana, including among health workers [15]. Cases of noncommunicable diseases rose sharply from 36.8% in 2020 to 42.9% in 2021, and then to 47.2% in 2022. The rate of increase in cases of noncommunicable diseases among health workers following a major outbreak of COVID-19 in 2020 is alarming and requires serious measures to control them.

The most prevalent noncommunicable diseases among health workers in Ghana are cardiovascular diseases, respiratory diseases, and diabetes mellitus in descending order of prevalence. According to a WHO report, noncommunicable diseases are responsible for 43% of all causes of death, including cardiovascular diseases, cancer, diabetes, respiratory tract infections, injuries, and maternal mortality in Ghana [16].

The highest peaks in the spread of occupational infectious diseases among Ghanaian health workers from 2018 to 2022 were recorded in 2020 and 2021 due to the outbreak of the COVID-19 pandemic. According to the World Health Organization, hepatitis B infection is one of the leading causes of diseases among health care workers. The risk of hepatitis B is reported to be 4 times higher among people who work in health care settings. It is estimated that about 8.6% of health care workers worldwide contract hepatitis B virus infection each year [17]. In addition to the COVID-19 pandemic, hepatitis B and tuberculosis are leading illnesses among health care workers in Ghana. The incidence of hepatitis B was highest in 2020 due to screening and testing for COVID-19. This is indicative of the high level of threats and the susceptibility of health workers to blood-borne diseases

such as hepatitis B and HIV/AIDS. In both cases, the proportion of medical personnel is higher than among allied professionals. This is because the nature of their work is directly with patients, having closer contact with them and handling sharp objects, such as needles, compared to allied professionals. However, the exposure of these threats to allied professionals, especially laboratory assistants, should not be overlooked. These workers are in constant contact with patients, bodily fluids and sharp objects that can pose serious threat to them [18].

We also assessed the knowledge of medical personnel of multidisciplinary medical institutions on the mechanisms and ways of infection of parenteral viral hepatitis B, C and HIV infection, as well as the prevention of these diseases. It was found that only 55.3% of doctors, 51.2% of nurses, 11.6% of service (auxiliary) personnel are convinced of the existence of a risk of occupational infection.

Malaria remains the leading cause of infectious diseases among the entire population of Ghana. Among health workers, the results of this study also show that malaria leads in the number of cases.

Dynamics of communicable and non-communicable diseases among health care workers in Ghana (2018–2022) is shown in Figure 2.

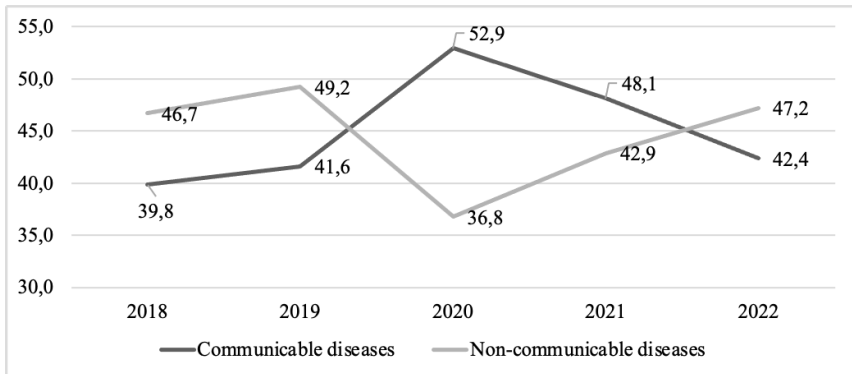


Figure 2. Dynamics of infectious and non-communicable diseases among health workers in Ghana, % (2018–2022)

Conclusion

The results of the study showed that a significant proportion of health workers in Ghana are exposed to serious health hazards that lead them to communicable and non-communicable diseases. Malaria, hepatitis B, HIV infection and tuberculosis are common infectious diseases among health workers in Ghana. Cardiovascular disease is the most common noncommunicable disease among healthcare professionals, followed by respiratory tract infections and diabetes.

Thus, the impact of harmful working conditions on the staff of medical insti-

tutions, the lack of information about the existing risks of health damage in the workplace, the lack system of registration and control of occupational diseases, and ineffective measures to preserve and strengthen the health of medical workers are identified as problems to be addressed, both at the level of medical organizations and at the level of the Government of Ghana.

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早产的妊娠过程特征和围产期结局取决于胎儿的性别二态性
**FEATURES OF THE COURSE OF PREGNANCY AND PERINATAL
OUTCOMES IN PREMATURE BIRTH, DEPENDING ON THE SEXUAL
DIMORPHISM OF THE FETUS**

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介绍了胎儿性别二态性对早产 (PB) 妊娠过程和围产期结局影响的比较研究结果。纳入研究的标准是 2014 年至 2016 年期间妊娠 22-36.6 周 (n=1411) 的单胎妊娠, 出生男孩 (第 1 组 - n=789) 和女孩 (第 2 组 - n = 622)。对 PB 病史的分析考虑了产科和妇科病史的特点、伴随疾病、当前妊娠的并发症、分娩时间和方法。围产期结局通过围产期发病率和死亡率指标进行评估。使用 Statistica 7.0 软件包进行统计分析。发现男孩母亲的 PB 频率增加 (增加 1.3 倍), 极早和早期 PB 的概率增加。在第 1 组中, 妊娠更常发生在贫血和急性呼吸道病毒感染的背景下, 与终止妊娠的威胁、胎膜早破、羊水过多和先兆子痫有关。在第 2 组中, 外阴阴道炎、肾盂肾炎、妊娠高血压和胎儿发育迟缓的发生率增加。据透露, 早产男孩更容易发生宫内缺氧、窒息和呼吸窘迫综合征。获得的数据表明, 在考虑胎儿性别的情况下, 在该领域进行进一步研究以提高孕妇护理质量是有利的。

关键词: 早产; 胎儿性别; 妊娠并发症; 围产期发病率

Abstract. *The results of a comparative study of the effect of fetal sexual dimorphism on the course of pregnancy and perinatal outcomes in preterm birth (PB) are presented. The criteria for inclusion in the study were single-child pregnancies at 22-36.6 weeks gestation (n=1411) for the period from 2014 to 2016, with the birth of boys (group 1 - n=789) and girls (group 2 - n=622). The analysis of the*

PB histories took into account the peculiarities of obstetric and gynecological anamnesis, concomitant diseases, complications of the present pregnancy, timing and methods of delivery. Perinatal outcomes were assessed by indicators of perinatal morbidity and mortality. Statistical analysis was performed using Statistica 7.0 packages. An increase in the frequency of PB in mothers of boys was found (by 1.3 times), with an increase in the probability of very early and early PB. In group 1, pregnancy occurred more often against the background of anemia and acute respiratory viral infections, was associated with the threat of termination, premature rupture of fetal membranes, polyhydramnios and preeclampsia. In group 2, the frequency of vulvovaginitis, pyelonephritis, gestational hypertension and fetal growth retardation increased. It was revealed that premature boys are more susceptible to the development of intrauterine hypoxia, asphyxia and respiratory distress syndrome. The data obtained indicate the expediency of further research in this area to improve the quality of care for pregnant women, taking into account the gender of the fetus.

Keywords: premature birth; fetal gender; complications of gestation; perinatal morbidity

Premature birth (PB) has been in the focus of attention of the world society of obstetricians and gynecologists for many years [1]. An indisputable fact is the close connection of PB with socio-demographic and medical problems, since they directly affect not only the indicators of perinatal morbidity and mortality, but also contribute to an increase in gynecological pathology due to an increase in the frequency of complicated course of puerperium at the early end of gestation [2, 3, 4].

For today, PB is considered to be a polyetiological clinical syndrome characterized by a chronic course, with mandatory participation in the pathogenesis of the fruit factor. It should be noted that in recent years, more and more works have begun to appear devoted to the study of the gender influence of the fetus on the state of hormonal background, immune status, coagulation homeostasis, the course and outcome of the gestational process [5, 6, 7]. According to some authors, it is the gender of the fetus that is associated with the risk of developing certain obstetric syndromes [8, 9]. At the same time, many scientists associate PB more often with pregnancy when carrying boys [10, 11]. At the same time, in the publication T. Štimac et al. (2019) the possible connection of the male sex of the fetus with PB is denied [12]. However, almost all studies convincingly demonstrate an increased risk of morbidity and mortality in premature boys compared to girls born prematurely [13, 14, 15].

The aim of the study: is to study the effect of fetal sexual dimorphism on the course of pregnancy and perinatal outcomes during premature birth.

Materials and methods. In the period from 2014 to 2016, according to the

data of the Perinatal Center of GUZ “Saratov City Clinical Hospital No. 8”, 15732 births were registered, 1536 of them, which amounted to 9.94%. The criteria for inclusion in the study were single-child pregnancies at 22-36.6 weeks gestation (n=1411) with the birth of boys (group 1 – n=789) and girls (group 2 - n=622). The criterion for exclusion from the groups were cases of early termination of multiple pregnancies (n=125). The work was carried out with the permission of the Ethics Committee of the Saratov State Medical University. And after obtaining the voluntary informed consent of women. The analysis of PB histories took into account the peculiarities of obstetric and gynecological anamnesis of pregnant women, the presence of concomitant extragenital diseases, complications during this pregnancy, timing and methods of delivery. Indicators of perinatal morbidity and mortality were used to assess perinatal outcomes.

Statistical analysis was performed using Statistica 7.0, SPSS 17 packages, as well as MS Excel 2013 statistical functions. The obtained data were presented in the form of mean values (M) and standard deviation (SD), absolute and relative frequencies of observations (n, %). To establish the significance of the differences between the two mean values of the parameters, the Student’s t-test was used, the Fisher’s criterion was used as qualitative (differences at $p < 0.05$ were considered significant).

Results and discussion

Over a three-year period, according to our data, the proportion of early termination of pregnancy in carrying boys (55.9%) statistically significantly (1.3 times) exceeded the frequency of PB in the group of women with an alternative fetus (44.1%; $p < 0.001$), which is consistent with the opinion of most researchers [10, 11, 15].

The average age of patients with PB in both groups had no significant differences: in group 1 - 27.4 (7.3) years, in group 2 – 26.7 (5.2) years ($p = 0.94$). Early termination of gestation was observed with almost the same frequency in both primiparous (group 1 - n=389; 49.3%; group 2 – n=290; 46.6%, $p = 0.32$) and repeat-bearing women (respectively: 50.7% and 53.4%, $p = 0.32$). Unfavorable outcomes from previous pregnancies (PB, miscarriages, artificial abortions) were detected in more than 50% of patients (Table 1).

Table 1

General characteristics of groups of women with premature birth

Studied parameters	1-st group (n=789)		2-nd group (n=622)		p^{1-2}
	n	%	n	%	
Features of obstetric and gynecological anamnesis					
Spontaneous miscarriage, medical abortion	335	42,5	259	41,6	0,76
Premature birth in anamnesis	127	16,1	107	17,2	0,58
Infertility	73	9,3	68	10,9	0,30

Anomalies of the ovarian-menstrual cycle	100	12,7	85	13,7	0,58
Chronic salpingoophoritis, endometritis	288	36,5	223	35,9	0,80
Uterine leiomyoma	62	7,9	48	7,7	0,92
Cervical pathology	95	12,0	65	10,5	0,35
Concomitant extragenital diseases					
Chronic tonsillitis	183	23,2	156	25,1	0,41
Chronic pyelonephritis	76	10,1	75	12,5	0,14
Diseases of the cardiovascular system	164	20,8	131	21,1	0,90
Diseases of the gastrointestinal tract	53	6,7	46	7,4	0,62
Enlargement of the thyroid gland	179	22,7	144	23,2	0,84
Obesity	159	20,2	115	18,5	0,43

Among gynecological diseases in the anamnesis of women of both groups, chronic salpingoophoritis and endometritis were more often traced, less often – anomalies of the ovarian-menstrual cycle, benign cervical pathology, infertility. Concomitant extragenital diseases in every third pregnant woman of the 1st and 2nd groups were represented by foci of chronic infection (tonsillitis, pyelonephritis), in every fifth - pathology of the cardiovascular system (vegetative vascular dystonia, chronic arterial hypertension), diffuse enlargement of the thyroid gland, without violation of its function and obesity. At the same time, when comparing the parameters of obstetric and gynecological anamnesis and the incidence of concomitant somatic pathology in women with male and female fetuses whose pregnancy ended with PB, we did not establish a statistical difference in the data obtained (Table 1). Based on the above, it can be concluded that the generally recognized risk factors for miscarriage, such as infections, hormonal dysfunction in genital and somatic diseases, are uniform in the pathogenesis of PB, regardless of the gender of the fetus [16, 17].

Completely different results were obtained by comparing the characteristics of the course of this pregnancy in the groups (Table 2).

Table 2
Features of the course of gestation and the timing of delivery in preterm labor, depending on the gender of the fetus

Parameters	1-st group (n=789)		2-nd group (n=622)		p^{1-2}
	n	%	n	%	
Anemia	479	60,7	254	40,8	<0,001
Vulvovaginitis	188	23,8	323	51,9	<0,001
Acute viral infections	175	22,2	98	15,8	0,003
Gestational pyelonephritis	76	10,1	85	13,7	0,02
Threatening miscarriage	396	50,2	210	33,8	<0,001
The threat of termination of pregnancy in the second half	482	61,1	257	41,3	<0,001

Isthmic-cervical insufficiency	64	8,1	29	4,7	0,01
Fetoplacental insufficiency	548	69,5	428	68,8	0,79
Polyhydramnios	127	16,1	68	10,9	0,006
Oligoamnios	71	9,1	72	11,6	0,11
Fetal growth retardation	105	13,3	107	17,2	0,04
Gestational hypertension	95	12,0	130	20,9	<0,001
Preeclampsia	398	50,4	174	28,0	<0,001
Premature rupture of fetal membranes	316	40,1	189	30,4	<0,001
Premature placental abruption	46	5,8	28	4,5	0,27
Antenatal fetal death	36	4,6	22	3,5	0,34
Delivery dates					
Very early PB 22-27,6 weeks	66	8,4	41	6,6	0,21
Early PB 28-30,6 weeks	54	6,8	26	4,2	0,03
PB 31-33,6 weeks	153	19,4	120	19,3	0,96
Late PB 34-36,6 weeks	516	65,4	435	69,9	0,07

It was noted that when carrying boys in women with PB, pregnancy was 1.5 times more likely to occur against the background of anemia and acute respiratory viral infections ($p<0.001$). While pregnant women with PB and female fetuses had a statistically significant increase in the proportion of diagnosis at different gestation periods of vulvovaginitis (2.2 times) and pyelonephritis (1.4 times). It should be noted that the fact of the negative impact of viral and bacterial infections on the course and outcomes of pregnancy is indisputable [18, 19, 20]. However, in our work, for the first time we established the specific features of infectious and inflammatory processes in pregnant women, taking into account the sex of the fetus being carried.

In addition, in patients of group 1, the frequency of threatened miscarriage and the threat of termination of pregnancy in its second half significantly exceeded (by 1.5 times) similar indicators of group 2 ($p<0.001$) (Table 2). Previously published studies have already proved the connection of the symptoms of threatening termination of pregnancy in the first trimester not only with the development of placental dysfunction and PB, but also suggested the negative effect of this gestational complication on the formation of the organs of the reproductive system of the male fetus [21, 22].

Despite the small total number of cases of isthmic-cervical insufficiency (ICI) in PB in our study, the risk of developing this pathology during the gestation of boys increased by 1.7 times ($p=0.01$). At the same time, in pregnant women with a male fetus, the proportion of premature rupture of the fetal membranes increased significantly (PRFM: 40.1% vs. 30.4%; $p<0.001$), polyhydramnios (16.1% vs. 10.9%; $p=0.006$) and preeclampsia (50.4% vs. 28%; $p<0.001$). An increase in the frequency of various complications of gestation in mothers of boys is evidenced

by many domestic and foreign scientists [10, 23]. At the same time, in the group of patients with a female fetus, according to our data, the probability of developing gestational arterial hypertension (GAH) increased significantly – by 1.7 times ($p < 0.001$) and fetal growth retardation (Table 2). When comparing the frequency of occurrence in PB fetoplacental insufficiency, lack of water, premature placental abruption and antenatal fetal death, we did not reveal significant differences in the groups depending on the sex of the fetus.

The study of the dates of delivery with PB in groups (Table 2) showed a slight increase in the risk of mothers of boys with very early PB (22-27.6 weeks: 8.4% vs. 6.6%, $p = 0.21$) and a significant increase (1.7 times) of early PB (28-30.6 weeks: 6.8% vs. 4.2%, $p = 0.03$). And in the mothers of girls, PB was recorded somewhat more often at a later date (34-36.6 weeks: 69.9% vs. 65.4%, $p = 0.07$) in the absence of significant intergroup differences. Through the natural birth canal, PB ended in 208 women with a male fetus (26.4%) and 187 with an alternative fetus (30.1%), with no statistical difference between the groups ($p = 0.13$). At the same time, the proportion of conservative births in group 1 was 2.8 times lower, and in group 2 - 2.3 times lower in comparison with the frequency of cesarean section (CS) in PB in both groups ($p < 0.001$). In addition, a detailed analysis of the peculiarities of the course of labor, taking into account the sex of the fetus, allowed us to establish that, despite the absence of significant differences in the total frequency of violations of contractile activity of the uterus in PB (group 1 - $n = 120$; 15.2%, 2nd - $n = 85$; 13.7%, $p = 0.41$), in mothers of boys, rapid and rapid childbirth was recorded 1.6 times more often ($n = 29$; 24.2% vs. $n = 12$; 14.1%, $p = 0.08$), and in mothers of girls, disorders of the type of discoordination of uterine contractions prevailed (1.3 times) ($n = 41$; 48.2% vs. $n = 44$; 36.6%, $p = 0.09$). And the weakness of labor activity, regardless of the sex of the fetus, with PB was observed in groups with the same frequency (group 1 - $n = 47$; 39.2%; group 2 - $n = 32$; 37.7%, $p = 0.83$). In isolated publications of domestic and foreign authors, there is information that childbirth with a female fetus is more often complicated by an anomaly of the contractile function of the uterus in the form of discoordination, and in women with a male fetus, the pathological type of excessive labor prevails [14, 23]. To date, there is a generally recognized tendency to increase the surgical method of delivery in PB, due to the high frequency of gestational complications, strict compliance with clinical recommendations for the prevention and reduction of perinatal losses [2, 24]. At the same time, there is no common point of view in modern literature sources about the gender influence of the fetus on the likelihood of termination of pregnancy or childbirth by CS surgery. In the study of N.B. Kolesnikova et al. (2011), based on the analysis of 1870 histories of single births, a statistically significant increase in CS was demonstrated in the mothers of girls [13]. At the same time, G.C. Di Renzo et al. (2007) found an increase in the spe-

cific weight of CS in pregnant women with a male fetus, regardless of the timing of delivery [10]. According to our data, during PB, we did not reveal significant differences in the frequency of use of CS surgery depending on the sex of the fetus being carried: Group 1 – n=581; 73.6%, group 2 – n=435; 69.9% (p=0.13). However, when studying the structure of indications for surgical delivery in the group of patients with a male fetus, the following were more common: critical fetal condition according to dopplerometry (group 1 - n=17; 2.9%, group 2 – n=0; p<0.001) and acute fetal distress according to cardiotocography (respectively: n=86; 14.8% vs. n=39; 9.0%, p=0.006).

