



# 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

Proceedings of the  
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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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關於俄羅斯聯邦的“人才流失”  
ON “BRAIN DRAIN” FROM THE RUSSIAN FEDERATION<sup>1\*</sup>

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註解。 國內發生了一些事件，削弱了當代俄羅斯社會進程。 對俄羅斯聯邦實施的諸多限制、禁止和製裁，旨在刺激此類負面現象的發展，擴大對俄羅斯經濟和社會造成的不良後果。 本文考慮了俄羅斯的削弱過程之一。 這就是所謂的「人才流失」。 給出了這種現象的一些定性和定量特徵； 導致「人才流失」的內部和外部因素被命名。 本文介紹了作者對俄羅斯對手選擇上述過程作為製裁對象對俄羅斯聯邦影響的有效性的研究結果。

關鍵字: 俄羅斯聯邦、反俄羅斯制裁、人才流失、敵對國家。

**Annotation.** *There are several occurring inside the country and weakening contemporary Russian society processes. Numerous restrictions, prohibitions and sanctions imposed on the Russian Federation are aimed at stimulating the development of such negative phenomena and expanding the scale of their undesirable consequences for the Russian economy and society. One of this weakening Russia processes is considered in the paper. That is so called “brain drain”. Some qualitative and quantitative characteristics of this phenomenon are given; the internal and external factors contributing to the “brain drain” are named. The results of the author’s research of the validity of the Russia’s adversaries choice of the above-mentioned process as objects of sanctions impact on the Russian Federation are presented in this article.*

**Keywords:** *Russian Federation, anti-Russian sanctions, brain drain, adversary state.*

An Emigration is a departure from the country of one’s citizenship to another state for residence or long-term work The emigration of a large number of special-

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<sup>1\*</sup> *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).*

ists from different fields of activity is called a “brain drain”<sup>2</sup>. A “brain drain” is caused by the following factors: low standard of living compared to foreign countries; worse living (in particular: nature, climate, danger of natural disasters, military actions) and working conditions compared to other countries; socio-economic inequality; political, religious, ethnic, etc. reasons<sup>3</sup>.

External factors include the luring of young people and the most in-demand specialists abroad, better living and business conditions in other countries, receiving the desired education abroad, ideas about a better life outside the Russian Federation spread from abroad<sup>4</sup>. Among Russian youth, “such ideas are hardly supported by serious knowledge about the culture or political structure of Western countries and probably superficial, but they are quite stable” [1, p. 7].

There are different estimates of the scale of emigration from the Russian Federation of scientists, specialists, cultural and sports figures. Thus, at the general meeting of the Russian Academy of Sciences (April 21-22, 2021), the Chief Scientific Secretary of the Russian Academy of Sciences N.K. Dolgushin said that the number of persons with higher education leaving Russia annually since 2012 has increased from 14 thousand to almost 70 thousand<sup>5</sup>.

According to the Chairman of the Siberia Branch of the Russian Academy of Sciences V.N. Parmon, “over the past five years, our science has lost about 50 thousand scientists” [2, p. 1].

Minister of Science and Higher Education of the Russian Federation V.N. Falkov said that “only 280 doctors and candidates of Sciences left Russia in 2012”, and that “he sees nothing wrong with migration”<sup>6</sup>.

The Minister of Digital Development, Communications and Mass Communications of the Russian Federation M.I. Shadaev said at the “government hour” in the State Duma of the Russian Federation on 20.12.2022 that “if we take two waves of departure of IT specialists, then up to 10% of employees of IT companies left the country and did not return. If we take it in total, about 100 thousand IT specialists are located outside our country”. He also noted that “80% of those who left continue to work for Russian companies”<sup>7</sup>.

<sup>2</sup> URL: <https://media.foxford.ru/articles/chem-otlichaetsya-ehmigraciya-ot-immigracii>

<sup>3</sup> See, for example, URL: <https://newizv.ru/news/2021-03-24/rektor-skolteha-aleksandr-kuleshov-strana-stanovitsya-starshe-bednee-i-glupee-323453>

<sup>4</sup> «Today, not only ordinary citizens, but also politicians themselves sometimes take for reality what is being said from television screens» [3, c. 194].