However, when studying the structure of indications for surgical delivery in the group of patients with a male fetus, the following were more common: critical fetal condition according to dopplerometry (group 1 - n=17; 2.9%, group 2 – n=0; p<0.001) and acute fetal distress according to cardiotocography (respectively: n=86; 14.8% vs. n=39; 9.0%, p=0.006). In the group of women with an alternative fetus, the probability of CS increased due to the diagnosis of clinical symptoms of chorioamnionitis (group 2 - n=121 (27.8%) versus n=118 – in group 1 (20.3%); p=0.006) and manifestations of placental insufficiency in the decompensation stage in combination with growth retardation fetal 2-3 degrees (respectively: n=42; 9.7% vs. n=23; 4.0%; p <0.001). Among other indications for CS surgery in PB, we found no significant differences: severe preeclampsia was found in 152 pregnant women in group 1 (26.2%) versus 94 in group 2 (21.6%) (p=0.09), uterine contractile disorders, respectively: 103 (17.7%) versus 79 (18.2%) (p=0.86), premature detachment placenta – in 46 (7.9%) vs. 28 (6.4%) (p=0.37), premature rupture of fetal membranes in combination with uterine scar and active labor – in 36 (6.2%) vs. 32 (7.4%) (p=0.47).

Over a three-year period, according to our data, 753 live premature boys and 599 girls were born with singleton pregnancies (Table 3). The stillbirth rate in group 1 reached 45.6% due to antenatal fetal death (n=36), which slightly exceeded (p=0.42) the same parameter in group 2 - 37.0% (22 cases of antenatal and 1 - intranatal fetal death). In a comparative analysis of the condition of premature babies at birth, we did not reveal significant differences in the average values of the Apgar score (group 1: 5.6 (0.6) points in the first minute, 6.4 (0.8) in the 2nd, p=0.42; at the fifth minute – 6.2 (0.4) and 6.6 (0.5) points, respectively, p = 0.53) and the weight of infants, depending on gender (the average weight of boys corresponded to 1482 (945) grams, girls – 1465 (784), p = 0.99). However, when studying the structure and frequency of perinatal morbidity, some differences were found (Table 3). Among premature boys, in comparison with girls, the proportion of infants with neonatal jaundice, intrauterine hypoxia and asphyxia at birth, respiratory distress syndrome (RDS) and intrauterine pneumonia increased statistically significantly.

Table 3**Structure and incidence of premature newborns, depending on gender**

Parameters	1-st group (n=735)		2-nd group (n=599)		<i>p</i> ¹⁻²
	n	%	n	%	
Neonatal jaundice	480	65,3	341	56,9	0,002
Intrauterine hypoxia and asphyxia at birth	352	47,9	233	38,9	<0,001
Respiratory distress syndrome	246	33,5	110	18,4	<0,001
Intrauterine pneumonia	71	9,7	40	6,7	0,05
Hypoxic hemorrhagic lesion of the central nervous system	63	8,6	40	6,7	0,20
Congenital malformations	60	8,2	44	7,3	0,58
Malnutrition and stunted growth	61	8,3	40	6,7	0,27
Hemolytic disease of newborns	12	1,6	9	1,5	0,85
Hematological and hemorrhagic disorders	5	0,7	4	0,7	0,98

In the early neonatal period (0-6 days; 168 hours), 29 premature boys and 15 girls died out of all children born alive. The perinatal mortality rate in group 1 was 82.4% (n=65), which exceeded the data of group 2 by 1.4 times - 61.1% (n=38), but we did not identify the statistical significance of this parameter in our work ($p=0.13$). However, the data obtained by us do not contradict the existing research results, which demonstrate an increased risk of perinatal morbidity and mortality among premature male infants, while girls born prematurely have higher chances of survival [15, 23, 25].

Conclusions

1. The frequency of PB in mothers of boys increases by 1.3 times, while the probability of very early (1.3 times) and early PB (1.7 times) increases.

2. When carrying boys in women with PB, pregnancy is 1.5 times more likely to occur against the background of anemia and acute respiratory viral infections, and when carrying a female fetus in pregnant women with PB, the incidence of vulvovaginitis (2.2 times) and pyelonephritis (1.4 times) increases. The course of gestation with a male fetus is more often associated with clinical symptoms of threatened miscarriage and the threat of termination of pregnancy in its second half (1.5 times), ICN (1.7 times), PRFM (1.3 times), polyhydramnios (1.5 times) and preeclampsia (1.8 times), and with an alternative fetus – the risk of gestational hypertension increases (by 1.7 times) and fetal growth retardation (by 1.3 times).

3. Premature male newborns are more susceptible to the development of neonatal jaundice (1.2 times), intrauterine hypoxia and asphyxia (1.2 times), RDS (1.8 times), intrauterine pneumonia (1.4 times), which directly affects the indicator of perinatal mortality, increasing it by 1.4 times (up to 82.4%) in comparison with the parameter in premature female infants. All of the above indicates the expediency

of further research in this area to improve the quality of care for pregnant women, taking into account the gender of the fetus being carried, and to improve perinatal outcomes.

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医疗机构的手卫生——预防医院感染的主要措施
**HAND HYGIENE IN MEDICAL ORGANIZATIONS - THE MAIN
MEASURES OF PREVENTION OF HAI**

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本文介绍了一项研究的结果，该研究旨在证实医疗机构的手部卫生是在实施国家医疗保健相关感染预防概念（由国家卫生总局批准）的框架内预防 HCAI 的最有效措施（俄罗斯联邦博士，2011 年 11 月 6 日）。研究发现，医疗保健相关感染（HCAI）是现代俄罗斯医疗保健的一个紧迫问题。HCAI 的主要原因是医疗机构的感染控制方法不够有效和抗菌药物的过度使用。研究过程中采用了内容分析法、文献综述法、排名法、假设演绎法、概括法、形式化法等方法。使用的材料是在国际书目和摘要数据库（Scopus、PubMed）中发表的文章；俄罗斯联邦的官方文件，以及关于与提供医疗服务有关的感染问题的国际文件（立法行为、计划、公约等）。进行的系统文献分析表明，预防 HCAI 的主要措施之一是保持手部卫生。研究发现，通过实施多模式方法可以最大程度地预防 HCAI。根据现有的科学研究，已经确定了医疗保健专业人员必须进行手部卫生的 5 个关键点。得出的结论是，HCAI 预防应该是多模式的，成功实施 HCAI 预防需要在医院层面进行文化转变，并且需要在国家层面进行协调以应对 HCAI 带来的严重威胁。

关键词：医疗保健相关感染，手卫生，预防，房间清洁，感染预防概念

Abstract. *The article presents the results of a study aimed at substantiating hand hygiene in medical organizations as the most effective measure for preventing HCAI in the framework of the implementation of the National Concept for the Prevention of Infections Associated with Medical Care (approved by the Chief State Sanitary Doctor of the Russian Federation on November 6, 2011). It was found that healthcare-associated infections (HCAIs) are an urgent problem of modern Russian healthcare. The main causes of HCAI are insufficiently effective infection control methods in medical organizations and the overuse of antimicrobials. In the course of the study, such methods as content analysis, literature review, ranking, hypothetical-deductive method, generalization, formalization were used. The materials used were articles published in international bibliographic and abstract*

databases (Scopus, PubMed); official documents of the Russian Federation, as well as international documents (legislative acts, programs, conventions, etc.) on the issues of infections associated with the provision of medical care. The performed systematic literature analysis suggests that one of the main measures to prevent HCAI is hand hygiene. It was found that the maximum result in the prevention of HCAI can be achieved through the implementation of a multimodal approach. Based on available scientific research, 5 key points have been identified when hand hygiene is mandatory for healthcare professionals. It was concluded that HCAI prevention should be multimodal, with successful implementation of HCAI prevention requiring cultural shifts at the hospital level, and coordination at the national level is needed to address the serious threat posed by HCAI.

Keywords: *healthcare-associated infections, hand hygiene, prevention, room cleaning, infection prevention concept*

Relevance of the problem

Healthcare-associated infections (HAIs) are infections that a patient gets while being treated in a health care setting, such as a hospital, or as a result of an infection from a healthcare worker, such as a doctor or nurse. Health care-acquired infections can enter the body through portals such as the bloodstream, lungs, skin, urinary tract, or digestive tract, causing serious illness. These infections are difficult to treat and can persist in the body for a long time. In the worst cases, infections of this group lead to death [1, 2].

The main causes of HCAI are insufficiently effective infection control methods in medical organizations and the overuse of antimicrobials. In the long term, the reduction of HCAI levels depends on the implementation of multimodal prevention strategies that require behavioral and cultural changes. Key components of such strategies include identification of carriers of multidrug-resistant organisms, elimination of environmental reservoirs, measures to control cross-transmission, and evidence-based use of antimicrobials. These measures must be implemented within the framework of individual responsibility, strong administrative support and access to up-to-date national and local surveillance data [3].

Treatment of HCAI is exacerbated by rising levels of antimicrobial resistance. Health care workers and contaminated hospital environments are increasingly causing the transmission and persistence of multidrug-resistant organisms, as well as other pathogens such as *Clostridium difficile*. This determines the relevance of focusing on a number of measures for the prevention of HAI.

The purpose of this study is to substantiate hand hygiene in medical organizations as the most effective measure for preventing HAI in the framework of the implementation of the National Concept for the Prevention of Infections Associated with Medical Care (approved by the Chief State Sanitary Doctor of

the Russian Federation on November 6, 2011).

Materials and methods

To achieve this goal, such methods as content analysis, literature review, ranking, hypothetical-deductive method, generalization, formalization were used.

The materials used were articles published in international bibliographic and abstract databases (Scopus, PubMed); official documents of the Russian Federation, as well as international documents (legislative acts, programs, conventions, etc.) on the issues of infections associated with the provision of medical care. 20 domestic and foreign sources were cited.

Results

The main components of HAI prevention have been found to include:

1. antimicrobial management to reduce overuse of antimicrobials and ensure evidence-based use of antimicrobials;
2. Infection prevention strategies to control multi-resistant to - especially methicillin-resistant *Staphylococcus aureus*, vancomycin-resistant *Enterococcus* spp. (VRE organisms) and, more recently, multiresistant gram-negative bacteria;
3. cleaning and disinfection of hospitals;
4. Development of prescription guidelines and standards of care [4, 5, 6].

At the same time, the main preventive measures recommended for patients in order to avoid infection are:

- Mandatory hand washing by the patient himself or the use of liquid, gel hand sanitizers.
- Handwashing by healthcare workers prior to handling or use of liquid and/or gel hand sanitizers;
- Taking antibiotics only as prescribed by a doctor;
- Taking antibiotics strictly according to the doctor's instructions, while completing the course
 - it is necessary strictly in accordance with the purpose;
- When taking antibiotics or painkillers, care must be taken to protect the digestive tract from side effects;
- Knowledge of the rights of the patient [7, 8].

Available studies suggest that *Clostridium difficile* is one of the most common causative agents of HAIs, with an annual incidence of 3.65 per 10,000 bed-days and a relative mortality rate of 6–7% per 30 days. The profile of *Clostridium difficile* has increased in recent decades. Between 1999 and 2013 a hyper-virulent strain of *C. difficile* (ribotype 027), which causes high morbidity among the elderly, has become endemic in hospitals in North America and the UK. The factors of its appearance were the poor practice of prescribing antibiotics, especially fluoroquinolones, inadequate environmental and hand hygiene, these short-

comings are also characteristic of modern Russian healthcare [9, 10, 11].

Complicating the epidemiology is that, according to experts and available research data, up to 1/3 of new infections caused by *Clostridium difficile* occur outside the home; only 35% of inpatient cases of *Clostridium difficile* infection were associated with other hospital cases when examined by whole genome sequencing [12, 13].

Available research data indicate that viable HAI spores have been isolated from 49% of surfaces surrounding patients in healthcare settings, including high-touch areas such as call buttons and bed rails, reflecting the ability of pathogens to resist drying out and survive on hard surfaces. At the same time, other factors, including aerosolization of spores after flushing in toilets and the release of asymptomatic carriers, further contribute to the environmental pollution of medical organizations [14, 15].

Patients admitted to a room previously occupied by *C. difficile* patients have an increased risk of acquiring HAI despite proper cleaning. For asymptomatic carriers of viable *C. difficile* spores, the pathogen has been found to contaminate 29% of surrounding surfaces, it is currently unclear whether standard bleach cleaning and standard contact precautions should be implemented in such cases, or whether a special specialized algorithm is needed [16].

C. difficile spores, the main causative agent of HAIs, have now been found to be resistant to standard hospital decontamination methods, including alcohol-based hand rubs and common disinfectants (quaternary ammonium compounds). To minimize pathogen transmission, patient care packages should include contact precautions, use of special patient equipment, regular bleach cleaning, and hand hygiene using soap and water [17].

The performed systematic literature analysis suggests that one of the main measures to prevent HAI is hand hygiene. At the same time, the maximum result in the course of HAI prevention can be achieved through the implementation of a multimodal approach.

Hand hygiene is a fundamental principle of quality health care. While interventions are often multimodal and direct causal relationships are difficult to prove, epidemiological evidence exists to support the role of hand hygiene in reducing HAI.

For example, between 2002 and 2013 *S. aureus* bacteremia (SAB) (MRSA and MSSA) with initial manifestations in the hospital decreased by 63%, and a similar decrease was demonstrated in many countries around the world. This decline in HAI has occurred in parallel with national initiatives, leading to the widespread adoption of successful hand hygiene programs. Proper hand hygiene is a core principle in HAI prevention packages and remains a key indicator of hospital safety and quality systems [18].

Infection with HAI pathogens occurs in nosocomial settings through cross-transmission, so hand and environmental hygiene are the main prevention strategies. Health care workers, patients and visitors should be aware of the importance of strict hand hygiene, especially after going to the toilet.

Based on available scientific research, 5 main points have been identified when hand hygiene is mandatory for healthcare workers [19, 20].

1. Before patient contact. Hand hygiene is performed to protect the patient from pathogen colonization and, in some cases, from exogenous infection, harmful microbes carried on the hands. Situations that are included in this paragraph: handshake; assisting the patient in self-care; assistance and other non-invasive therapeutic procedures: applying an oxygen mask, massage, etc.; performing a physical non-invasive examination: measurement of pulse, blood pressure, chest auscultation, ECG recording, etc.

2. Before clean / aseptic procedures. Hand hygiene is performed to protect the patient from being exposed to harmful germs, including his/her own germs entering his/her body. Situations that are included in this paragraph: brushing the patient's teeth, instilling eye drops, performing a digital vaginal or rectal examination, examining the mouth, nose, ear with or without instruments, inserting a suppository / pessary, suctioning the mucosa; wound dressing with or without an instrument, application of ointment to the vesicle, injections/punctures; introduction of an invasive medical device (nasal cannula, nasogastric tube, endotracheal tube, urinary tube, catheter, drainage); cooking, drugs, pharmaceutical products, sterile materials.

3. Contact with biological fluids. Hand hygiene is performed to protect the healthcare worker from colonizing or infecting the patient with harmful microbes and to protect the healthcare environment from the spread of germs. Situations that are included in this paragraph: contact with the mucous membrane and with intact skin; performing an injection or puncture; introduction of an invasive medical device (vascular access, catheter, tube, drainage, etc.); removal of an invasive medical device; removal of any material that provides protection (napkin, bandage, gauze, sanitary napkin, etc.); dealing with a sample containing organic matter after cleaning excrement and any other biological fluids after cleaning any contaminated surface and contaminated material (dirty bedding, dentures, tools, urinal, bedpan, toilet bowls, etc.).

4. After contact with the patient. Hand hygiene is performed to protect the healthcare worker from infection with pathogenic microbes and to protect the environment of the healthcare facility from the spread of germs. Situations that are included in this paragraph: after shaking hands, stroking the child on the forehead; after helping the patient in self-care; after assistance and other non-invasive treatment; after a non-invasive examination: measurement of pulse, blood pressure,

chest auscultation, ECG recording, etc.

5. After contact with objects surrounding the patient. Hand hygiene is performed to protect the healthcare worker from colonization by disease-causing microbes that may be on surfaces/objects around the patient, as well as to protect the environment of the healthcare facility from the spread of pathogens. Situations that are included in this paragraph: after physical contact with the patient and his environment; after the provision of medical care, for example, after setting up equipment; after contact with surfaces or other objects, bed, bedside tables and so on.

When considering hand hygiene, the wearing of gloves deserves special attention. Wearing gloves does not replace the need for good hand hygiene. Hand hygiene should be performed at all times and in other situations, regardless of the indication for the use of gloves. After each use of gloves, throw them away and wash your hands. Gloves are required only when indicated according to established standards – otherwise they become a major risk for germ transmission.

Conclusion

Successful implementation of HAI prevention requires a cultural shift at the hospital level, and national coordination is needed to address the serious threat posed by HAI. Prevention of HAI should be multimodal, with hand hygiene being the most effective intervention.

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近端消化道乳头瘤病毒感染的诊断特点

**FEATURES OF DIAGNOSTICS IN PROXIMAL GASTROINTESTINAL
TRACT IN PAPILLOMAVIRUS INFECTION**

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现阶段，乳头瘤病毒是各种定位癌症的主要病原体之一。同时，已知最具侵袭性和预后不良的是由乳头瘤病毒感染诱发的胃癌和食道癌。早期诊断最常使用内窥镜技术和活检进行，用于诊断目的和确定手术干预的程度。然而，在大多数情况下，早期发现这种病理是极其困难的。这主要是由于这种类型的肿瘤的定位，具有浸润性生长的特点，不仅扩散到粘膜，还扩散到粘膜下层。在这项研究中，不仅考虑了使用内窥镜方法诊断此类肿瘤的可能性，而且还考虑了现有致癌性乳头瘤病毒株在组织恶性肿瘤中的作用。

关键词：癌症，人乳头瘤病毒，胃，食道，HPV，HPVI，恶性肿瘤，胃肠道，超声内镜。

Abstract. *At the present stage, papillomavirus is one of the main etiological agents of cancer of various localization. At the same time, it is known that the most aggressive and prognostically unfavorable is cancer of the stomach and esophagus induced by papillomavirus infection. Early diagnosis is most often carried out using endoscopic techniques with biopsy for diagnostic purposes and to determine the extent of surgical intervention. However, in most cases, the detection of this pathology in the early stages is extremely difficult. This is primarily due to the localization of this type of tumors, with the peculiarities of their infiltrating growth*

with spread not only to the mucosa, but also to the submucosa. In this study, not only the possibilities of diagnosing this type of neoplasm using endoscopic methods are considered, but also the role of existing oncogenic strains of papillomaviruses in malignancy of tissues.

Keywords: cancer, human papillomavirus, stomach, esophagus, HPV, HPV1, malignancy, gastrointestinal tract, endosonography.

Relevance. Although some researchers have shown a low role of human papillomavirus (HPV) in the development of gastric cancer [8], the Epstein-Barr virus and *H. pylori* are the most reliable etiological factors, as well as duodenogastric reflux disease (DGR), which play the main role as risk factors in tissue malignancy in the structure of the gastrointestinal tract, however, it is recognized that HPV is also one of the main oncogenic viruses in the world [1-2]. According to Syrjänen S. (2018), persistent HPV infection is essential for HPV-associated malignant transformation. However, HPV lesions require additional cofactors to progress to malignant lesions. In the early 1980s, the first evidence was presented that a subgroup of oral and other head and neck cancers could be causally linked to HPV infection [3].

One of the targets of this etiological agent is the mucosa and submucosa of the esophagus and stomach. With this localization, cancer in the initial stage is a difficult-to-diagnose disease [4]. The main method of its diagnosis is a biopsy, the materials of which can be genotyped and analyzed for the expression of viral genes E6 and E7 [5]. However, with gastroesophageal reflux disease and the ingress of gastric juice into the esophagus with irritation of its walls, metaplasia of the squamous epithelium of the esophagus may occur with replacement by a cylindrical epithelium - Barrett's esophagus [6]. In the terminal stage, this pathological condition can be presented in the form of adenocarcinoma of the esophagus or esophagogastric cancer.