<sup>5</sup> URL: <https://nauka.tass.ru/nauka/11198355>; [4].

<sup>6</sup> URL: <https://newizv.ru/news/society/27-08-2021/v-minobrnauki-ozabotilis-statistikoy-ob-utechke-mozgov-iz-rossii>

<sup>7</sup> URL: <https://www.interfax.ru/russia/877771>

In general, the Russian Federation is among the countries with a positive migration balance (arrivals minus departures). From a number of unfriendly states bordering Russia, more leave than come (see Table 1).

**Table 1.**

*The average annual values of the ratio of the migration balance (arrivals minus departures) to the population of the country, 1989-2021, person / 1000 persons*

Country	1989-1999	2000-2013	2014-2021
United States	6,3	4,0	3,6
Norway	1,9	6,0	4,6
Russian Federation	2,9	2,1	2,3
Finland	1,3	2,1	3,0
Japan	0,3	1,0	1,2
Estonia	-7,6	-2,6	3,0
Poland	-1,0	0,1	-0,2
Ukraine	-0,8	-0,1	-0,7
Latvia	-6,6	-7,5	-5,2
Lithuania	-4,7	-9,4	-5,9

*Source:* the table was compiled by the author on the basis of data from United Nations Population Division Department of Economics and Social affairs.

The main question is who is leaving the country and who is coming to it. The shortage of highly qualified specialists in the modern high-tech world, in which states and economic entities fight for technological primacy, leadership and dominance, hinders back the development of the country. Therefore, government agencies and private firms in many countries of the world are actively luring professionals to themselves, creating more comfortable conditions for them than in their homeland, including in Russia.

In the field of information technology, the sources of the “Kommersant” newspaper “speak about the expressed desire to leave from about 5 thousand specialists. They are considering Cyprus, Georgia, Turkey, Lithuania and the USA for relocation. According to “Kommersant”, some companies themselves export entire teams abroad. ... According to the latest assessment of the Ministry of Digital Development, Communications and Mass Communications of the Russian Federation, the shortage of personnel in the IT industry in the Russian Federation already ranges from 500 thousand to 1 million people, by 2027, the shortage may increase to 2 million specialists”<sup>8</sup>.

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<sup>8</sup> . URL: <https://www.kommersant.ru/doc/5237954>

Emigration of professional personnel reduces, first of all, the possibility of scientific, technological, cultural and educational development of the country they leave. In the long term, this affects the ethnic composition of society, the ratio of denominations and worldviews, the criminogenic situation and, ultimately, the important factor of security – the unity of society.

“All this is clearly manifested when highly qualified, proactive, creative individuals leave the country (for example, such as Pavel V. Durov, one of the creators of the “VKontakte” social network and the company of the same name, the Telegram cross-platform messenger; Founder and Honorary President of “Vimpel Communications”, radio scientist, philanthropist, founder of the “Dynasty Foundation”, co-founder of the “Enlightener Award”, Doctor of Technical Sciences Dmitry B. Zimin), and poorly educated people with norms of behavior alien to indigenous population, concepts of justice and law, with a different ideology come instead of them.

With the formation of a certain “critical number” of the latter, crime increases<sup>9</sup>, the disunity of society, hostility and opposition of individual social groups arise and intensify” [5, pp. 65-66].

Since 1992, the balance of external migration (arrivals minus departures) to the Russian Federation has been formed mainly by arrivals from the former republics of the USSR (*see Table 2*).

**Table 2.**  
*Average annual values of external migration growth<sup>10</sup>, 1992-2022, thousand persons*

<b>Indicator</b>	<b>1992-2000</b>	<b>2001-2006</b>	<b>2007-2020</b>	<b>2021</b>	<b>2022 (estimation)</b>
Total	384,1	77,4	236,7	429,9	34,9
Including					
The CIS countries	н.д.	91,6	233,6	401,2	51,4
The non-CIS countries	н.д.	-26,2	3,1	28,7	-16,6

*Source:* the table was compiled by the author on the basis of data from “Migration balance (1992-2022)”<sup>11</sup>.

<sup>9</sup> At a meeting of the State Duma on January 17, 2023, Deputy Minister of Internal Affairs of the Russian Federation, retired general-colonel of militia Zubov Igor N. said: “By the end of 2022, 40.2 thousand crimes were committed by foreigners, which is 10.3% more than last year”. “Zubov stressed that they accounted for 3.9% of the total number of crimes committed in the Russian Federation during the year” [6] (The Ministry of Internal Affairs reported an increase in the crime rate among migrants for the year by 10% // URL: <https://tass.ru/obschestvo/16874075>).

<sup>10</sup> Migration growth = the number of arrivals from abroad minus the number of departures from the country.

<sup>11</sup> URL: <https://aftershock.news/?q=node/1227918&full>

Over the past “30 years, Ukraine and Kazakhstan have been the main ‘suppliers’ of migrants to Russia, and Tajikistan has joined them in the last 3-4 years. ... Armenia, Kyrgyzstan and Uzbekistan, from where until the mid-1990s a lot of citizens of predominantly Russian origin came, also were among the leaders in the last decade”<sup>12</sup>. To Russia “more often come mainly skilled workers from the Central Asian republics among them only 13-17% have a higher education, while there is an ‘intellectual emigration’ from Russia, 70% of departures have a higher education”<sup>13</sup>.

Chairman of the Supervisory Board of the ANO “Institute of Demography, Migration and Regional Development”, laureate of the Prize of the President of the Russian Federation in the field of education, acting State Adviser of the Russian Federation 3rd class Yuri V. Krupnov notes that “every year 5-10 percent of migrants entering the Russian Federation remain on our territory and are naturalized, legalized” and that “in the Russian Federation, there is an ethnographic substitution of the indigenous population”<sup>14</sup>.

I suppose that in order to solve the problem of brain drain, it is important to put things in such a way that high-class professionals from different fields of activity and talented entrepreneurs, having gone abroad, lived, studied, passed an internship, worked there, returned to Russia.

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<sup>12</sup> Ibid.

<sup>13</sup> URL: <https://newizv.ru/news/2021-08-27/v-minobrnauki-ozabotilis-statistikoy-ob-utechke-mozgov-iz-rossii-336699>

<sup>14</sup> URL: <https://dzen.ru/a/Yya0wgtPry-IX1oZ>

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社會方向，作為經濟發展的因素  
**SOCIAL DIRECTION, AS A FACTOR OF ECONOMIC  
DEVELOPMENT**

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註解。基於對經濟發展過程的科學資訊的綜合，對國家社會管理結構及其對經濟效率的影響進行了研究。

社會正義與經濟發展總過程之間的關聯已被粗略地確定。在此基礎上，提出了考慮社會因素的經濟發展管理方案。制定了合理的經濟發展計劃，考慮到人口社會狀況的動態。

關鍵字：發展、結構、管理、生活水準、經濟、效率、人口。

**Annotation.** *Based on the synthesis of scientific information on the processes of economic development, a study of the structure of state social management and its impact on economic efficiency was carried out.*

*The connection between social justice and the general process of economic development has been roughly determined. On this basis, a scheme for managing economic development is proposed, taking into account social factor. A rational scheme of economic development was developed that takes into account the dynamics of the social condition of the population.*

**Keywords:** *development, structure, management, standard of living, economy, efficiency, population.*

Increasing the status of the social direction is one of the areas of rationality in economic development. The process of developing the social direction in the rationalization of the economy increases its efficiency and has a direct impact on the well-being of the population. For companies, focusing their management on social and economic development is also important, since it provides objective indicators of their activities: rationality, harmony, and competitiveness.