Main results. As a result of the analysis of our own data and in accordance with the results of other authors, the most oncogenic strains of HPV are varieties with the following substrains: most often these are 16 and 18, and less often 31 and 33 [7, 8]. Most often in medical practice, in the study of squamous cell carcinoma of the esophagus, biopsy material contains immortalized lines of embryonic epithelial cells (fetal esophageal epithelial cell line - SHEE) of the human esophagus, induced by the E6E7 genes of HPV type 18. Evaluation of cell morphology of the 10th passage (SHEE10), 31 passage (SHEE31), passage 61 (SHEE61) and SHEE61A are performed using electron microscopy, and for cell cycle evaluation, flow cytometry is performed with the analysis of the transcription factor affinity prediction (TRAP) of oncogenic genetic cascades with the detection oncoprotein HPV18 E6 and E7 using Western blotting [9]. From the point of view of endos-

copy at the initial stages, the diagnosis of the oncological process can only show hyperkeratosis of individual sections of the esophagus [3, 6, 7]. With the development of adenocarcinoma, the distal third is affected, and with squamous cell (squamous cell) cancer, in the proximal two-thirds of the esophagus [5, 7]. In this case, a biopsy may show a negative result for dysplasia. Later, with infiltrative oncological growth, polyps and warty structures begin to appear on the mucosa, an increase in the coverage of other areas with hyperkeratosis, and multiple squamous cell anomalies are found in the biopsy material, negative for dysplasia and positive for HPV strains. Upon confirmation of histological analysis and a set of clinical symptoms (the presence of circumferential stenosis, progressive dysphagia), which is an indication for esophagectomy [4, 5]. Confirmation of histological analysis against the background of relevant clinical symptoms (presence of circumferential stenosis, progressive dysphagia) is an indication for esophagectomy [4, 5].

The use of fibrogastroduodenoscopy (FGDS) and endosonography in the early stages of gastric cancer, as well as the esophagus, does not provide specific research results [4, 7, 9]. There may be erosive or polyposis changes in the cardia of the stomach, which are not specific diagnostic markers for the development of oncological pathologies. The greatest diagnostic efficiency can be achieved with the use of intravital sampling of material from altered areas of the gastric mucosa and submucosa and a histological analysis for the presence of squamous glandular changes in the organ.

Conclusion. An analysis of currently known oncogenic strains of HPV, as well as features of the histological material observed during a biopsy of the esophago-gastric region, showed that HPV can act as an etiological agent in the development of adenocarcinoma or squamous cell carcinoma of the esophagus [10]. In the manifestation of oncological processes of the stomach, strains of the virus play an insignificant role. However, a violation of the anatomical and physiological parameters can be the cause of the development of Barrett's esophagus, which in turn can lead to the development of this oncological process. Mirzaei H., Goudarzi H., Eslami G., Faghihloo E. (2018) believe that gastrointestinal cancer is a global public health problem that accounts for the vast majority of all cancer deaths in both men and women. On the other hand, viral pathogens have long been considered etiological factors in the occurrence of certain types of cancer in humans, including tumors of the gastrointestinal tract [11]. In this regard, human papillomavirus (HPV), Epstein-Barr virus (EBV), and John Cunningham virus (JCV) are more actively involved in gastrointestinal carcinogenesis; Thus, the association of HPV with cancer of the oropharynx and anal canal, as well as the association of EBV with gastric cancer, has been etiologically confirmed by epidemiological and experimental studies.

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单一人为影响对低温落叶松林中树木生长的影响
**INFLUENCE OF A SINGLE ANTHROPOGENIC IMPACT ON THE
GROWTH OF TREES IN CRYOGENIC LARCH FORESTS**

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该研究的目的是确定人为影响对低温落叶松林中树干生长的影响。该方法的独特之处在于，以火灾后更新的同龄落叶松林为例，当地（铺设道路 - “冬季道路”）对林分树木的人为影响是“建模”。

关键词：冰晶石带，落叶松，径向生长，当地条件，气候因子，测树仪

Abstract. *The purpose of the study is to identify the consequences of anthropogenic impact on the growth of tree trunks in a cryogenic larch forest. The uniqueness of the methodological approach lies in the fact that, using the example of the same-aged larch forest of post-fire renewal, the local (laying of the road - "winter road") anthropogenic impact on trees in the forest stand is "modeled".*

Keywords: *cryolithozone, Gmelin larch, radial growth, local conditions, climatic factors, dendrometers*

Introduction

The current climate warming has led to certain changes in the state of northern forests [1, 2, 3, 4, 5]. The main role in these changes is played by the degradation of permafrost. However, with the modern intensive development of the northern territories, the effect of anthropogenic impact on permafrost has increased, aggravating its degradation (laying roads, cutting down, construction of facilities, etc.). This effect can significantly exceed the climatic one. Despite the fact that much attention is paid to the study of cryogenic forests in the current

climate, questions about the consequences of anthropogenic impact remain open. Meanwhile, their solution for the socio-economic development of the northern territories is **important and relevant**. Northern forests have impressive reserves and play a significant role in maintaining the carbon balance on the planet [6].

The purpose of the study is to identify the consequences of anthropogenic impact on the growth of tree trunks in a cryogenic larch forest.

Materials and methods

The studies are a continuation of the work that was carried out in cryogenic forests in the north of central Siberia, in the middle reaches of the river. Lower Tunguska near the village. Tura, (64°19'N, 100°13'E), at the base of the Evenk expeditionary base of the Forest Institute of the Siberian Branch of the Russian Academy of Sciences [5, 7, 8, 9]. The climate is semi-humid, sharply continental, which is due to the geographical location and manifests itself in seasonal temperature fluctuations, in the amount and distribution of precipitation in the region. According to the Tura meteorological station for the period 1934–2003, the average annual temperature in January is -36.0°C , in July $+16.5^{\circ}\text{C}$, the average annual temperature is -9.0°C , and the amount of precipitation is 366 mm. The frost-free period lasts 100 days, the period with negative daily temperatures - 210 days, the period without frost on the soil is only 53–56 days, or about 70% of the duration of the growing season [10].

Forest stands are 90% composed of Gmelin larch trees (*Larix gmelinii* (Rupr.) Rupr.) [11]. The species is very undemanding to heat and soil conditions, resistant to soil freezing, adapted to the conditions of shallow permafrost [12, 13, 14]. More than 80% of larch roots are concentrated in the litter and the upper 20 cm layer of mineral soil [15, 10]. The undergrowth is distributed evenly over the area, represented by *Salix* species. The ground cover is relatively homogeneous, shrubs dominate: *Ledum palustre* L., *Vaccinium vitis-idaea* L., *V. uliginosum* L. The moss-lichen cover is represented mainly by *Pleurozium schreberi* (Brid.) Mitt. (30–35%), *Hylocomium splendens* (Hedw.) B.S.G. (8–10%), *Aulacomnium turgidum* ((Wahlenb.) Schwaegr. (35–40%) [16].

The soils are cryohydromorphic cryozems, homogeneous, characterized by high humidity and the presence of suprapermafrost water runoff. Seasonal thawing is 42 ± 10 cm in permafrost heaving mounds and 6 ± 6 cm in depressions [10].

The studies were carried out in 2017–2021. in a coeval cryogenic larch forest formed after a strong ground fire in 1899 (the fire was dated by A. Knorre [17]) on a slope of northern exposure with a slope of about 20. up) a road was laid - "winter road". The effect on trees was detected in two forest stands: located along the road edge (sample plot (SP) TR) and undisturbed, located in the depths of the forest (SP TE) based on direct measurements of silvicultural biometric indicators of trees, annual ring width (ARW), dendrometric and meteorological

characteristics. Silvicultural biometric indicators for each SP were obtained from 10 model trees. They represented three "social" categories: dominant, co-dominant and suppressive. For the year of the study, the diameter at breast height (DBH) in trees on TE took values from 45 to 103 mm, the trunk circumference at a height of 1.3 meters from the soil surface - from 140 to 324 mm. In the TR section, measurements were carried out on larch trees with a trunk diameter of 53 to 106 mm and a circumference of 165 to 330 mm.

To study the course of radial growth and the dynamics of seasonal growth, we selected five trees at the TR SP and seven at the TE SP (the number of trees was limited by the available equipment). These trees were used as trial trees for several seasons. Two of the seven trees selected at the TE SP were dry-topped.

The growth ring width was measured using standard methods in dendrochronology. In the TE and TR sites, cores were taken from selected trees at breast height for a comparative analysis of the course of radial growth. The dating and measurement of the width of growth rings were carried out using measuring complexes LINTAB v3.0 and LINTAB v5.0 "Frank-Rinn-Tech" (Germany), equipped with the TSAP Win v4.68 software package (accuracy 0.01 mm), as well as



Fig. 1. Experimental Gmelin larch trees in a cryogenic larch forest with DRL-26 belt dendrometers installed on them.

Registration of seasonal radial growth was carried out with dendrometers, which tracked the growth of the annual ring during the season and daily variability. For several seasons (2017–2021), in early June (the beginning of the growing season in the study area), EMS DRL-26 dendrometers (Czech Republic) were

installed on selected trees (Fig. 1).

Measurement of meteorological characteristics. Near the TE SP there was a tower (“Eddy covariance”), on which a set of instruments for continuous seasonal measurements of micrometeorological and hydrothermal soil parameters was installed. Of the measured parameters, temperature and precipitation were used in the work. The parameters were measured at two-minute intervals.

Research results and discussion

The difference in the radial growth patterns of trees on the TE and TR SPs is clearly shown in Figure 2.

Figure 2. Change in the annual rings width (ARW) over time (in calendar dates) in experimental Gmelin larch trees in the depths of the forest (TE) and at the edge of the winter road (TR). The numbers in the designation of the curves under the graphs are the circumferences of the trunks at chest height (mm).

Until the beginning of the 80s. trees at the TR SP grew much more slowly. A sharp increase in the annual rings width at the TR SP (on the edge of the winter road) occurred from the mid-1980s, namely the next year after the road was laid (1984). The main reason is the improvement of the hydrothermal properties of

the seasonally thawed layer due to the removal of the heat-insulating moss-lichen cover and tree and shrub vegetation, which led to better soil heating and a sharp improvement in drainage. Note that dominant trees (in Fig. 2, this is an R320 tree with a girth of 320 mm) turned out to be more sensitive to improving growth conditions. At the TR SP, the ARW reached its peak values 25 years after the construction of the winter road and then gradually decreased (due to the rise of permafrost), while remaining noticeably higher than at the TE SP until the year of observation (2020).

The greater intensity of seasonal radial growth on the TR SP compared to the TE SP is clearly established by *dendrometric studies* conducted in 2017–2021. Figure 3 shows dendrometric data for 2018 and 2019 as an example.

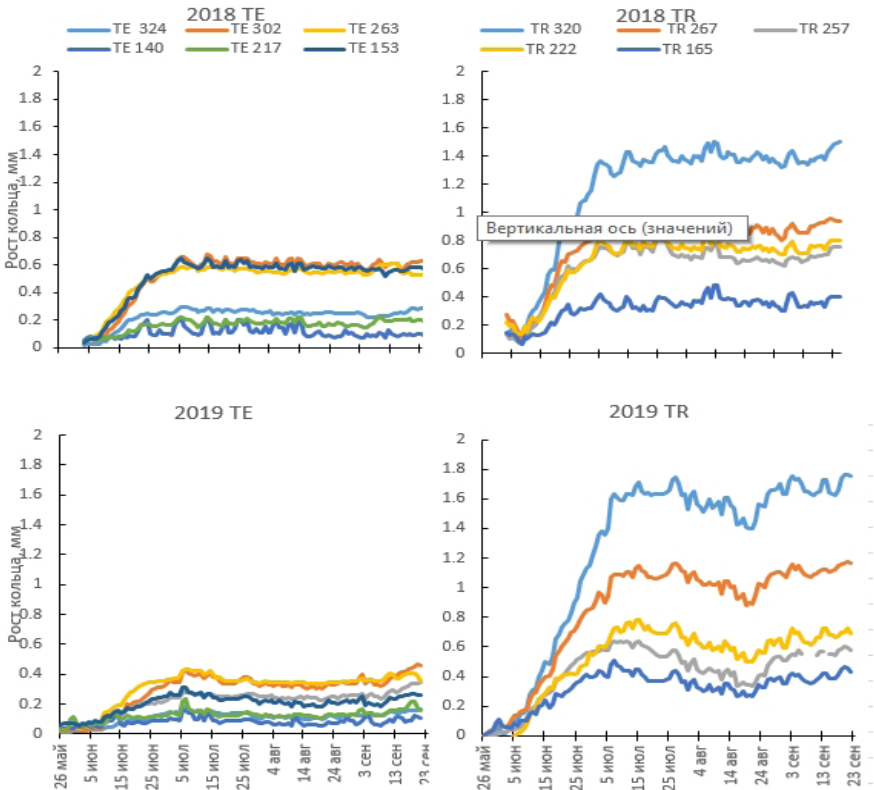


Figure 3. Seasonal annual ring growth (mm) as measured by dendrometers during the 2018 and 2019 growth seasons. near trees in the depths of the forest stand (SP TE) and on the edge of the winter road (SP TR)

The seasonal growth of the trunk along the radius of the trees on the edge of the "winter road" (SP TR) is several times higher than that in the depth of the forest stand (SP TE) (trees of approximately the same trunk circumference are compared with each other). Thus, at the TE SP, the growth for the 2018 season was approximately 2 times less, and for the 2019 season, 3.5–4 times less than at the TR SP (Fig. 3). The duration of the period of the most intensive seasonal growth of the larch trunk on the SP TE does not noticeably change due to the weather conditions of the seasons. So, according to the graphs in Figure 2, this period on TE lasts from the end of the first ten days of June to the middle of the first ten days of July in both 2018 and 2019, which differ in weather conditions. In other words, both the beginning and the end of the period of intensive growth in different years fall at approximately the same time. At the same time, on the edge of the winter road (SP TR), the end of the period of intensive formation of the annual ring turned out to be sensitive to the weather conditions of the season: In 2018, this is the middle of the first ten days of July, and in 2019, about July.

The amplitude of daily variations in the maximum values of the trunk radius in dead-top larches, which are characterized by a relatively low rate of ring growth, is almost two times higher than in neighboring healthy larches (an example is dry-top tree 140 on the TE SP, Figure 3).

Previously, we indirectly showed that dried-up larches experience a more severe water deficit than neighboring healthy trees of the same age [7–9]. This may be evidence of a stronger daily moisture loss from stem wood in dry top trees. It follows from this that dry top trees use the water reserve in the trunk more fully (compared to healthy ones) (night refilling) to provide the required level of transpiration with a general deficit of absorbed water (Fig. 3, dry top trees TE140 and TE153).

From a comparison of seasonal growth patterns on test plots in the same year, it follows that the main factor that determined the significant difference (in our case, by about 50–70%) in the intensity of seasonal radial growth of trunks in stands undamaged and damaged by anthropogenic impact — hydrothermal properties of permafrost soil. From a comparison of seasonal growth patterns on the same sample site, but in different years, it follows that the contribution of weather conditions is noticeably lower—in our case, 12–30%. Judging by the graphs in Figure 3, relatively small trees in the stand depth (TE) turned out to be the most sensitive to the weather conditions of the season.

Conclusion

The results of the work show that even a one-time anthropogenic disturbance (laying a road - a "winter road") has a significant impact on the growth of woody biomass. The main factor that determined the relatively high intensity of seasonal

radial growth in the forest stand at the edge of the road is the improvement of drainage and hydrothermal properties of permafrost soil. The contribution of weather conditions to the growth of trees is much less, and relatively small trees in the depth of the forest stand turned out to be the most sensitive to this factor. Dead top trees are found only in the undisturbed area in the depth of the forest stand. They are more deficient in available soil moisture, and therefore their annual ring is formed most slowly.

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2021–2022 年阿瓦查湾沿岸的 LOCUSTOGAMMARUS LOCUSTOIDES 单一种群的特征

CHARACTERISTICS OF THE LOCUSTOGAMMARUS LOCUSTOIDES MONOPOPULATION OF THE LITTORAL OF THE AVACHA BAY 2021-2022

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分析了阿瓦恰湾沿岸片脚类动物的物种组成。结果表明，只有一种两足动物目 *Locustogammarus locustoides* 存在。该论文给出了 2021–2022 年 7 月收集的这些甲壳类动物种群的大小、性别特征。

关键词：阿瓦查湾，片脚类动物，片脚类动物，*Locustogammarus locustoides*，大小，性别。

Abstract. *The species composition of amphipods in the Avacha Bay littoral was analyzed. The results showed the presence of only one species of the order Amphipoda, Locustogammarus locustoides. The paper gives the size, sex characteristics of the population of these crustaceans collected in July 2021-2022.*

Keywords: *Avacha Bay, amphipods, Amphipoda, Locustogammarus locustoides, size, sex.*

The study of benthic communities in the upper shelf zone of Eastern Kamchatka is relevant for many reasons. The main one is the insufficient knowledge of the benthos community in the shallow waters of the Kamchatka shelf of the Pacific Ocean, as well as the impact of anthropogenic impact on the ecosystem of the eastern coast of Kamchatka. The littoral of the Far Eastern seas is rich in crustaceans of the Amphipoda order, the dominant group is representatives of the *Gammaridea* family. In addition to the rather frequent predominance in terms of biomass, gammarus also serve as the fundamental forms of coastal biocenoses.

Most native species belong to the family *Anisogammaridae*, a family endemic to the North Pacific.

In July 2021-2022 we collected amphipods in the littoral of Avacha Bay, in the center of the city of Petropavlovsk-Kamchatsky (Fig. 1). The crustaceans were caught under rocks at low tide as close to the water's edge as possible. Then they were fixed in 6% formalin, then measured under laboratory conditions, sex and species were determined. A total of 410 specimens were analyzed. When identifying species, reference materials were used (Guryanova, 1951; V. S. Labai, 1998; I. L. Tsvetkova, 1975). The stages of embryonic development were determined by Weygoldt (1924) and Skadsheim (1982) (cited in Pockl, 1993).

Avacha Bay is the second largest ice-free harbor in the world and is located on the southeastern coast of the Kamchatka Peninsula (Lepsкая et al., 2013). The length of the bay is 24 km, the mirror area is 215 sq. km, maximum depth - 28 m, average depth - 18 m. The bay is connected to the ocean by a narrow strait, in which tidal currents constantly operate. The general direction of water circulation in the bay is cyclonic. During high tide, water with oceanic salinity (31–32‰ in summer) spreads along the eastern coast of the bay, and the waters of the estuaries of the Paratunka, Avacha, and other rivers, freshened to 2–5‰ (in June and July), roll down the western half of the bay. At low tide, a more or less uniform movement of the surface desalinated water layer towards the Avacha Bay is observed. Further, the waters of the bay deviate to the south. The straits in the Avacha Bay are irregular diurnal (Vinogradov, 1949; Oshurkov et al., 1989).

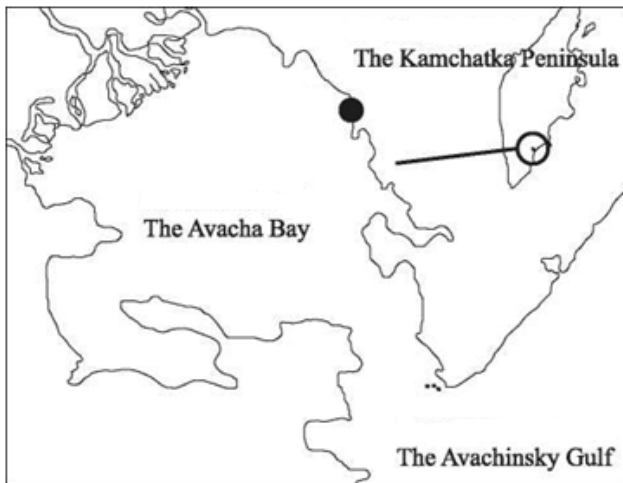


Fig. 1. Study area

The results of hydrobiological studies showed that the only species inhabiting the Avacha Bay littoral is *Locustogammarus locustoides* (Fig. 2.). This species belongs to the order Amphipoda, to the family Anisogammaridae and to the genus *Locustogammarus*.