In the integral world economic order, it is difficult for the state to perform the managerial functions of a system integrator, a harmonizer of moral values. In such conditions, the state, while remaining social, democratic, legal, planned and market, must be fair, humane, smart and intellectual [1].

Extensive information states that for economic structures that are advanced in the development of the modern world economy in the countries of Asia, China, and India are characterized by the presence of moral imperatives. The population's assessments of inequalities as excessive and unfair indicate social tension and a decrease in citizens' trust in political institutions and government decisions [2, 3].

In many countries, what is of fundamental importance for the majority of the population is not so much the absence of income differentiation as the reduction of inequality of opportunity. The main condition for building a rationally just society is considered by the majority of the population to be a reduction in monetary inequality in income and standard of living. Moreover, the reduction of non-monetary inequalities is more significant: access to medical care, education, jobs, solution to housing problems [4]. This situation defines the resource of human potential as one of the vectors for increasing the efficiency of economic development. Social justice can be considered a socio-economic factor influencing economic relations [5].

Balance and inner stability economic system can be provided management decisions aimed at increasing social justice, since the criterion of social justice is an important systemic resource for socio-economic development and an incentive for investment in human capital.

However, optimization of the state apparatus can lead to increased unemployment. Officials and managers may not want to work in the field or in the production sectors of industry. The desire to force them to work through economic or forceful methods may cause their further resistance, which will require additional repressive measures to suppress.

Although most citizens prefer democracy, elite societies that control the financial sector resist it. They will never voluntarily give up their rights. If citizens create a threat to public order, this will inevitably lead to instability in the dictatorship of the state. Finding a solution to the problem of social stability can be successful through social rationalization of public administration. Such rationalization can be achieved through the full or partial transfer of political power to citizens. This can happen when a point is reached when promises of concessions from the state no longer inspire the trust of the population, and the cost of repression will be significantly high. In this case, a social transformation of economic management can be realized and the elite part of the population will be forced to agree to the creation of democratic solutions for the democratization of the public administration system, which will inspire the trust of the population.

Economic development is determined by the relations between the main decisive macro-systems: the state, as a political system that carries out management, the society of individuals in the population (including political and other organizations) and the economy, including productive forces and production relations.

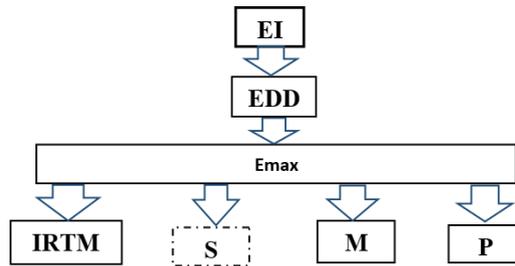
Several directions of development are known in the structure of state social management:

- social infrastructure.
- national relations;
- defense capability;
- healthcare;
- large production;
- small business;

The main indicators of the social state of the state are:

- income (salary, pensions, scholarships, benefits, cost of living);
- wage arrears;
- consumer price index;
- unemployment rate;
- the ratio of incomes of the most and least affluent population;
- volume of social investments, as a special type of investment that connects the economic and social spheres of life;

The basis of social economic rationalization is the economic imperative (EI). The main components of EI are known mechanisms and organized economic entities, united by a target maximum characteristic, forming an economic development driver (EDD) (Fig. 1)



*Figure 1. Scheme of socio-economic rationalization.*

Components of a rational economic development process diagram:

EI - Economic imperative, an integral indicator of rational, social economic development;

EDD - Target object of the economy. Driver of economic development;

Emax - Maximums of economic entities;

Economic subjects:

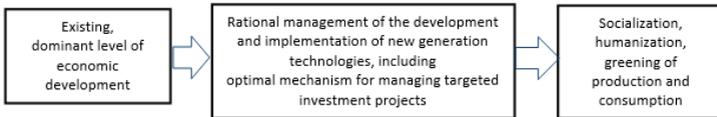
IRTM - Innovations. Rational target management;

S - Socialization of the economy;

M - Market;  
P – Profit

Control of the economic situation for a company operating on the market becomes possible when the current state of the object’s economy is characterized by the EDR indicator. Any changes in the economic situation are reflected in the EDR values, which in turn depend on the economic level of development of regional entities and on the orientation of the company’s management and personnel towards rational management that takes into account the social factor.