Locustogammarus locustoides (Brandt, 1851) is a boreal, widespread Pacific species, usually associated with rocky and bouldery coasts. Synonyms: *Anisogammarus locustoides* Brandt, 1851; *Gammarus (Marinogammarus) locustoides* Gurianova, 1951; *Anisogammarus (Eogammarus) locustoides* Barnard, 1954 (Alaska); *Gammarus locustoides* Brandt, 1851 (Drumm et al, 2016).

Distribution: Aleutian Islands and western Alaska, through Prince William Sound and southeastern Alaska to northern Queen Charlotte. Islands and northern mainland coast of British Columbia; western North Pacific; intertidal and shallow intertidal zones (Drumm et al, 2016).

This species has not been sufficiently studied: literature data on biology are rather scarce: only a few works mention the nature of distribution, the time of detection of individual stages (Tsvetkova, 1975).

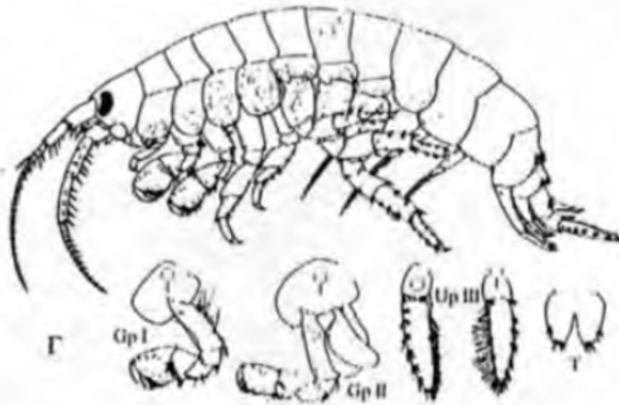


Fig.2. *Locustogammarus locustoides* (Brandt, 1851), (Labay, 1998)

In 2022, 193 specimens of *L. locustoides* were analyzed: females - 97, males - 96 specimens. The crustaceans were from 10 mm to 30 mm long. Females are smaller than males 10-23 mm and 15-30 mm, respectively. Slightly more than half of the females we caught (64 specimens) carried young crustaceans in the brood pouch. Another 8 females had eggs at stages 1-2 in their bags. The average number of crustaceans in the pouch was 20 specimens.

In 2021, a total of 160 crustaceans were analyzed, females - 89, males - 71. The

smallest length in females was recorded at 11 mm; maximum 20 mm and average 15 mm. In males, the smallest body length is 15 mm; maximum 31 mm and average 19 mm. 78 females with young crustaceans in a brood pouch were examined. The average number of crustaceans in the pouch was 10 specimens.

For comparison, in the summer of 2021, a sample of amphipods was taken from the zone located 1.2 m from the water's edge. A total of 57 specimens of *L. locustoides* were caught, 46 of them were females. The crustaceans of this zone turned out to be smaller than the crustaceans living near water. The minimum length in females was recorded as 11 mm; maximum 19 mm and average 14 mm. In males, the smallest body length is 16 mm; maximum 22 mm and average 19 mm. 21 females were found with young crustaceans in a brood pouch. The maximum number of crustaceans was 34 pieces, and the average was 15 pieces.

Summarizing the above, in our samples from the littoral of the center of the city of Petropavlovsk-Kamchatsky, representatives of one amphipod species, *L. locustoides*, were found. Our results confirm the information (Guryanova, 1951; Tsvetkova, 1975) on the formation of pure populations by this species, which do not mix with other amphipod species. During the study period, crustaceans with a length of 10 to 30 mm were noted. Males are larger than females. By the time of capture (July), some females had crustaceans at different stages of development in their brood bags; it can be assumed that *L. locustoides* reproduces en masse in early June.

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使用附加方法诊断犬贫血的有效性
**THE EFFECTIVENESS OF THE USE OF ADDITIONAL METHODS
FOR THE DIAGNOSIS OF ANEMIA OF DOGS**

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这篇文章描述了一只狗巴贝斯虫病的临床病例。 该研究的目的是应用澄清方法诊断贫血。 在一些红细胞指标变化的背景下，红细胞大小分布水平在参考范围内。 为了明确贫血的类型，在患病期间和恢复后计算了红细胞的形态定量指标。 这项工作是在以 B. M. 命名的 FSBI ASRIHAB 的基础上进行的。 Zhitkov 和兽医诊所“真正的朋友”，基洛夫。 诊断时进行外周血涂片镜检。 使用 Diahim-Diff-Quick 试剂盒对涂片进行染色。 使用带有 VISION BIO (Epi) 分析软件的 MeijiTechno MT5000 硬件软件复合体（日本）检查血涂片。 在 Micro-20 Plus（美国）和 BioCnem SA（美国）血液分析仪上进行血液学和生化研究。 在一般血液检查中，发现血小板减少症，血小板水平下降 59.4%，淋巴细胞下降 33.3%。 红细胞水平也下降了 11.7%，血红蛋白下降了 16%，血细胞比容下降了 7%，红细胞中血红蛋白的平均浓度下降了 7.9%，这是溶血性贫血的典型表现。 同时，红细胞大小分布水平正常。 血涂片显微镜显示红细胞中存在犬巴贝斯虫。 红细胞形态定量测量（面积、周长、直径、厚度和球形指数）显示受影响细胞的值与游离细胞相比增加，进入参考值（受影响红细胞面积为 $48.4 \pm 1.21 \mu\text{m}^2$ ，游离红细胞面积为 $41.4 \pm 0.9 \mu\text{m}^2$ ）。 使用对红细胞进行澄清的形态学研究解释了没有小红细胞增多症，这是巴贝斯虫病中溶血性贫血的特征。

关键词：红细胞形态计量学，贫血，犬巴贝斯虫病，狗的血液学参数。

Abstract. *The article describes a clinical case of babesiosis in a dog. The aim of the study was to apply a clarifying method for diagnosing anemia. Against the background of changes in some erythrocyte indices, the level of distribution of erythrocytes in size was within the reference limits. To clarify the type of anemia, morphometric quantitative indicators of erythrocytes were calculated during the illness and after recovery. The work was carried out on the basis of the FSBI ASRIHAB named after B.M. Zhitkov and the veterinary clinic "True friend", Kirov. When making a diagnosis, microscopy of peripheral blood smears was performed. The smears were stained using the Diahim-Diff-Quick reagent kit. Blood smears were examined using the MeijiTechno MT5000 hardware-software complex (Japan) with VISION BIO (Epi) analysis software. Hematological and biochemical studies were performed on Micro-20 Plus (USA) and BioCnem SA (USA) hematological analyzers. In the general blood test, thrombocytopenia was found with a decrease in the level of platelets by 59.4%, a decrease in lymphocytes by 33.3%. There was also a decrease in the level of erythrocytes by 11.7%, hemoglobin by 16%, hematocrit by 7%, the level of the average concentration of hemoglobin in the erythrocyte by 7.9%, which was typical for hemolytic anemia. At the same time, the level of distribution of erythrocytes in size was normal. Microscopy of a blood smear revealed the presence of Babesia canis in erythrocytes. Morphometric quantitative measurements of erythrocytes (area, perimeter, diameter, thickness and sphericity index) showed increased values of affected cells in comparison with free ones, entering the reference values (the area of affected erythrocytes is $48.4 \pm 1.21 \mu\text{m}^2$, the area of free erythrocytes is $41.4 \pm 0.9 \mu\text{m}^2$). The use of a clarifying morphometric study of erythrocytes explained the absence of microcytosis, which is characteristic of hemolytic anemia in babesiosis.*

Keywords: *erythrocyte morphometry, anemia, canine babesiosis, hematological parameters in dogs.*

Introduction

Babesiosis (piroplasmosis) (Babesios) is a dangerous invasive protozoal disease that is seasonal. The causative agent parasitizes in the erythrocytes of the animal's blood. The diagnostic form of *B. canis* is pair pear-shaped, in the center of the erythrocyte, the thin connected ends of which form an acute angle, and its dimensions are greater than or equal to the radius of the erythrocyte [4, 14, 15]. With untimely treatment, mortality can reach 90-95% [9]. The disease is characterized by damage to the cardiovascular, digestive and central nervous systems, fever, yellowness of the mucous membranes, hemoglobinuria, bilirubinemia, intoxication, hemolytic anemia due to massive destruction of red blood cells [6, 7, 8]. At the same time, in the general blood test, there is a decrease in all erythrocyte indices, as well as microspherocytosis, which is reflected in the indicator of the level of

distribution of erythrocytes in size [3, 11].

Analysis of disorders of the erythrocyte system, determination of the type and severity of ongoing anemia is an important structural link in the clinical diagnosis of diseases of the blood system and has a diagnostic prognostic value in assessing the state of the animal, contributes to the correct choice of etiopathogenetic therapy for the disease [1, 2].

The aim of the study was to test a clarifying method for diagnosing anemia in dogs.

Materials and research methods

Therapeutic measures were carried out in the veterinary clinic "True friend", Kirov. A clinical study for the purpose of making a diagnosis was carried out according to the generally accepted method in veterinary medicine: history taking, clinical examination, accompanied by thermometry, auscultation, palpation and percussion. A schedule of anti-epizootological measures was also established - vaccinations against infectious diseases, anti-parasitic treatments.

Laboratory studies were carried out on the basis of the FSBI ASRIHAB named after B.M. Zhitkov. Blood for analysis was taken from the anterior lateral vein of the forearm into two sterile tubes with K3 EDTA (China) and with a coagulation activator (China) and examined using Micro-20 Plus (USA) and BioCnem SA (USA) hematological analyzers. For biochemical analysis, we used reagents from Eco-Service (Russia). Blood smears were examined using the MeijiTechno MT5000 hardware-software complex (Japan), which includes a microscope, a computer, an imaging system, and VISION BIO (Epi) analysis software. An immersion objective $\times 100$ and immersion oil were used. To obtain blood smears, a drop of blood was taken from the ear vein. The dried smears were fixed and stained using the Diahim-Diff-Quick reagent kit according to the instructions. Also, a second blood test was performed after the treatment, the results were compared.

The dog was prescribed complex treatment using etiotropic and symptomatic therapy. As an etiotropic therapy, the drug "Piro-stop" at a dosage of 0.5 ml/10 kg subcutaneously on the second day of treatment [5, 13]. Symptomatic therapy included the use of the drug Diphenhydramine 1% solution for injection 30 minutes before the use of the drug "Piro-stop" on the second day of treatment; intravenous administration of Heprtral at a dose of 20 mg/kg once a day for seven days; intravenous administration of the drug Kvamatel at a dose of 1 mg/10 kg once a day for seven days; intravenous administration of a 5% solution of Rimadyl at a dose of 4 mg/kg on the first day, then 2 mg/kg on the days of the disease, when hyperthermia was observed above 39.5° (on the second and third days of treatment); intravenous drip of Ringer-Locke's solution at a dose of 20 ml/kg for three days of treatment. The duration of treatment was 10 days.

Results and discussion

A dog at the age of 2 years, weighing 12 kg, was admitted to the veterinary clinic "True friend" in the city of Kirov with complaints of refusing to eat for the last 24 hours. When collecting an anamnesis, it was revealed: the dog is kept in an apartment, walking twice a day, feeding with dry food; the dog is annually vaccinated against viral infections, quarterly deworming, there was a tick bite 2 days ago. At the time of clinical examination, the dog showed lethargy, unsteady gait, anemic visible mucous membranes, fever 40.8. The condition of the dog was assessed as moderate. To make a diagnosis, blood samples were taken for general and biochemical analysis, and a capillary blood smear was made.

According to the general blood test (Table 1), erythrocytopenia was observed (a decrease in the RBC level by 11.7% from the lower limit of the reference intervals (RI)), a decrease in the HGB content by 16% from the lower limit of the RI, a decrease in the HCT level by 7% from the lower limit of the RI, a decrease MCHC by 7.9% from the lower limit of RI. Based on the data obtained, it was possible to say that anemia was developing, the RDW indicator was within the RI, and it was necessary to study the morphometric parameters of erythrocytes in order to establish the cause and type of anemia. Thrombocytopenia was also detected (the amount of PLT was reduced by 59.4% from the lower limit of RI).

Next, a smear of capillary blood was examined. In the leukocyte formula (Table 3), there is a decrease in the number of lymphocytes by 33.3% from the lower reference limit, segmented neutrophils are at the upper limit of the RI.

When examining a blood smear for the presence of intracellular parasites, individuals of *Babesia canis* were found in erythrocytes.

As a clarifying method for diagnosing anemia, morphometric measurements of erythrocytes were carried out: not containing babesia and with babesia. With obvious clinical symptoms of anemia in the patient (paleness of visible mucous membranes) and a decrease in erythrocyte parameters in the general blood test, although RDW was in the RI. For erythrocytes, the square (S), perimeter (P) and diameter (D) of erythrocytes were measured using a hardware-software complex. The thickness (T) of erythrocytes was calculated using the formula $T = MCV / S$. The sphericity index was also calculated using the formula $I = D / T$. The obtained values (Table 2) corresponded to the RI.

A decrease in erythrocyte parameters in the general blood test occurs as a result of the reproduction of *Babesia canis* in the blood, which leads to hemolysis, hemolytic anemia develops, and intoxication appears. Quantification of the morphological parameters of erythrocytes did not reveal any deviations in the size of erythrocytes. The applied method of clarifying diagnostics by means of cell morphology in this case made it possible to confirm hemolytic anemia.

Morphometric quantitative diagnostic method allows you to evaluate the qual-

ity of blood cells. Cells can perform their functions only if they have normal morphological parameters. Of the existing diagnostic methods, only computer morphometry makes it possible to assess the qualitative parameters of blood cells.

Thrombocytopenia could be due to several reasons - firstly, high cell utilization, secondly, the destruction of platelets can be caused by immunity, and thirdly, a non-immune factor (exposure to parasite toxins) [10].

Approaching the lower limit of the number of leukocytes and a low number of lymphocytes indicates an immunodeficiency state, which in babesiosis is probably caused by the negative impact of the disease on the bone marrow and impaired maturation of immune cells [16]. As well as this may be due to the suppression of immunity by proteins that are in roptry [10].

Table 1
Hematological parameters of the dog on days 1 and 5 of the disease

Indicators	Norm*	1 day	5 day
Leukocytes (WBC), 10 ⁹ /l	6-17	6.7	12
Erythrocytes (RBC), 10 ¹² /l	5.4-7.8	4.77	7.97
Hemoglobin (HGB), g/l	130-190	108	165
Hematocrit (HCT), %	37-54	34.4	51.3
MEV	0-22	19	8
Mean erythrocyte volume (MCV), fl	64-74	72.3	64.4
Average content of hemoglobin in an erythrocyte (MCH), Pg	22-27	22.6	20.7
Mean erythrocyte hemoglobin concentration (MCHC), Pg	340-360	313	321
Distribution of erythrocytes by size (RDW), %	12.0-17.5	14,2	13.2
Platelets (PLT), 103/μl	160-430	65	255
GGT, mmol	1-10	7.6	7.7
ALT, mmol	9-52	40.8	51.2
AST, mmol	11-42	47.8	42.2
Creatinine, mmol	26-120	78	98.7

Table 2

Clinical analysis of the patient's blood (Leukocyte formula 100 cells)

Indicators	Norm*	1 day	5 day
Young neutrophils /pcs.	0	0	0
Stab neutrophils/pc.	1-6	7	8
Segmented neutrophils/pc.	40-75	75	54
Basophils/piece	0-1	0	0
Eosinophils/piece	2-9	2	4
Monocytes/piece	0-5	1	1
Lymphocytes/piece	21-40	14	34

Table 3

Morphometric parameters of the patient's erythrocytes on the 1st and 5th day of the disease

Indicators	1 day		5 day
	Erythrocytes without babesia	Erythrocytes without babesia	
Average square of erythrocytes (S), μm^2	41.4±1.21	48.4±1.91	40.5±0.9
The average perimeter of erythrocytes (P), microns	25.2	27.6	25.1
Average diameter of erythrocytes (D), microns	5.9	6.3	6.1
Average thickness of erythrocytes (T), μm	1.74	1.49	1.59
Erythrocyte sphericity index (I)	3.42	4.19	3.84

Conclusion. When diagnosing babesiosis in dogs in the general blood test, changes were noted that are characteristic of various types of anemia. To clarify the diagnosis, it is necessary to conduct a comprehensive diagnosis using morphometric studies of blood smears, including a quantitative assessment of morphological parameters.

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益生菌苏巴林对胃肠道微生物群形成的影响和幼年洛克狗血液的一些免疫生化指标 (NUCTEREUTES PROCYONOIDES GREY)

INFLUENCE OF THE PROBIOTIC SUBALIN ON THE FORMATION OF THE GASTROINTESTINAL TRACT MICROBIOTA AND SOME IMMUNOMORPHOBIOCHEMICAL INDICATORS OF THE BLOOD OF YOUNG ROCCOON DOG (NUCTEREUTES PROCYONOIDES GREY)

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这篇文章介绍了胃肠道微生物群和一些免疫形态学血液参数的研究结果，以及益生菌苏巴林对 42-45 日龄浣熊幼犬的影响评估。建立了微生物的定性驻留和暂留群，以及它们和肠管内容物微生物群的定量指标，并确定了益生菌菌株对微生物指标校正的影响程度。我们确定了幼貉消化道中的主要微生物群，研究了苏巴林对从肠道分离的细菌群的拮抗活性，并确定了动物体内益生菌菌株的消除期。根据主要的血液学、生化和免疫学血液参数评估益生菌的影响。研究结果发现，在动物实验组中使用苏巴林 5 天后，药物会影响血液的免疫形态学参数：在 1.5 个月大的幼犬中，红细胞数量增加 降低 9.8%，血红蛋白水平降低 7.2%，白细胞水平降低 20-25%，增加总蛋白量、 β -、 γ -球蛋白、血清的杀菌和吞噬活性。

关键词：subalin，貉，微生物，胃肠道微生物区系，血液，血清，蛋白质组分，嗜中性粒细胞的吞噬反应，杀菌活性。

Abstract. *The article presents the results of a study of the microbiota of the gastrointestinal tract and some immunomorphological blood parameters, as*

well as an assessment of the effect of the probiotic subalin when fed to raccoon dog puppies from 42-45 days of age. Qualitative resident and transient groups of microorganisms were established, as well as their and quantitative indicators of the microbiota of the contents of the intestinal tube, and the degree of influence of the probiotic strain on the correction of microbial indicators was determined. We established the main groups of microorganisms in the digestive tract of young raccoon dogs, studied the antagonistic activity of subalin against groups of bacteria isolated from the intestines, and also established the period of elimination of the probiotic strain from the body of animals. The influence of the probiotic was assessed according to the main hematological, biochemical and immunological blood parameters. As a result of the research, it was found that the use of subalin for 5 days in the experimental group of animals, the drug affects the immunomorphological parameters of the blood: in puppies at 1.5 months of age, the number of red blood cells increases by 9.8%, hemoglobin levels by 7.2%, and the level of leukocytes decreases by 20-25%, increases the amount of total protein, β -, γ - globulins, bactericidal and phagocytic activity of blood serum.

Keywords: subalin, raccoon dog, microorganisms, microflora of the gastrointestinal tract, blood, blood serum, protein fractions, phagocytic reaction of neutrophils, bactericidal activity.

Introduction

In modern economic conditions, among the most common pathologies of caged fur animals associated with the technology of keeping, feeding and use, there are often diseases caused by contamination of feed with pathogenic, opportunistic microorganisms and their toxic metabolites. The most common in fur farming in recent years for the prevention of such contaminants has been the use of feed antibacterial drugs, which often leads to dysbiotic conditions of varying severity and, as a rule, to significant economic losses as a result of reduced productivity, unproductive disposal and death of fur animals. In the process of ontogenetic development, the organism of animals is influenced by stress factors: deposition from the mother, change of feeding during the transition to the main diet, planned veterinary measures (immunization, vitaminization), etc. One of the promising ways to solve these problems is bacterial preparations based on probiotic strains of microorganisms of different groups and symbiotic feed additives [1, 2, 3, 4].

Goals and objectives of the study

The aim of the study was to determine the microbiological parameters of the digestive tract and changes in microbiocenosis in raccoon dog puppies of cellular content during the period of deposition from the mother and within 15 days after deposition, as well as to evaluate the effect of the subalin probiotic on the formation of microbiota and changes in immunobiochemical and physiological blood

parameters.

Goals and objectives of research:

1. to determine the composition of the microbiota of the gastrointestinal tract, as well as to evaluate the effect of the probiotic subalin on the qualitative and quantitative changes in the microbial landscape of the intestinal tube in raccoon dog puppies;
2. to establish the timing of elimination of the probiotic strain from the digestive tract of animals and to study its antagonistic activity against groups of microbes isolated from the intestines;
3. to study the effect of subalin on some immunobiochemical and morphological parameters of blood.

Materials and methods of research

For research, young fur-bearing animals of the *Canidae* family were used: a raccoon dog (*Nuclereutes procyonoides gray*) from 42-45 days of age. Groups of animals were formed according to the method of paired analogues, clinically healthy animals were selected for the experiment, the animals were selectively weighed.

The probiotic subalin was used in the work, the preparation was based on the *B. subtilis* 2335 (105) RNCIM B4759 strain, dehydrated in a protective medium containing sucrose and gelatin.

Feeding of the probiotic Subalin was carried out for 5 days at a dose of 1-2 * 10⁸ CFU/kg, mixing the drug with food.

Experiments on animals were carried out in accordance with the guidelines of Balakirev N.A. and others, [5, 6]. The work was carried out in compliance with the international humane treatment of animals (WMA Declaration of Helsinki - Ethical Principles for Medical Research Involving Human Subjects, 2013), the principles of humanity set forth in the Directive of the European Parliament and the Council of the European Union 2010/63 / EC "On the protection of animals used for scientific purposes" (Directive 2010/63/EU of the European Parliament and of the Council of 22 September 2010 on the protection of animals used for scientific purposes, 2010), in accordance with the rules for conducting work using experimental animals. [Annex to the Order of the Ministry of Health of the USSR No. 755 of 12.08.1977] [7].

Microbiological studies were carried out in accordance with the current Methodological recommendations "Bacteriological diagnosis of intestinal dysbacteriosis" (approved by the Ministry of Health of the RSFSR on April 14, 1977) [8]. Fecal samples were taken from animals of the experimental and control groups before the start of the study, at the age of 42-45 days, after 5 days of using the drug in the experimental group and control, and 10 days after using the drug.

The antagonistic activity of the probiotic strain against groups of microor-

ganisms isolated from the gastrointestinal tract was performed using a two-layer technique according to Frederico [9]. Antagonistic activity was manifested by the formation of zones of inhibition of the growth of test strains around the colonies.

Blood for research in raccoon dog puppies was taken (n=5 of each group) from the lateral saphenous vein of the leg before and at the end of the experiments.

Morphological parameters of the blood of animals were determined using an automatic hematological analyzer ERMA INC model PCE-90 (Japan). Protein fractions in blood serum were determined by the nephelometric method according to V.Ya. Antonov et al. [10], the bactericidal activity of blood serum was determined by the method of T.A. Kuzmina, O.V. Smirnova [11], opson-phagocytic reaction according to A.S. Labinskaya [12].

Statistical data. The obtained data were processed using the MS Excel and Statgraphics software packages by conventional methods of variation statistics, comparison of differences between groups was performed using the nonparametric Wilcoxon-Mann-Whitney (U) test. Differences with $p < 0.05$ were considered statistically significant.

Research results

Feeding the probiotic subalin to young raccoon dogs began from the day of jiggling from the mother, when transferred to the main diet. The puppies of the experimental and control groups were observed and changes in behavior (oppression, refusal to feed, etc.) were recorded.

The influence of the drug on the morphological composition of the microbiota of the gastrointestinal tract of animals was assessed in three stages: at the first stage, the study of the intestinal microbiocenosis before the use of the probiotic, and at the second stage, after 5 days of the use of the probiotic. At the third stage, the period of elimination of the probiotic strain from the gastrointestinal tract was assessed over the next 10 days.

Table 1

The results of studies of the microbiota of the gastrointestinal tract of young raccoon dogs

Name of groups of microorganisms (Lg CFU/g)	1 stage		2 stage		3 stage	
	Control group	Experimental group	Control group	Experimental group	Control group	Experimental group
Bifidobacterium sp.	11,08±0,3	11,14±0,24	11,12±0,54	11,7±0,24	10±0,57	10,88±0,11
Lactobacillus sp.	10,83±0,1	10,82±0,13	10,25±0,1	10,53±0,12	7,18±0,1	8,58±0,16
E.coli	6,79±0,11	6,81±0,16	6,3±0,12	6,76±0,13	7,78±0,13	6,72±0,07
Hydrogen sulfide forming E.coli	6,53±0,21	6,48±0,34	6,12±0,17	5,21±0,13	6,24±0,32	4,96±0,24
Lactose-negative E. coli	3,9±0,3	3,85±12	3,96±0,12	1,27±0,03	4,15±0,03	-

Staphylococcus sp.	5,72±0,28	5,75±0,16	5,9±0,24	5,45±0,1	6,93±0,03	5,78±0,11
Staphylococcus lecithinase positive	2,76±0,2	2,55±0,37	2,93±0,12	1,03±0,05	4,18±0,22	-
Streptococcus sp.	5,73±0,12	5,68±0,21	5,1±0,18	5,08±0,05	5,19±0,21	5,41±0,15
Streptococcus faecium	3,65±0,18	3,74±0,16	3,1±0,08	2,76±0,15	3,15±0,1	2,18±0,08
Streptococcus faecalis	4,38±0,23	4,56±0,21	4,33±0,25	4,69±0,2	4,3±0,12	4,56±0,16
Proteus sp.	6,5±0,25	6,48±0,19	6,48±0,21	-	3,55±0,2	-
Clostridium sp.	6,91±0,045	6,92±0,07	6,8±0,17	4,66±0,13	4,1±0,24	4,62±0,12
B.subtilis	-	-	-	11,0±0,32	-	-

The main dominant groups of microorganisms in the gastrointestinal tract of a raccoon dog are bacteria of the genus *Bifidobacterium* and *Lactobacillus*, obligate representatives of the microbiota of monogastric animals, occupying about 90-95% of the total microbial mass. Bifidobacterium are obligate anaerobes, occupy parietal taxa of the intervacular space of the intestinal mucosa, and have a high adhesive ability to epitheliocytes.

The family *Enterobacteriaceae* in the microbial landscape is represented by three main genera: *Escherichia*, *Proteus* and *Salmonella*. At the same time, representatives of the genus *Escherichia* were isolated: *E. coli* - hydrogen sulfide forming lactose-positive and lactose-negative groups.

In single samples, bacteria of the genus *Salmonella* were isolated, not differentiated to species and serogroup.

Representatives of coccid forms of microorganisms, widespread in the intestines of carnivorous cellular fur animals belonging to the genus *Staphylococcus*, were differentiated by pigment formation, the presence of cloudy areas around the colonies was determined by the number of lecithinase-positive, as well as hemolyzing species. When determining antagonistic activity, an overall lower sensitivity to the probiotic strain was established.

When differentiating the genus *Streptococcus*, two dominant species in the intestine, *Streptococcus faecium* and *Streptococcus faecalis*, were identified.

Spore-forming, obligate anaerobic bacteria of the genus *Clostridium sp.* cultured on iron sulfite medium, not differentiated.

The results obtained make it possible to determine the main taxonomic groups of bacteria that are constantly present in the gastrointestinal tract of young raccoon dogs, as well as the effect of the probiotic strain *B. subtilis* 2335 (105) RNCIM B4759 on changes in the microflora and its antagonistic activity.

The elimination period of the probiotic strain was determined by inoculation of faeces on the GRM-agar with kanamycin, according to Starovoitova S.A. [13], resistant to kanamycin. As a result of the research, it was found that the complete elimination of *B. subtilis* 2335 (105) RNCIM B4759 from the intestine occurs by

the 10th day after the last feeding.

The assessment of the antagonistic activity of the probiotic strain in relation to the selected groups of opportunistic microorganisms was carried out by a two-layer method according to Frederico.

Table 2

Results of the antagonistic activity of a probiotic strain against microorganisms isolated from the gastrointestinal tract of a raccoon dog

Cultures of microorganisms	Diameter of the zone of inhibition of microbial growth in the experiment with strains isolated from animals *, mm
Staphylococcus sp.	15±1
Streptococcus sp.	25±3
E.coli	15±1
Proteus sp.	17±1
Salmonella sp.	19±2

*- measurement error ±0.5 mm

As a result of the research, it was found that the probiotic strain has the highest level of antagonistic activity of the waste products of the probiotic strain against streptococci, salmonella and proteus, while also inhibiting the growth of staphylococci and E. coli.

The study of the effect of subalin on the immunomorphological parameters of blood in the body of a raccoon dog was carried out on the 5th day of feeding the probiotic.

Table 3

The results of studies of immunomorphological parameters of blood in puppies of a raccoon dog on the 5th day of the use of subalin

Indicators	Age, groups	2 months	
		Experimental group (n=5)	Control group (n=5)
number of erythrocytes, 10 ¹² /g/l		7,9±0,13*	6,28±0,25*
the number of leukocytes, 10 ⁹ /l		3,82±0,16	4,38±0,15
hemoglobin, g%		11,8±1,7	10,4±1,1
Albumins, %		31,49 ± 7,3**	49,88, ±1,92**
α-globulin, %		48,75 ±8,3**	34,05 ±2,5**
β – globulins, %		15,16 ± 0,203	11,24± 1,7
γ – globulin, %		4,6 ± 0,7	4,9 ±0,3
Total immunoglobulins, g %		187,8±20**	112±18,88**
Bactericidal activity of blood serum		51,01 ± 8,95	32,8 ±10,01
Phagocytic activity of neutrophils		43,8±0,15*	27,4±0,22*

*p<0,05, **p<0,001

As can be seen from Table 3, feeding the probiotic subalin to puppies from 42-45 days of age does not have a significant effect on hematological blood parameters. The number of erythrocytes and the level of hemoglobin in both groups remained within the physiological norm. A significant decrease ($p < 0.05$) of leukocytes in the experimental group of animals by 12.8% occurs on the 5th day of probiotic use.

When studying blood serum proteins, it was found that in the experimental group there was a significant (** $p < 0.001$) decrease in albumin by 36.9%. At the same time, there is a change in the amount of α - globulins, their number increases in the experimental group by 1.7 times, while the level of β - and γ - globulins does not change significantly and amounts to $11.5 \pm 0.207\%$ and 4.9 ± 0.093 in the animals of the experimental group. %, control $13.52 \pm 0.781\%$ and $3.29 \pm 0.074\%$, respectively.

It should be noted that in the animals of the experimental group on the 5th day after the application of subalin, the level of bactericidal activity of blood serum increased significantly, which amounted to 51.01 ± 8.95 , which is 1.5 times higher than in the control group. At the same time, there was a significant increase in the level of total immunoglobulins in the experimental group up to 187.8 ± 20 , which is 1.47 times higher than in the control group ($p < 0.001$).

Conclusion

As a result of the research, the main groups of microorganisms, permanent representatives of the gastrointestinal tract of young raccoon dogs, were identified: *Bifidobacterium sp.*, *Lactobacillus sp.*, *E. coli*, *Staphylococcus sp.*, *Streptococcus sp.*, *Streptococcus faecium*, *Streptococcus faecalis*, *Proteus sp.* and *Clostridium sp.* When feeding the probiotic subalin to raccoon dog puppies from the period of jiggling from the mother and transferring to the main diet, a decrease in the number of *E. coli*, *Staphylococcus sp.*, *Streptococcus sp.*, and *Clostridium sp.* complete displacement of bacteria of the genus *Proteus sp.* and *Salmonella sp.*

The period of elimination of the probiotic strain from the gastrointestinal tract of young raccoon dogs has been established. Thus, the complete elimination of the strain occurs by the 10th day after the cessation of feeding.

The introduction of the probiotic Subalin into the diet for 5 days does not have a significant effect on the main hematological parameters, but there is a significant decrease in the number of leukocytes, with an increase in the content of total immunoglobulins, an increase in the bactericidal activity of blood serum and phagocytic activity of neutrophils.

Thus, based on the data obtained, the use of the probiotic Subalin is advisable to use during the period of jiggling of animals and when transferring puppies to the main diet, as well as during planned veterinary measures.

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引入 SUBALIN 的赤狐幼犬 (VULPES VULPES) 血液的免疫形态学指标
**IMMUNOMORPHOLOGICAL INDICATORS OF THE BLOOD OF RED
FOX PUPPIES (VULPES VULPES) WITH THE INTRODUCTION OF
SUBALIN**

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本文介绍了益生菌苏巴林对 2 个月和 8 个月大的幼年红狐血液免疫形态学参数影响的研究结果。根据主要的血液学、生化和免疫学血液参数评估益生菌的影响。研究发现,在所有实验组动物中使用苏巴林 5 天会影响血液的免疫形态学参数:在 8 个月大的幼犬中,红细胞数量增加 9.8%,血红蛋白水平降低 7.2%,白细胞水平降低 20-25%,增加血清总蛋白、 β -、 γ -球蛋白、杀菌和吞噬活性的量。

关键词:苏巴林,赤狐,血液,血清,蛋白质组分,中性粒细胞的吞噬反应,杀菌活性。

Abstract. *The article presents the results of a study of the effect of the probiotic subalin on the immunomorphological parameters of the blood of young red foxes at two and eight months of age. The influence of the probiotic was assessed according to the main hematological, biochemical and immunological blood parameters. As a result of the research, it was found that the use of subalin for 5 days in all experimental groups of animals affects the immunomorphological parameters of the blood: in puppies at 8 months of age, the number of red blood cells increases by 9.8%, the hemoglobin level by 7.2%, and the level of leukocytes decreases by 20-25%, increases the amount of total protein, β -, γ - globulins,*

bactericidal and phagocytic activity of blood serum.

Keywords: *subalin, red fox, blood, blood serum, protein fractions, phagocytic reaction of neutrophils, bactericidal activity.*

Introduction

At different stages of postnatal ontogenesis, changes in the immunomorphological parameters of blood occur in the body of young red foxes. In the process of ontogenetic development, the organism of animals is influenced by external stress factors: deposition from the mother, change of feeding, during the transition to the main diet, planned veterinary measures (immunization, vitaminization), etc. [7, 8, 9]. Currently, various biologically active substances of various etiologies are used to reduce stress levels: vitamin and mineral preparations, enzyme preparations and probiotics.

Materials and methods of research

Fur-bearing animals of the Canidae family were used for research: the red fox "Ognyovka Vyatskaya" (*Vulpes vulpes*), young animals of 2 and 8 months of age. Groups of animals were formed according to the method of paired analogues, clinically healthy animals were selected for the experiment, the animals were selectively weighed.

The probiotic subalin was used in the work, the preparation was based on the *B. subtilis* 2335 (105) RNCIM B4759 strain, dehydrated in a protective medium containing sucrose and gelatin.

Feeding of the probiotic Subalin was carried out for 5 days at a dose of 1-2 * 10⁸ CFU/kg, mixing the drug with food. Blood sampling was carried out before the introduction and after 5 days of using subalin.

Experiments on animals were carried out in accordance with the guidelines of Balakirev N.A. and others, [2, 6]. The work was carried out in compliance with the international humane treatment of animals (WMA Declaration of Helsinki - Ethical Principles for Medical Research Involving Human Subjects, 2013), the principles of humanity set forth in the Directive of the European Parliament and the Council of the European Union 2010/63 / EC "On the protection of animals used for scientific purposes" (Directive 2010/63/EU of the European Parliament and of the Council of 22 September 2010 on the protection of animals used for scientific purposes, 2010), in accordance with the rules for conducting work using experimental animals. [Annex to the Order of the Ministry of Health of the USSR No. 755 of 12.08.1977]. [10]

Research methods

Blood for research in the red fox "Ognevka Vyatskaya" was taken (n=10 of each group) from the lateral saphenous vein of the leg before the start of the experiments and at the end of the experiments.

Biochemical methods

Morphological parameters of the blood of animals were determined using an automatic hematological analyzer ERMA INC model PCE-90 (Japan). Protein fractions in blood serum were determined by the nephelometric method according to V.Ya. Antonov et al. [1], the bactericidal activity of blood serum was determined by the method of T.A. Kuzmina, O.V. Smirnova [5], opson-phagocytic reaction according to A.S. Labinskaya [4].

Statistical data

The obtained data were processed using the MS Excel and Statgraphics software packages by conventional methods of variation statistics, comparison of differences between groups was performed using the nonparametric Wilcoxon-Mann-Whitney (U) test. Differences with $p < 0.05$ were considered statistically significant.

Research results

Feeding the probiotic subalin to red fox puppies was carried out on the day of jiggling from the mother, when switching to the main diet. The puppies of the experimental and control groups were observed and behavioral changes were recorded (oppression, increased activity, food refusal, etc.). The study of the effect of subalin on the immunomorphological parameters of blood in the body of the red fox was carried out in two stages. The first stage of the study was carried out on red fox puppies at the age of 2 months.

The research results are presented in table 1.

Table 1 - Results of studies of immunomorphological blood parameters in red fox puppies at 2 and 8 months of age

Indicators	Age, groups		2 months		8 months	
	Experimental group (n=10)	Control group (n=10)	Experimental group (n=10)	Control group (n=10)		
The number erythrocytes, $10^{12}/l$	8,23±1,39	8,88±1,23	9,42±0,55*	8,58±0,29*		
the number of leukocytes, $10^9/l$	5,47±0,2*	7,33±0,2*	5,2±0,12*	6,5±0,35*		
hemoglobin, g%	13,4±0,11	13,4±0,07	14,8±0,6	13,8±0,38		
total protein, g %	7,86±0,6*	6,03±0,6*	7,9±0,6*	6,3±0,6*		
Albumins, %	53,9±8,7*	67,8±1,0*	50,8±3,7*	65,8±1,0*		
α -globulin, %	8,76±1,76	7,88±2,07	8,6±1,0	7,8±0,7		
β – globulins, %	20,88±11,94*	9,42±5,54*	20,8±1,94*	9,42±3,54*		
γ – globulin, %	16,39±3,06	14,88±2,78	16,9±2,06	14,8±1,8		
Total immunoglobulins, g %	144,67±67,7	139±64,94	155,7±27,7	139±24,94		
Bactericidal activity of blood serum	47,7±1,4*	17,1±1,54*	144,5±67,77	139,2±64,94		
Phagocytic activity of neutrophils	40,6±0,15*	22,8±0,22*	45±0,25*	26,8±0,22*		

* $p < 0,05$

As can be seen from Table 1, feeding the probiotic subalin to puppies 2 months of age does not have a significant effect on hematological blood parameters. The number of erythrocytes and the level of hemoglobin in both groups remained within the physiological norm. A significant decrease ($p < 0.05$) of leukocytes in the experimental group of animals by 25% occurs on the 5th day of probiotic use.