A rational system of economic development can be represented as a diagram of an innovative, continuously developing model of effective development, taking into account the social factor (Fig. 2)



**Figure 2.** A rational scheme of economic development (RSED), taking into account the dynamics of the social condition of the population.

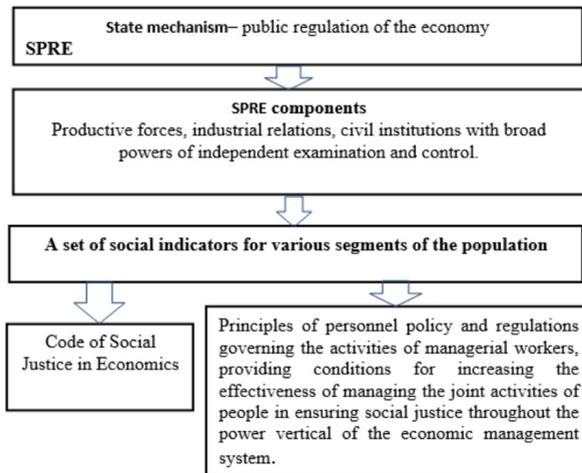
Economic development is determined by the relationship between two main macro-systems: the state, the political system that manages the society of individuals (including political and other organizations) and the economy, which includes productive forces and production relations.

It is quite possible to form a rational mechanism between these two macro-systems with the help of state-public regulation of the economy on the basis of civil society institutions, endowed with broad rights of independent examination and control.

To achieve this goal, an appropriate system of socio-economic monitoring is required as a method of state-public regulation of the economy (SPRE). The institutional mechanism of SPRE will provide objective conditions under which economic entities, represented by representatives - people endowed with the rights to prepare and make decisions, when choosing strategies of economic behavior, act in accordance with the principles of social justice.

The condition for choosing the best strategy of economic behavior that promotes a compromise between economic efficiency and social justice is the maximum consistency of the subject’s internal motives with external institutional incentives.

Such consistency can be achieved by including in external institutional norms of justice a system of effective preventive positive incentives and fines that apply equally to all economic entities, regardless of their formal and informal status (Fig. 3).



**Figure 3.** Targeted institutional mechanism systems of state and public regulation of the economy of the state energy sector.

### Conclusions:

1. Based on taking into account the influence of social justice with the process of economic development, a scheme for managing economic development is proposed, taking into account social factor.
2. Developed rational scheme of economic development that takes into account the dynamics of the social condition of the population.

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珍珠母公司組成的問題與展望

**PROBLEMS AND PROSPECTS FOR THE FORMATION OF  
MOTHER-OF-PEARL COMPANIES**

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抽象的。珍珠母公司是正在取代綠松石公司的最先進的現代公司類型，根據螺旋動力學的概念，珍珠母公司是組織系統進化的皇冠。本研究的目的是明確珍珠母公司的製度特徵及其形成的問題和前景。研究對象是已定下珍珠母公司轉型路線的企業，研究的主題是轉型為珍珠母公司的問題與前景。

關鍵字：綠松石公司、珍珠母公司、螺旋動力學、問題、前景、組織演化。

JEL分類：D21、D23。

**Abstract.** *Mother-of-pearl companies are the most advanced type of modern companies that are replacing turquoise companies, which, according to the concept of spiral dynamics, are the crown of the evolution of organizational systems. The purpose of this study is to identify the institutional features of mother-of-pearl companies, as well as the problems and prospects for their formation. The object of the study is companies that have set a course for their transformation into mother-of-pearl companies, the subject of the study is the problems and prospects of their transformation into mother-of-pearl companies.*