When studying the effect of subalin on the immunomorphological blood parameters of red fox puppies at 8 months of age, on the 5th day of subalin use, there was a significant increase ($p < 0.05$) in the number of erythrocytes by 9.8%, hemoglobin levels by 7.2%, as well as a decrease the number of leukocytes in animals of the experimental group (by 20%).

When studying blood serum in puppies at 2 months old, it was found that the use of subalin affects the level and content of protein fractions in blood serum: in animals of the experimental group, there is a significant ($p < 0.05$) decrease in the amount of albumin, and is $53.89 \pm 8.7\%$, which is 14% less than in the animals of the control group, and the level of α -globulins and γ -globulins in puppies of both groups did not change significantly. At the same time, the level of β -globulins in animals of the experimental group is significantly ($p < 0.05$) higher (2.2 times) than in animals of the control group. The number of total immunoglobulins in the animals of the experimental group is higher than in the control group and was 144.67 ± 67.7 and 139 ± 64.94 , respectively, but the difference in the results obtained is not significant. When assessing the bactericidal activity of blood serum and phagocytic activity of neutrophils in the experimental group of animals, the indicators are significantly higher.

When examining the blood serum of a red fox at the age of 8 months, it was found that subalin affects the ratio of protein and protein fractions. Thus, it was found that in the animals of the experimental group, the level of total protein increased by 20.25%. When determining the amount of α -, β -, γ - globulins, an increase in these indicators in the experimental group of animals by 9.3 was noted; 54.7 and 12.4%, respectively, while the amount of albumin is reduced by 29.5%. When determining some immunological parameters on the 5th day after the application of subalin, it was found that in the experimental group of puppies, an increase in bactericidal activity by 3.7%, and total immunoglobulins by 10.6%. compared to the control group. The phagocytic activity of neutrophils was significantly higher in the experimental group of animals ($p < 0.05$).

Conclusion

Thus, based on the data obtained, the use of the probiotic Subalin is advisable to reduce stress factors, such as: separating from the mother, switching to the main diet, carrying out planned veterinary measures that affect the body of puppies as a whole, and also affects some hematological immunomorphological blood parameters.

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尽量减少日常生活中的浪费：“SEPARATE”原则
**MINIMIZATION OF WASTE IN EVERYDAY LIFE: THE "SEPARATE"
PRINCIPLE**

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建议：购买可以使用多年的优质耐用设备。修理，不要扔掉并妥善处理。70%的手机材料可以回收利用。许多商店接受二手设备，甚至在购买新产品时给予折扣。旧笔记本电脑、电脑和电话可用作备件。

关键词：废弃物，永久冻土，沉积，堆肥。

Abstract. *Recommendations: buy quality, durable equipment that will last for many years. Repair, don't throw away and dispose of properly. 70% of mobile phone materials can be recycled. Many stores accept used equipment and even give a discount for it when buying a new product. Old laptops, computers and telephones can be used for spare parts.*

Keywords: *waste, permafrost soils, depositing, composting.*

Hazardous waste in everyday life

- Wastes are considered hazardous if they fall into one of the characteristics of the worldwide classification specified in Annex III to the Basel Convention.
- Hazardous waste: mercury lamps, residues of drugs, cosmetics and household products, plastic bottles and bags, electrical waste and batteries, varnishes and paints, car tires.
- Mixing of hazardous waste is prohibited in order to prevent risks to human health.

In everyday life, hazardous waste is constantly generated: mercury lamps, residues of drugs, cosmetics and household products, plastic bottles and bags, electrical waste and batteries, varnishes and paints, car tires. Let us dwell on the most hazardous waste in everyday life, which poses a threat to human health and the

environment. They contain substances with properties such as toxicity, explosiveness, flammability, high reactivity (explode spontaneously, cause corrosion, rust). Wastes are considered hazardous if they fall into one of the characteristics of the worldwide classification specified in Annex III to the Basel Convention. Hazardous waste is classified based on its biological, chemical and physical properties. More than 500 substances are included in the list of hazardous waste. This list is still under review and is constantly updated.

There are 4 classes of waste according to the degree of hazard.

Table. 4 classes of hazardous waste

Classes	1st class	2nd class	3rd class	4th class
Degree of danger to the environment	Extremely dangerous	Highly dangerous	Moderately dangerous	Negligibly dangerous
Environment recovery time	Indefinitely long	30 years and more	Minimum 10 years	Up to 3 years
Examples	Transformers, capacitors, mercury-containing lamps, thermometers	Car tires, lithium batteries	Copper wires, engine oil, acetone and its analogues, fresh manure	Sawdust, wooden furniture, shards of natural glass, various construction waste

The mixing of hazardous substances is prohibited in order to prevent risks to human health.

Batteries - mega-hazardous waste. Moreover, any batteries are dangerous (in industrial accumulators, in remote controls, in watches, etc.), because they contain heavy metals (lead, cadmium and mercury). For example, the most popular A1, as it is called, the finger battery, is capable of contaminating 20 square meters of soil or poisoning 400 liters of water with heavy metals. At the same time, every year the inhabitants of the earth throw 450 tons of batteries into waste. What to do? Used batteries should only be taken to designated collection points, such as household chemicals stores, or disposed of in special containers. Whenever possible, avoid using low-capacity batteries and switch to rechargeable batteries.

Failed computers, electronics, household appliances are dangerous. Refrigerators contain freon, which causes ozone holes in the atmosphere. Old electronic boards and wires in landfills undergo various chemical reactions when they come into contact with moisture. Phones with lithium-ion batteries release lead and mercury. The metal (cadmium) is found in all types of electronics. Large doses of it cause deformation of the human skeleton, fractures, accumulating in internal organs, it causes cancer. Lead is also used in computer technology, and when it gets into living chains, for example, with water, it can cause nervous disorders, kidney and brain diseases.

Recommendations: buy quality, durable equipment that will last for many

years. Repair, don't throw away and dispose of properly. 70% of mobile phone materials can be recycled. Many stores accept used equipment and even give a discount for it when buying a new product. Old laptops, computers and telephones can be used for spare parts.

- The EU Waste Directive prescribes the separate collection of at least four fractions of MSW: glass, plastic, metal, paper (cardboard). Bio waste (5th fraction) is collected separately.
- Used glass products are sorted by color (white and colored separately, including empty glass bottles without corks and glass jars) and placed in separate containers that are taken out by the recycling service when filled. It is forbidden to dump heat-resistant glass, building glass blocks and window glass, filled bottles, glass waste from laboratories, mirror glass into this container.

The EU Waste Directive prescribes the separate collection of at least four fractions of MSW: glass, plastic, metal, paper (cardboard). I will show this with an example. Before you is waste generated in everyday life. First, we will form 4 piles of waste in accordance with EU requirements :

- shards of glass separately (window glass and other high strength is not suitable, collected separately and disposed of separately),
- tin can separately in the 2nd pile,
- plastic bottle separately,
- paper separately.

Remaining are the tangerine rind, eggshells, potato peels, onion skins, and moldy bread. This can be composted, a valuable organic fertilizer and soil structure improver. We add these ingredients to the fourth pile (where paper waste is), then grind the mixture and put it in a container with ventilation and a filter. In addition to the organic component, moisture, oxygen and bacteria are also important for proper composting, which provide rotting and decomposition of the mixture. The moisture content of the mixed mass should be the same as that of the wrung out sponge. You can also add plant residues to the mixture, and to speed up the process, ordinary yeast. Compost is formed in the container, which can be used to feed indoor flowers, to fertilize the soil of flower beds. In small volumes, compost is prepared at room temperature (but not higher than 30 °C), within two weeks (the container can be placed on the balcony, in the loggia of a city apartment. To prepare compost in a country house with a garden and a kailyard, you must choose a place on the site - you can use a compost pit, or you can build a compost area with boards of wood. At the bottom of a pit or site, sand or fine gravel is usually poured for drainage, then a layer of humus, manure should be laid out so that the heap is actively supplied with bacteria and microorganisms. In the compost heap, you can add cuttings, weeds, sawdust and wood waste, food residues of plant origin, her-

bivore manure and bird droppings, chalk, ash, coal, eggshells. The decay process needs to be kept up with enough moisture, so it will be appropriate to spill the pile with water in dry weather. The composting process can take from several months to two to three years, depending on the size of the components and the fermentation mode. In this case, there is only one drawback - the long maturation process. You can shorten the composting time of the mass with the help of manure: it is a rich source of nitrogen, and this is a necessary condition for a high rate of decay.

What should be collected in a biowaste container (lid with biofilter) for composting leftover bread and bakery products, kitchen waste and food leftovers - cheese, sausages, meat and fish (boiled), dairy products, salads, fruits and vegetables, as well as eggshells, bones, tea bags and coffee filters, flowers and compostable waste (paper bags and towels, napkins). It is not allowed to throw flower soil, wood debris, plastic bags, straw, litter of litter boxes for cats, non-compostable products and plastic bags, diapers, waste containing harmful substances, such as batteries, into the container.

Bag for packing materials. Collected here: packaging made of artificial materials (cups for yogurt, sour cream, tubes of paste, bottles for shampoo, packaging film, nets for vegetables and fruits), metal packaging (aluminum film, foil, canned food cans, aluminum bowls, beverage bottles, screw caps), non-woven packaging (milk and juice bags, vacuum coffee packaging, frozen food packaging). Artificial materials and metals that were not packaging (scrap, glass, paper, residual debris), aerosol cans, PVC tiles, food remains must not be thrown into the yellow bag.

Residual waste - in a separate container. Residual waste – cinder, cigarette butts and ashes, bandages, cotton wool, plaster and tampons, plaster and rubber, ceramics and porcelain, ballpoint pens and felt-tip pens, fish and meat leftovers (raw), cat litter and bird sand, candle residues and self-adhesive labels, cosmetic wipes and condoms, clay pots and pans, silk stockings, tights and socks, diapers, toothbrushes, wallpaper, cloths for cleaning and mopping, vacuum cleaner bags, light bulbs. Waste that can be reused (glass, paper), as well as problematic waste containing toxic materials (solvents, heavy metals) and construction waste, stones, electrical appliances must not be thrown into the specified container.

Problematic and hazardous waste (waste oil, batteries, paints, varnishes, cleaning agents, plant protection products and poisons, medicines, fluorescent lamps, spray cans, edible oils) are taken to recycling points.

Expired medicines – a hazardous medical waste.

Fluorescent (energy saving) lamps and mercury thermometers contain mercury. Each lamp contains from 3 to 7 mg of mercury, and in a household thermometer - up to one milligram of mercury.

Bulky waste is collected at the side of the road and removed separately. These are furniture, beds, baby carriages, bicycles, suitcases, stairs, cages for small an-

imals, sports equipment, carpets/floor coverings, as well as electrical appliances: players, TVs, computers, printers, monitors, refrigerators, electric and gas stoves, microwave ovens, vacuum cleaners, VCRs, dishwashers and washing machines, waste from the garden and balconies. The actual garden waste (foliage, branches, grass cuttings) is packed in special bags designed for 25 kg, and taken out simultaneously with bulky waste.

Thus, the correct disposal of environmentally hazardous waste is very important for the environment and for human health. Minimization of household waste, their separate collection, recycling contribute to effective waste management and provide a high environmental impact. With regard to waste, both in everyday life and at work, the SEPARATE principle must apply. Such a separate collection of waste allows you to preserve in them valuable components and raw materials necessary for obtaining other materials, products and goods.

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概念：零浪费。 家用地热能

CONCEPT: ZERO WASTE. GEOTHERMAL ENERGY FOR THE HOME

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解决资源节约问题的最佳途径是从线性产生废物的经济转变为基于循环生产和消费废物原则的资源节约型、低碳循环经济。

关键词：废弃物，永久冻土，沉积，堆肥。

Abstract. *The best way to solve the problems of resource conservation is the transition from a linear waste-generating economy to a circular resource-efficient, low-carbon economy based on the principles of recycling production and consumption waste.*

Keywords: *waste, permafrost soils, depositing, composting.*

Let's dwell on the new environmental trend - zero waste or zero loss - living in the Zero Waste style. This area is developing in Brazil, Argentina, the USA and Mexico, Japan, New Zealand and the UAE. Large manufacturing companies are trying to match the Zero Waste ideas: Procter & Gamble, Subaru, Ford, Nestle. In 2018, the IT giant Apple became independent from traditional sources of raw materials and fully supports all its needs with renewable energy. Besides, Facebook, IKEA, Google want to transition as well.

The founder of the Zero Waste concept, Robin Murray, first of all insisted on global changes, such as:

- Avoiding private cars in favor of public transport;

- Increasing the lifespan of things, leading to a decrease in the number of goods produced, which, after use, are sent to landfill.

This was the concept of the structure of the economy and production, it did not contain a call to asceticism. The main idea is the work of the whole society, and therefore people who are fond of Zero Waste in everyday life should not oppose themselves to society.

Proposes a transition to low-carbon fuel for cars, to electric vehicles, and the preferential right to use public transport is chosen. Those who support this movement advocate conscious consumption and want to come to the idea of living without waste. Such people try not to generate garbage at all. They do not use disposable items, send sorted waste for recycling, see the benefits of renewable energy sources and other components of the "green economy".

Sorting out recyclable materials is an important factor in ensuring the efficiency of the circular economy. Many countries have developed their own national strategy for integrated waste management, based on the 3Rs concept, aimed at reducing the generation, reusing and recycling waste.

Zero Waste activist Bea Johnson – a pioneer of the eco-movement, based on the concept of 3Rs, formulated the 5R rule. It articulates the principles of eco-life. The general principle is to consume less raw materials that need to be thrown away.

Refuse

Make shopping deliberate. To do this, create grocery lists and weigh purchasing decisions. Learn to say "no" to everything that is disposable and useless, too cheap and of poor quality. Use sustainable alternatives to paper and plastic dishes. Avocado pits and cornstarch dishes, applesauce cups, dough spoons, potato peel straws are edible dishes that can not only help solve the problem of garbage disposal, but also benefit the body.

Reduce

Use water-saving sanitary equipment with Eco function in your home: thermostatic, single-lever aerated faucets, water-saving shower heads, dual-flush toilets. The water used on the farm can be reused, for example, for irrigation of plantings near the house. The use of rainwater and water melted from snow is one of the sources of saving water resources in an office and residential building, a cottage, or even a large industrial enterprise.

Save resources and use fewer things in everyday life. This is not about reducing the grocery basket, but it is possible to change the way you dress. Don't buy "sweaty" fabrics like nylon and polyester. They are made from petrochemicals, using vast amounts of energy, water and synthetic oils in the process. Nitrous oxide, which is emitted during the production of nylon, is 310 times more potent as a greenhouse gas than carbon dioxide. Choose natural fabrics whenever possible, and cut down on electronics and furniture in your home. Reducing your consumption doesn't necessarily mean becoming a complete ascetic. Just be smart about every purchase.

Reuse + Repair

Handle things more carefully so they last longer, try to give them a second chance. You shouldn't buy disposable items that are guaranteed to be thrown into

the trash can. Better to use items that last a long time. Even if they break, try to fix them.

Wastepoint website will show you how to reuse things.

Recycle

Dispose of waste designated for this purpose at recycling centers. Sort glass, waste paper, plastic, metal, and dispose of light bulbs, batteries, accumulators and other hazardous waste separately.

Here are some examples of successful recycling of waste caught in the ocean. Adidas, in collaboration with Parley for the Oceans, an organization for the protection of the oceans, has created the football kit for "Real Madrid" and "Bayern Munich". The garments are 100% made from recycled materials, namely yarns and fibers made from recycled plastic waste collected by Parley during the cleaning of the Maldives coast. Previously, ADIDASxPARLEY had already released running shoes made from recycled plastic and abandoned fishing nets found in the oceans. The company has now sold over 1 billion pairs of recycled sneakers.

The Russian football clubs "Zenit" and "Spartak" have a uniform made of recycled plastic. The plastic bottles are first collected, sorted and washed, then crushed and melted into thin plastic threads from which the shape is sewn. The material is not inferior in quality to ordinary polyester. It takes about 16 bottles to create one set.

The "Forest Green" sports club is considered the most environmentally friendly in the world. The players here are prescribed a vegetarian diet, and all the equipment in the stadium is powered exclusively by solar energy. The club also collects rainwater to use for irrigation. The uniform for the players was made of plastic and bamboo. The color of the uniform is black-green and the design resembles that of a zebra. This reference demonstrates the club's oneness with wildlife.

And another example. The plastic cups left over from the 2018 FIFA World Cup (Russia) have been recycled. They were used to make an artificial football field in Sochi near the Fisht stadium. More than 50 thousand glasses were spent on the sports facility. They were processed into special threads, which became the main coating.

Rot

From organic waste, make fertilizers for plants or a vegetable garden in the country. For compost, put in containers (with ventilation and a filter) vegetable and fruit peels, paper sleeves, food leftovers, dried flowers, tea bags, animal hair, and even hair with cut off nails. In any apartment in the sink, you can install a chopper and pass all the organic matter from the table through it, i.e. turn food leftovers into small gruel, flushing it down the drain. Liquid food waste accounts for 35-40% of all kitchen waste. Each of the 5R Principles includes many small steps that must be gradually developed into a habit so that living Zero Waste does

not seem like a heavy burden. Zero Waste Policy does not require giving up. all at once, but with each consumer action, think about whether you are harming yourself and nature. Zero Waste is not against comfort, but against excess.

Geothermal energy for the home

Here are examples of the promising use of alternative energy sources in the future.

1. Extraction and use of geothermal energy. The inexhaustible potential of energy is hidden in the depths of the Earth: the heat stored in the rock. The Geoscience Center in Potsdam (GFZ), together with the German company Herrenknecht, have developed the InnovaRig mobile rig for deep drilling and obtaining hot water from underground horizons. The plant operates without waste, noiselessly, and passes 100 m in depth per day. Its capacity of 2700hp is enough to drill the rock to a depth of 5 km. The height of InnovaTing - 52 meters. To obtain geothermal energy, two wells are always drilled at a distance of 6 - 10 m from one another. From one, hot water is supplied upward, its heat is used for energy production, and then the cooled water is pumped down through the second well into the hot layers of the rock. Near Munich (the town of Durnhaar, Germany), according to the presented scheme, hot water is produced from a depth of 4.4 km with a flow rate of 150 l/s and a temperature of 140 °C. To generate energy using geothermal heat, hot water is supplied to a power plant . In a heat exchanger, it gives off heat and drives turbines that produce electricity. The residual heat is then used for district heating. The cooled water is again fed down into the rock.

All over the world, geothermal energy lags far behind other renewable energy sources. In Germany, its share among environmentally friendly energy sources is 2.5%. Most of the geothermal stations are in the United States, the Philippines, Indonesia, Mexico and Iceland.

Thus, geothermal power plants take the Earth's internal energy - hot water and steam. They are placed in volcanic regions, where water is at the surface or you can get to it by drilling a well (from 3 to 10 km.). Disadvantages: price, threat to Earth temperature, emissions of carbon dioxide and hydrogen sulfide.

2. An example of the use of hydrothermal energy – the energy of a temperature gradient.

Sea water has different temperatures on the surface and in the depths of the ocean. Using this difference, electricity can be obtained.

The first installation, which gives electricity due to the ocean temperature, was made back in 1930. There are now closed, open and combined ocean power plants in the USA and Japan.

3. An example of using the energy of liquid diffusion

This is a new kind of alternative energy source. An osmotic power plant, installed at the mouth of a river, controls the mixing of salt and fresh water and

extracts energy from the entropy of fluids. Equalizing the concentration of salts gives an overpressure, which starts the rotation of the turbine. So far, there is only one such power plant in Norway.

Summary

The laws on matter and energy assert that if we, people, continue to use resources and create waste at an increasing rate, then sooner or later the ability of the natural environment to dissipate, dissolve waste substances and absorb waste heat will be exceeded in any climatic zone, in any territorial and global levels. Recycling waste requires high quality energy that cannot be reused. However, recycling, for example, from paper or plastic waste, requires less energy than the extraction and processing of primary resources. Do not mix, throw waste containing valuable raw materials and substances suitable for recycling. And when recycling waste, waste still appears and low-quality heat accumulates in the environment. The development of society should have sources of affordable high-quality energy, and the natural environment should have the ability to absorb and neutralize heat waste, dissolve, dissipate and decompose solid waste. However, we understand that the reserves of carbon, oil, natural gas and uranium are limited, and oil, as an additional type of energy resources, will soon be depleted. Therefore, in the long term, the best way to solve the problems of resource conservation is the transition from a linear waste-generating economy to a circular resource-efficient, low-carbon economy based on the principles of recycling production and consumption waste.

Thus, priority should be given to reducing waste by preventing it and then preparing it for reuse and recycling. Waste-to-energy projects can be categorized as complementary technologies for recovering energy from the remaining non-recyclable fractions of MSW and therefore should not compete with measures to reduce waste, reuse and recycle materials. Nevertheless, it is necessary to use energy more efficiently, without using unnecessarily high quality types of energy.

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面粉悬浮液流变学参数研究
**RESEARCH OF RHEOLOGICAL PARAMETERS OF FLOUR
SUSPENSIONS**

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对面粉悬浮液进行了流变学研究，并将所得值与面粉悬浮液的类似指标进行了比较。结果表明，通过保水能力、介质的 pH 值和面粉混合物的密度，可以找到添加到面粉悬浮液结构中的添加剂的粘合形式，用于生产面粉烹饪产品。该研究的目的是研究面粉悬浮液的流变学参数，以提高富含非传统草药补充剂的面粉烹饪产品的质量，供广大消费者使用。研究对象是最高等级的小麦粉样品、面粉混合物（谷物）、单组分和多组分：西葫芦和胡萝卜的全麦多谷物速溶粥；全麦杂粮即食粥配野生浆果；全麦即食葡萄籽粥，早上；全麦葡萄籽即食粥，每天；全麦方便粥，士兵之夜；全麦多种谷物鸡油菌即食粥；小米荞麦粥；荞麦大麦粥；拼写扁豆小米粥。已经确定这两种成分的混合物是小米-荞麦；葡萄籽、西葫芦和胡萝卜的最低WSS，与其他功能性添加剂相差1.5至6倍；密度在 0.0382 到 0.062 的范围内变化。

关键词：流变指标，面粉悬浮液，质量，添加剂。

Abstract. *Rheological studies of flour suspensions were carried out and the obtained values were compared with similar indicators of flour suspensions. It is shown that the water-retaining capacity, pH of the medium and the density of flour mixtures make it possible to find the adhesive bond forms of additives introduced into the structure of flour suspensions for the manufacture of flour culinary products. Purpose of the study – was a study of the rheological parameters of flour suspensions to improve the quality of flour culinary products enriched with non-traditional herbal supplements for a wide range of consumers. The objects of the study were samples of wheat flour of the highest grade, flour mixtures (cereals), single and multicomponent: whole-grain multi-cereal instant porridge with zucchini and carrots; whole-grain multi-grain instant porridge with wild berries; whole-grain instant porridge with grape seed, morning; whole grain instant porridge with grape seed, daily; whole-grain instant porridge, soldier's evening; whole grain multi-cereal instant porridge with chanterelles; millet-buckwheat porridge; buckwheat-barley porridge; spelled-lentil-millet porridge. It has been established that the two-component mixtures are millet-buckwheat; with grape seed and with zucchini and carrots have a minimum WSS, which differs from 1.5 to 6 times from other functional additives; density varies in the range from 0.0382 to 0.062.*

Keywords: *rheological indicators, flour suspensions, quality, additives.*

Introduction

The influence of protein products on the quality of finished products and the flow of technological processes of their production and storage is due to the distinctive features of the functional properties of the proteins that make up such products. In turn, the functional properties of proteins, as well as other components of raw materials, in the process of manufacturing food products are influenced by various technological factors and prescription components [1].

For the correct conduct of the technological process of kneading dough of a certain consistency, an indicator of the water absorption capacity of flour (WPS) is used. The method for determining the water absorption capacity of flour from soft wheat grain provides for testing the nature of the grain, determining the protein in the grain and calculating the water absorption capacity of the flour. The method according to the invention Kostrov L.I. and Schott P.R. is simple and at the same time allows you to determine the water absorption capacity of flour with a high level of reliability [2].

When evaluating the baking properties of flour by a direct method (baking bread), the dough consistency is the same for all samples. For the correct conduct of the technological process of kneading dough of a certain consistency, an indicator of the water absorption capacity of flour is used, the determination of which

(according to the authors) is carried out using an expensive imported device. The task facing the authors (Kostrova L.I. and Shott P.R.) is to expand the arsenal of methods for determining the WFS of flour and simplify it, which made it possible to optimally determine the required indicators for obtaining high-quality flour culinary products.

An analysis of the quality of grain and the resulting flour from 133 varieties of soft wheat, carried out by Little T. and Hills F. [3] showed that in all years of research (2006, 2007 and 2008) the grain quality of the studied varieties varied in terms of grain nature, protein content and water absorption capacity. capabilities.

Little T. and Hills F. [3] also considered various relationships: WFS flour - grain nature - protein c. Multiple correlation analysis showed a fairly close relationship between the WPS of soft wheat flour with grain characteristics: in kind and protein content (correlation coefficient $R_{WPS} = 0.50$). Statistical assessment of the multiple correlation coefficient was carried out by calculating the actual Fisher test ($F_{act} = 21.6$) and comparing it with the table for such a data array ($F_{01} = 5.49$ - 1% error). Thus, the comparison of $F_{act} > F_{01}$ proves that the relationship between the EFS of flour, the nature of the grain and the protein content in the grain is significant. This was the basis for calculating the regression equation, which describes the dependence of the WPS of flour on grain quality indicators [2].

When carrying out the processes of grinding, transportation, unloading, storage, compaction and processing, it is necessary to take into account the properties and behavior of bulk materials. Insufficient attention to their properties often leads to a violation of the technological regime, deterioration of the product quality, sticking and clogging of the equipment. Pumpkin powder was chosen as the object of study, it is stable over time and practically does not cake when stored under standard conditions. The physicochemical characteristics of the powder: moisture content ($W = 4.98\%$), average equivalent particle diameter ($d_{equiv} = 92 \mu\text{m}$) and bulk density ($\rho = 490.3 \text{ kg/m}^3$) were determined on the following instruments: MA-150, a GIU-1 granulometer and a Scott PT-SV100 volumetric meter [4].

V.V. Kolpakov and A.P. Nechaev [1] considers it expedient to use both total bran and its granulometric fraction with a particle size of 195 to 670 μm to obtain protein flour from by-products of wheat processing as a raw material. In the latter case, along with an increase in the yield of the protein product, its biological value improved.

Studies of the functional properties of two types of protein flour: from total bran and granulometric fraction (bran product and dry protein flour) and the protein solubility of the studied products in the pH range from 1 to 12 showed that dry protein products obtained in the experimental plant VNIIZH, contained 40-42% protein, and protein paste from common bran, isolated in laboratory conditions, contained 70-91% [1].

The determination of the rheological properties of the structural components of wheat flour in the process of heating their aqueous suspensions and the assessment of the quality of bread were carried out by V.Ya. Chernykh, M.A. Shirshikov, A.S. Maksimov [5]. In the work of the same authors earlier in 2003 [6], the rheological properties of the structural components of wheat flour were determined during dough kneading and the influence of the composition of the model mixture wheat starch-dry gluten on the rheological behavior of its gelatinized aqueous suspension was also determined. To do this, we used the device amylorest AT-97(ChP-TA) (NPO Radius, Russia) [6], which allows obtaining a testogram (the dynamics of the rheological behavior of the paste) and an amylogram (the kinetics of the rheological behavior of the paste) of the samples under study.

An analysis of the change in the falling number depending on the concentration of dry gluten in the model mixture [5] showed that gelatinized wheat starch makes a significant contribution to the gel viscosity of the model mixture than denatured gluten proteins. The established dependence of the maximum mixing force of the gelatinized aqueous suspension and the corresponding time - testogram parameters - on the concentration of dry gluten-wine in the model mixture indicates that with a gluten content of more than 80%, significant changes occur in the starch-gluten system due to the fact that the processes associated with swelling and denaturation of gluten proteins, rather than the process of starch gelatinization, have a predominant influence on the rheological behavior of an aqueous suspension of a model mixture. The kinetics of the change in the criterion of autolytic activity A [7] depending on the content of gluten in the model mixture (Fig. 3) confirmed the rheological behavior of the gelatinized aqueous suspension of the sample with a change in the percentage ratio in the mixture of gluten and wheat starch, i.e. at gluten content of more than 80%, there is a significant increase (after the *miri* extremum) of criterion A , which indicates the predominance of the process of protein denaturation over starch gelatinization (due to its low content).

Analysis of the dependence of the maximum mixing force of the gelatinized aqueous suspension of the mixture \max, N , and the corresponding temperature $t, \max, ^\circ C$, on the amount of gluten-wine in the mixture when implementing the amylographic technique showed that with a gluten-wine content of more than 40%, significant changes occur in starch-gluten system. This is associated with the stratification of the system, each component of which manifests itself independently of the other as an individual substance, which confirms the course of the amylogram curves (two peaks of viscosity).

Studies have shown that the manufacture of flour culinary products requires a concentration of flour and liquid in certain ratios. Additionally, the question arises about the properties of the suspension when non-traditional components or wild plants are introduced into the formulations, since it requires an expansion of the

raw material base and relevant research.

Purpose of the study – was a study of the rheological parameters of flour suspensions to improve the quality of flour culinary products enriched with non-traditional herbal supplements for a wide range of consumers.

Materials and methods

Methodology. The mass fraction of moisture in flour, flour multicomponent mixtures was determined by drying in an oven at 130 °C for 40 min. Then the bottles taken out of the cabinet were cooled in a desiccator for no more than 2 hours and the moisture content was calculated by the formula: $W_m = ((m_1 - m_2)) / m \cdot 100$, where m_1 is the mass of the bottle with a sample before drying, g; m_2 is the weight of the bottle with a sample after drying, g; m - sample, g.

The water-holding capacity (WHR) is characterized by the amount of water held by the product against the force of gravity. A weighed portion of the drug in an amount of 1 g was placed in a graduated centrifuge tube, 5 cm³ of water was added, and the mixture was stirred for 1 minute at an electric stirrer rotation speed of 100 rpm. and left alone for 30 minutes. The mixture was then centrifuged for 25 minutes at 3200 rpm. Weigh a test tube with a sample and water. The total volume of the mixture in the tube and the volume of water remaining unadsorbed were measured. The non-adsorbed water was drained and the tubes were placed in an inclined position for 10 minutes to remove the remaining water. The test tubes were weighed. The data obtained were calculated by the formula: $WHC = ((a - b) / c) \times 100$, where a is the weight of the test tube with a sample and bound oil, g; b is the weight of a test tube with a sample, g; (c) sample, g. pH was determined on a pH meter. The density of flour mixtures was determined by the formula: $\rho = m / V$, g/cm³, where m is the mass of the substance, g; V is the volume occupied by the product, cm³

These samples were studied using organoleptic and physicochemical methods. The quality of flour and flour mixtures (cereals) was determined according to GOST 26574-2017. The nutritional value of the samples was determined by the calculation method.

The object of the study. The objects of the study were samples of wheat flour of the highest grade, flour mixtures (cereals), single and multi-component: whole grain multi-cereal porridge with zucchini and carrots; whole-grain multi-cereal instant porridge with wild berries; whole grain instant porridge with grape seed, morning; whole grain instant porridge with grape seed, daily; whole-grain instant porridge, soldier's evening; whole-grain multi-cereal instant porridge with chate-relles; millet-buckwheat porridge; buckwheat-barley porridge; spelled-lentil-millet porridge.

Results and discussion

For the purpose of scientific substantiation and determination of ways to use multicomponent flour mixtures (cereals) in the manufacture of flour culinary products from wheat, we studied the dependence of its functional properties, in particular the solubility and water-binding capacity of WCS, on technological parameters - temperature, pH, concentration -traces and nature of mixture additives (cereals).

To determine the water-retaining capacity of flour with the addition of flour mixtures (cereals), we have developed the recipe shown in Table. 1.

Table 1 - Test recipe for determining the water-retaining capacity of the flour of flour mixtures (cereals)

Name of raw materials	Gross, g	Net, g
Wheat flour	19.2	19,2
Porridge (in assortment)	4.8	4,8
Egg	1/40 pcs.	0,7
Water	72	72
Soda	1.4	1,4
Sugar	1.7	1,7
Salt	0.9	0,9
Output:		100

The rheological parameters of flour suspensions with the addition of flour mixtures (cereals) are given in Table. 2.

Table 2 - Rheological indicators of flour suspensions with additives of flour mixtures (cereals)

Sample name	Volume before moisturizing V ₀ , ml	Volume after moisturizing V ₁ ml	Temp., °S	VUS, %	pH	ρ, g/cm ³
Whole grain instant porridge with grape seed, evening	82	80	21	6,97	7,533	0.9756
Whole grain multi-grain instant porridge with zucchini and carrots	82	80	21	6,97	7,590	0.9756
Whole-grain instant multi-grain porridge with wild berries	81	74	21	24,39	7,832	0.9136

Whole grain instant porridge with grape seed, morning	81	74	21	24,39	7,823	0.9634
Whole grain instant porridge with grape seed, daily	82	70	21	41,81	7,827	0.8537
Whole-grain instant porridge, soldier's evening	82	79	21	10,45	7,841	0.8537
Whole grain multi-grain instant porridge with chanterelles	82	70	21	41,81	7,895	0.8659
Millet-buckwheat porridge	82	80	21	6,97	7,927	0.9756
Buckwheat-barley porridge	93	89	21	13,94	7,674	0.9569
Spelled-lentil-millet porridge	83	79	21	13,93	7,786	0.9518

As a result of the research, it was found that the two-component mixtures are millet-buckwheat; with grape seed and with zucchini and carrots have a minimum VSL, which differs from 1.5 to 6 times from other functional additives.

The study of the pH of the medium shows that all the presented samples of flour mixtures have a slightly alkaline medium, which differs slightly from each other. The difference is from 0.057 to 0.394.

The same dependence is observed in the study of the density of flour mixtures (cereals). The deviations of indicators between samples are from 0.0382 to 0.062. This confirms the fact that the degree of grinding of multicomponent flour mixtures is approximately the same.

Conclusion

Thus, the study of the processes of water-retaining capacity, pH of the medium and the density of flour mixtures makes it possible to find adhesive forms of the connection of additives introduced into the structure of flour suspensions for the manufacture of flour culinary products [8-10].

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开发含有植物性膳食补充剂和藻类的鱼类功能性产品
**DEVELOPMENT OF FISH FUNCTIONAL PRODUCTS WITH
VEGETABLE DIETARY SUPPLEMENTS AND ALGAE**

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这篇文章介绍了配方组成成分的研究结果，这使得获得具有特定营养和生物学特性的功能性产品成为可能。鱼是生产功能性食品的理想原料，因为它含有必需氨基酸，包括赖氨酸和亮氨酸、必需脂肪酸，包括独特的二十碳五烯酸和二十二碳六烯酸、脂溶性维生素、微量元素和常量元素，比例适宜。鱼原料与草药补充剂的结合，以及在鱼露或蛋黄酱配方中添加藻类，将使食品富含碘、海藻酸，并引入含有维生素和微量元素的冻干植物粉。该研究的目的是开发含有草本生物活性添加剂和藻类的鱼类功能性产品。已获得半成品鱼产品以及添加小球藻的鱼露的配方。鱼产品含有额外的功能成分，例如具有多种已证实的生物矫正特性的膳食补充剂，使用香料。确定了半成品鱼产品的生产技术制度及其对人类日常消费的好处。

关键词：鱼原料，藻类，冻干蔬菜粉

Abstract. *The article presents the results of a study of the constituent components of the formulation, which allow obtaining a functional product with specified nutritional and biological properties. Fish is an ideal raw material for the production of functional food products, as it contains essential amino acids, including lysine and leucine, essential fatty acids, including unique eicosapentaenoic and docosahexaenoic acids, fat-soluble vitamins, micro- and macroelements in favorable proportions for the body. -wearing. The combination of fish raw materials with herbal supplements and the addition of algae to the formulation of fish sauces or mayonnaise will enrich food products with iodine, alginic acids, and the introduction of freeze-dried vegetable powders with vitamins and microelements. The purpose of the research is the development of fish functional products with herbal biologically active additives and algae. Recipes for semi-finished fish products, as well as fish sauces with the addition of chlorella, have been obtained. Fish products contain additional functional components such as dietary supplements with a wide range of proven biocorrective properties, spices are used. The technological regimes for the production of semi-finished fish products, as well as its benefits in daily human consumption, are determined.*

Keywords: *fish raw materials, algae, freeze-dried vegetable powders*

Introduction

Fish, having exceptionally high nutritional qualities, occupies an important place in human nutrition. Fish is an ideal raw material for the production of functional food products, as it contains essential amino acids, including lysine and leucine, essential fatty acids, including unique eicosapentaenoic and docosahexaenoic acids, fat-soluble vitamins, micro- and macroelements in ratios favorable for the organism. It should be noted that quick-frozen culinary products — fish cakes, meatballs, meatballs, and so on — are becoming increasingly popular among consumers. Fish products are widely used in the daily diet, in dietary and baby food, because they are a source of complete animal protein. A shaped fish product is a product of a given shape and size, made from fish fillet or minced meat with various additives (Zh. M. Atambaeva, A. N. Nurgazezova, Z. Zh. Kalieva, M. B. Rebezov, 2016, p. 64).

Currently, the range of fish semi-finished products that meet modern medical, biological and physiological standards, intended for all categories of people, is practically not formed. In the current structure of nutrition of both the adult and child population of Russia, a lack of animal protein and micronutrients - vitamins and minerals - was revealed. Extensive research has shown (Antipova L.V., Batishchev V.V., Golovina I.N., 2001, p. 19; Antipova L.V., Tolpygina I.N., Batishchev V.V., 2003, p. 3; Katserikova N.V., 2004, - 146 pp. Bobreneva I.V., 2013, - 258 pp.; Pchelintseva O.N., Bochkareva Z.A., Lisina S.V., 2021, p. 132) that

disturbances in the structure of nutrition and nutritional status lead to deviations: disturbances in the balance of diets; decrease in indicators of physical development. A particularly serious problem is the deficiency of a number of micronutrients (M. K. Sborets, L. V. Antipova, I. A. Glotova, 2010, p. 68).

Currently, semi-finished fish products are in high demand in the domestic consumer market (Lukin V.K., Kushnir D.D., 2017, p. 129; Khaustova E.V., 2009. - p. 15; Petrenko N.N., Krishtafovich V.I., Kushnir D.D., 2012, p. 45). In this regard, manufacturers are looking for and developing technologies and recipes for the range of fish raw materials in order to increase the volume of their production.

Among fish semi-finished products, cutlet masses, namely fish meatballs, are especially popular. However, the range provided is usually limited. An analytical review of the literature and a patent search showed that in the preparation of fish semi-finished products, mainly minced fish, wheat bread, and an egg are used.

Tretyakova E.N., Necheporuk A.G., Titova I.M., Kulikova A.S., Voytenko O.S., Voitenko L.G., Antipova L. V., Bessonova L.P., Ushakova E.N. and etc.

An increase in the production of semi-finished products can be realized through the use of other types of cutlet mass thickeners. There are also studies devoted to the use of various vegetable thickeners in the technology of fish meal products of increased nutritional value (Turchinskaya A.V., Asfondyarova I.V., Buldakov A.V., 2016, p. 132).

Thus, scientific research in the field of creating functional fish products is relevant.

Purpose of the study - scientific substantiation and development of technology and recipes for fish semi-finished products and sauces with the addition of vegetable raw materials, algae and dietary supplements for functional nutrition.

Materials and methods

To write this scientific article, materials in Russian and English from such databases as Google Scholar, Web of Science, Elibrary.ru, Google Academy were studied. The search was limited to the time period from 2010 to 2022, and a minimum citation threshold of 5 was set. The focus was on articles published in scientific journals to ensure the accuracy of the data. During the search for material, the following keywords were used: “fish semi-finished products”, “rational nutrition”, “cat-flying masses”, “thickeners”, “technologies and recipes”.

These samples were studied using organoleptic and physicochemical methods. The quality of flour and flour mixtures (cereals) was determined according to GOST 26574-2017. The nutritional value of the samples was determined by the calculation method.

The object of the study.

The objects of the study were fish cakes with additives of vegetable raw materials and freeze-dried vegetable powders, as well as fish sauces and mayonnaise

sauce with chlorella and alginic acids.

Results and discussion

The realized semi-finished product is intended to be included in its daily diet by all age groups of the population, the functional composition of which will enrich human meals with vitamins, micro- and macronutrients, minerals (A.T. Vasyukova, A.A. Slavyansky, D.A. Kulikov, 2020, 496 pp.; A. T. Vasyukova, N. I. Myachikova, V. F. Puchkova, 2020, 368 pp.; Karpukhina V., 2014, 256 pp.).

The use of thickeners that are part of fish meatballs helps to expand the range of functional properties of the product, namely, to improve taste and nutritional properties, have a beneficial effect on the physiological aspects of human health, improve the nutrition structure of the population and, as a result, increase consumer demand for such products .

An urgent task in the field of food hygiene is to identify ways that would ensure the consumption of substances that play an important role in the physiological processes of the body, i.e. dietary fiber, which is valued for its ability to stimulate intestinal motility, remove radionuclides and heavy metals from the body, normalize the composition of microorganisms in the intestine, ensure the formation of B vitamins, and normalize cholesterol. Therefore, the use of vegetables, spices and various flours in the production of semi-finished fish products makes it possible to partially solve this problem. (13. Samoilova, D. and Tsibizova, M., 2015, c. 129).

The use of natural products has a number of advantages.

As additives from vegetable raw materials, dried basil-tomato-paprika, dried dill, Jerusalem artichoke flour were selected. Fish cakes with the use of such additives have a functional purpose. Daily consumption of this product will help to fill the deficiency of nutrients necessary for the body.

Dried basil is an indispensable product for the nutrition of people who are in rehabilitation after a serious long-term illness. A rich vitamin-mineral complex, flavonoids, phytoncides in the composition of the plant determines the beneficial properties of dried basil.

Dill is a unique vegetable raw material that has a strong spicy refreshing taste and smell, a rich composition and has a beneficial effect on many body systems. Dry dill retains almost all minerals, micro- and macro-elements useful for the body. It contains flavonoids. Nutritionists recommend adding dill to food for those who want to lose weight or watch their weight. The vegetable fiber contained in the composition cleanses the body of toxins and toxins, stimulates metabolism, accelerates the process of splitting fats, provides a quick and long-lasting feeling of fullness, which reduces the volume of portions, and there is no need for additional snacks.

Chlorella is a common microalgae that has long been used in Asian countries

for the treatment of various diseases, which is confirmed by science. Very common is *Chlorella vulgaris*, constantly found in masses in water and in the mud of puddles, ditches and ponds. It often develops, as well as its related form, *Chlorella infusioformis* in laboratories and at home. *Chlorella* is a microalgae that has significant potential to protect the cardiovascular system, liver and other organs from chronic diseases.

As a result of the work, complex studies of technological operations for the production of semi-finished fish products were carried out, aimed at optimizing the water-retaining properties, pH-environment and density of the cutlet mass, as well as the operating modes of the technological equipment.

The possibility of using components in the technology of a new functional food product has been theoretically substantiated and experimentally confirmed.

The developed semi-finished product is natural, the components included in the composition (dried basil-tomato-paprika, dried dill, Jerusalem artichoke flour) are also natural and natural, which allows expanding the circle of consumers. In terms of taste properties, the developed product surpasses the control.

To obtain a waste-free technology in the processing of fish raw materials, a broth was prepared from food fish waste with the addition of freeze-dried dill, a complex additive of basil-tomato-paprika. The broth was the liquid base of the dietary fish sauce, which included *Chlorella*, as well as mayonnaise with alginic acids.

The developed products based on fish raw materials had high organoleptic quality indicators. The conducted tastings of functional fish culinary products with herbal and biologically active additives showed that the developed products have a pleasant taste and smell with the aroma of vegetable raw materials, which have an increased nutritional value.

Conclusion

Thus, recipes for fish semi-finished products and culinary products have been developed, in which there are additional functional components such as complex spices: basil-tomato-paprika, tomato-paprika-dill, tomato-paprika, as well as Jerusalem artichoke flour, which have a wide range of proven biocorrective properties, spices are used. Technological regimes for the production of fish culinary products were determined: cooking with 30% steam for 8 minutes at a temperature of 170°C. The products are juicy and the inside temperature will be 80 °C, and then cooking on the “heat” mode for 4 minutes at a temperature of 190 °C at an inside temperature of 80 °C. Its use in the daily use of developed functional fish culinary products by a person is also substantiated.

Sauces with *Chlorella* will enrich the diet of consumers with biologically active substances.

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主要传统和组合加工方法对烹饪产品制造中家禽减重的影响
**THE INFLUENCE OF THE MAIN TRADITIONAL AND COMBINED
METHODS OF PROCESSING ON THE WEIGHT LOSS OF POULTRY
IN THE MANUFACTURE OF CULINARY PRODUCTS**

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分析与研究课题相关的科技文献水平。已经确定了采用传统和新热处理方法从家禽的有机原料生产烹饪产品的技术和技术中未开发的领域。制定了公共餐饮用天然禽肉半成品及其菜肴的工艺和配方改进工作方向。这项工作的相关性是由于对各种家禽加工方法进行了比较描述，减肥，考虑到加工模式和口味特征的形成，将有很高的需求，并将占据有机原料产品市场的重要部分。这篇文章具有研究性质，致力于农业原材料的高科技加工，作为使用现代设备（烤箱、电磁炉和万能蒸烤箱）时获得合理质量损失率的基础。以最小合理的质量和营养损失获得烹饪产品的算法。首次从理论上证实并通过实验证实了以禽肉为基础的有机原料制造烹饪产品并获得具有高商品特性的产品的可能性。

关键词：家禽，万能蒸烤箱，生化过程减重。

Abstract. *The level of scientific and technical literature related to the research topic is analyzed. Unexplored areas in the technique and technology for the production of culinary products from organic raw materials of poultry subjected to*

traditional and new methods of heat treatment have been identified. The direction of work on improving the technology and recipes of natural poultry semi-finished products and dishes based on them for public catering has been formulated. The relevance of the work is justified by the fact that a comparative description of various methods of processing poultry has been carried out, weight loss, taking into account processing modes and the formation of taste characteristics, will be in high demand, and will occupy a significant segment in the market of products from organic raw materials. The article is of a research nature and is devoted to high-tech processing of agricultural raw materials, as the basis for obtaining reasonable mass loss rates when using modern equipment: an oven, an induction cooker and a combi steamer. Algorithm for obtaining culinary products with minimal reasonable loss of mass and nutrients. For the first time, the possibility of manufacturing culinary products from organic raw materials based on poultry meat and obtaining a product with high commodity characteristics was theoretically substantiated and experimentally confirmed.

Keywords: *poultry, combi steamer, biochemical processes weight loss.*

Introduction

The intensification of production in the food industry is inextricably linked with the need to improve technological processes, the use of innovative methods and methods of thermal processing of raw materials and semi-finished products.

Since today the possibilities of traditional types of heating are mostly exhausted, innovations in the field of heat treatment can be achieved through combined methods using modern types of high-tech equipment [1].

One of the options for solving this problem was the restructuring of food systems in many countries [2]. Therefore, the priority tasks in solving these areas are ensuring the availability of food products, reducing food loss, reducing the amount of food waste and increasing the nutritional value of food products [3]. These features of the functioning of food systems correlate with legislative acts and resolutions adopted on the territory of Russia [4-6]. According to the results of studies [7], there is currently no threat of malnutrition in the Russian Federation. In general, the diets of citizens correspond to the needs of the population for basic nutrients and energy. At the same time, the amount of vegetables and fruits, dairy products is limited, and the consumption of salt, sugar, products containing animal fat and trans-fatty acids is excessive [8]. Against the background of the presented data, an increase in the prevalence of overweight, obesity, micronutrient deficiencies and other risk factors for nutritional diseases is recorded.

The formation of certain gastronomic habits and passions of each people of the world has evolved over many centuries. Gradually, national cuisines of the peoples of the world developed, which are an integral part of any national culture.

Today, each nation has its own national cuisine, which is characterized by customs and traditions that are different from others, national dishes and features of their preparation [9]. At the heart of every cuisine there are two important factors that are interconnected with the set of raw materials and the way they are processed. In addition to the above factors, the specific features of certain national cuisines are also influenced by the geographical location of the country; climatic and economic conditions of the country. However, a certain set of products from which national dishes are prepared does not yet determine the nature of this cuisine and its features. Using the same product, different peoples in the process of preparing a dish give it their own unique taste and aroma. This is explained by the fact that each cook in his country uses different methods of heat treatment, unique, unique combinations of products, as well as his own spices and additives. A. I. Tityunnik, Yu. M. Novozhenov note that national cuisine is created by the national community of people, the community of their characteristic features of taste perceptions and predilections. Cooking is one of the dynamic and developed parts of the national culture of the peoples of the world [10]. Of particular importance are the interpenetration and mutual influence of national cuisines, which often takes place. This also applies to meat products, in particular to poultry meat. But this mutual influence does not exclude its inherent features, since each nation gives any food its indescribable taste.

I. N. Somov notes that poultry and wild birds are intended mainly for frying and stewing (less tasty when boiled). As a result, the duck gives a good, tasty dish in those national cuisines where traditional culinary techniques contribute to the best revealing of the qualities of its meat and where such additives are used that, during cooking, absorb duck fat, neutralize it or eliminate the specific smell by the action of spices and aromatic seasonings, especially in a wild bird. Duck dishes are classic in Western European and Chinese cuisines, where there are several different ways of cooking duck, which are very different from each other [11]. This study also applies to the use of poultry in Russian cuisine. Known since antiquity, such poultry dishes as frying whole young chickens on skewers, and a wide variety of main dishes and snacks were prepared from adults.

At present, the chemical composition and nutritional value of meat are widely and fully considered in many works. The works of I. A. Rogov, L. V. Antipova, N. I. Dunchenko, N. A. Zhrebtsov show the importance of meat in human nutrition [12]. Meat food stimulates growth, puberty, fertility of offspring and its survival. Meat proteins have a high biological value, as they have a well-balanced amino acid composition that is closest to the amino acid composition of human proteins. Products containing proteins form the basis of rational nutrition [13, 14].

Due to the use of all of the above technologies, certain raw materials or semi-finished products are needed, which, after heat treatment, will have high or-

ganoleptic characteristics and nutritional value. The biological value of broiler chicken meat proteins is determined by the content of essential amino acids. It is known that broiler chicken meat proteins are complete. Also a significant indicator is the energy value, which for a broiler chicken is 142.3 kcal. [11-18].

Thus, the best solution to this problem is the development of technical and technological methods and methods of thermal culinary treatment, which will allow organizing the production of high quality products from organic raw materials.

Purpose of the study – The article is aimed at substantiating the advantages of heat treatment of птицы products in the Com-bi Oven, in comparison with traditional methods, to obtain high-quality culinary products.

Materials and methods

Methodology. In the study of sample No. 1, an electric four-burner stove with an oven EP-4ZhSh "Abat" was used according to TU 5151-005-01439034-2000 (JSC "Chuvashorgtekhnik", Russian Federation), an electronic thermometer TR101 "Raylights" (China), culinary thermometer "BEKA" (Germany). When conducting the experiment again with study samples No. 1, 2 and 3, an electric four-burner stove with an oven EP-4ZhSh "Abat", a combi steamer KEG 0074 "Kuppersbusch Gelsenkirchen" (Germany), an electronic thermometer TP101 "Raylights" (China), cooking thermometer "BEKA" (Germany). The examination included: identification of products (Technical Regulations of the customs union 022/2011), assessment of conformity of products to the requirements of regulatory documents (RD). Compliance with safety standards is guaranteed by the manufacturer (Sanitary and epidemiological rules and regulations 2.3.2.1078-01 и Technical Regulations of the customs union - 021/2011, 034/2013).

The object of the study. The object of scientific research was semi-finished products: weight frozen broiler chicken breast fillet, frozen broiler chicken thigh, the subject of the research was the development of a technology for preparing culinary products from high quality poultry.

Results and discussion

With heat treatment, the speed of warming up is of great importance. It depends on the heat capacity and thermal conductivity of the environment and heated products, the size of the specific surface and density.

Due to the low thermal conductivity of meat products, their heating in the form of large pieces is very slow.

We used portioned semi-finished products from poultry (broiler chicken fillet) and developed a technology for baking them in a combi steamer. The technological process included the following parameters: heating the combi oven to 170°C. Laying the semi-finished product on a baking sheet and connecting the probe. At 180°C, the "steam" mode is turned on, baking for 4 minutes, and then in the "heat" mode at 200°C, bringing inside to 80°C and heating for another 3-4 minutes at

this temperature. Fixing the time of heat treatment. Weighing the finished product immediately after baking and at 65°C.

At the same time, we study the same semi-finished products using traditional equipment and bake them in an oven. The technological process included the following parameters: heating the oven up to 200°C. Laying the semi-finished product on a baking sheet and connecting the probe and at 200 ° C, baking for 7 minutes, and then increasing the temperature to 250 ° C and bringing it to 80 ° C inside, heating at this temperature for another 3-5 minutes. With multi-stage cooking, the duration of baking is up to 11-15 minutes at a temperature of 200-250°C. The designation of the duration of heat treatment. Weighing the finished product immediately after baking and at 65°C.

Portion semi-finished products from poultry (broiler chicken fillet) were cooked in a combi steamer in the "Steam" mode. At the same time, the combi steamer was heated up to 170°C. The product was prepared: 0.3 g of salt was added per 100 g of the semi-finished product. They laid the semi-finished product on a baking sheet and connected the probe. A baking sheet with a semi-finished product was placed in a combi steamer and the product was heat treated at 180°C, then steamed until it reached 80°C inside. The heat treatment time was recorded. We weigh the finished semi-finished product immediately after cooking, at 65 ° C.

In parallel, we study the same semi-finished products using traditional equipment and cook in the main way, using an induction furnace and a four-burner electric stove. Pour water into the container in a ratio of 1: 3 or 2-2.5 liters per 1 kg of semi-finished poultry. Bring to a boil - 100 ° C and lay the product. We connect the temperature probe. Then reduce the heat to 95°C. Add salt 0.5 g per 100 g of product. Cook until reaching 80°C in the center of the sample. Record the heat treatment time. Weigh the fillets immediately after cooking, at 65°C.

The analysis of the effect of technology on the semi-finished product consisted in the study of temperature changes depending on time. For this, control was carried out every 30 seconds, as a result, all the data received were compiled.

Also, when using technology 1, the semi-finished product was placed in boiling salted water at a temperature of 100°C. With technology 2, the temperature in the thickness of the semi-finished product was 30°C. In the "convection" mode, a semi-finished product with a temperature of 37 ° C was placed in the combi steamer chamber and the heat treatment process began according to technology 3. And with technology 4, the temperature was 19 ° C. During the experiment, it turned out that the error of the built-in probe is 5 ° C. On the graph (Figure 1, 2) you can see the overall picture based on the data obtained during the study, and provides complete information about the temperature change depending on the cooking time.

When re-investigating the impact of technologies, the temperature parameters

of semi-finished products: technology 1 - 4°C, technology 2 - 8°C, technology 3 - 12°C, technology 4 - 10°C, a graph was drawn up (Figure 2), in which the dependences of temperature on time are shown.

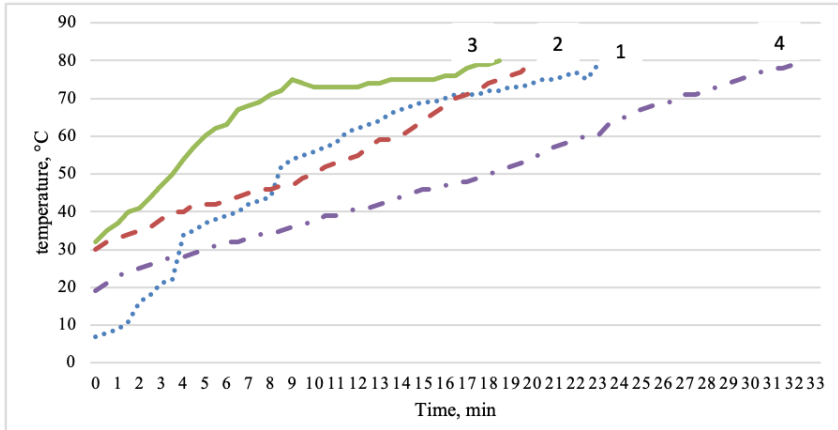


Figure 1 - Mass loss of broiler chicken breast fillet (experiment No. 1), where 1 - cooking in the main way, 2 - cooking in a combi oven in the "steam" mode, 3 - baking in a combi oven in the "convection" mode, 4 - baking in the oven

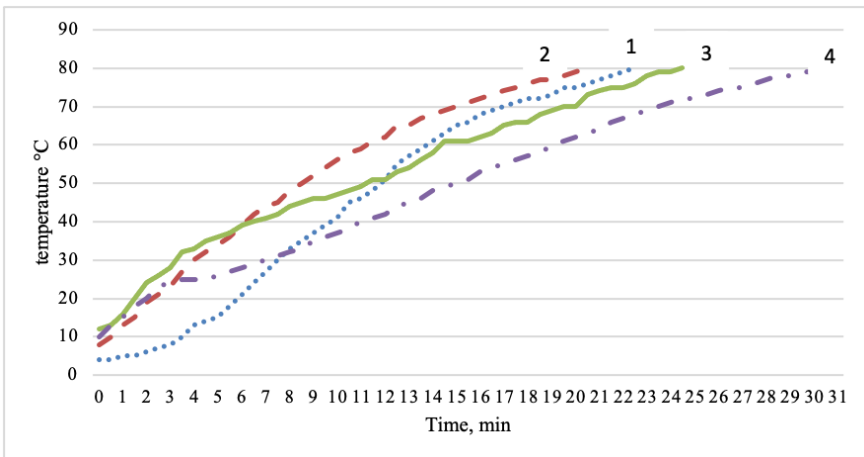


Figure 2 - Mass loss of broiler chicken breast fillet (experiment No. 2): where 1 - cooking in the main way, 2 - cooking in a combi oven in the "steam" mode, 3 - baking in a combi oven in the "convection" mode, 4 - baking in the oven

Because of the research, it was found that heat treatment using boiling and steaming is more intensive. The longest process of heating the product and bringing it to culinary readiness is carried out by baking in an oven.

The organoleptic evaluation of the finished product showed that the highest scores were noted when cooking both in a combi steamer and in an oven using baking.

Conclusion

Thus, the longest heat treatment time in both experiments was baking in an oven. This is due to the gradual heating of the breast fillet in its thickened part to a temperature of 80 ° C. At this temperature, in all experiments, the product was heated for another 3-5 minutes, which ensured the safety of the culinary product. An analysis of the experimental data obtained confirms the feasibility of using both traditional processing methods and new electrical ones using such modes as "steam" and "convection".

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