**Keywords:** *turquoise companies, mother-of-pearl companies, spiral dynamics, problems, prospects, organizational evolution.*

**JEL classification:** *D21, D23.*

Mother-of-pearl companies are today, perhaps, the most advanced type of organizational structure of modern companies, which have come or are replacing turquoise companies. Their distinctive feature is the maximum involvement of company employees in intra-company management processes, which directly affects the economic efficiency of their activities. This is facilitated by the institutional structure of such companies – friendly towards their own employees as business partners, not in words, but in deeds. This is achieved by refusing purely formal involvement in the company’s activities, which can dull the employees’ desire for self-government and self-promotion, which is still dominant in turquoise companies.

Turquoise companies are named after the concept of spiral dynamics of Clair Graves, Don Edward Beck, Christopher Cowan, while pearl companies are named after the concept of George B. Kleiner, who by them means companies capable of ensuring the long-term efficiency of their employees and structural divisions of the organization and the entire company in general (Kleiner, 2020; Kuropatkina, 2023).

To successfully build mother-of-pearl companies from scratch or form them through the transformation of turquoise companies, it is necessary to solve a number of problems, primarily of an institutional nature. Without going into details, we note that the process of construction or transformation itself should be aimed at such a transformation of the institutional environment that will be able to support the desired organizational system institutionally.

Since, in general, according to G.B. Kleiner, two main developments of the country are possible – innovative and repeating (Kleiner, 2006), and the achievement of our goal is associated primarily with the implementation of the innovative development scenario, we will dwell on the typical problems faced by participants in innovative activities in Russia (Nikonova, 2011).

Such problems are:

- lack of consistency in strategic management institutions (irrelevance of government activities, priorities, strategic decisions, spending of funds);
- lack of a system of independent examination, control and, importantly, responsibility of its participants involved in institutional construction (this is expressed in the lack of control over the implementation of innovations, the lack of regulations and the interest of officials involved in the innovation process in the results, increased costs, and decreased efficiency);
- difficulties in attracting financial resources to implement new ideas and developments;
- low level of taking business and financial risks;
- lack of adequate legislative support and a link between science and production.

The listed problems are intended to reflect primarily those encountered in the process of implementing innovative activities as such, but they are also relevant for the formation of an adequate institutional environment for mother-of-pearl companies. This is all the more relevant because in the modern knowledge economy, “it is the corps of pearl enterprises that should become the flagship of innovative and socially oriented development. Pearl enterprises must find a solution to the problem of reducing the level of opportunism of workers and their alienation from each other and from the company as a whole” (Kleiner, 2020, p. 474).

When solving these and other problems, one should keep in mind the presence of a number of contradictions in the Russian institutional environment, such as, for example, the proximity of institutions that do not fit well with each other, which is explained by the specifics of institutional construction in our country, especially in the 90s of the last century, when the main the emphasis was on the desire to ensure harmony or congruence of new (market-oriented) institutions with old ones (inherited from Soviet times), as well as on the adequacy of existing mechanisms to counter potential opportunistic behavior. And since the transformation of turquoise organizations into mother-of-pearl companies is a dynamic process, when forming a relevant institutional system, it makes sense, if necessary, to turn to the idea of Victor M. Polterovich on the creation of a system of intermediate institutions that can assist in achieving this goal.

The appeal to such institutions is due to the fact that often the immediate implementation of the desired institutions is impossible due to resource, technological, cultural, political or institutional limitations. To solve the problem of limitations, a sequence of successive intermediate institutions is built until the formation of the desired institution and thus achieving the final goal. At the same time, two approaches to finding the desired institution are possible – the “mixing” method and the method of institutional competition, which does not exclude the possibility of institutional experimentation (Polterovich, 2007, p. 25).

We also note that the relevance of turning to mother-of-pearl companies is dictated by the increased difficulties in relationships between companies, especially those belonging to different jurisdictions, and the complication of relationships between employees, between them and organizations, between insiders and outsiders and other economic agents involved in the economic process. We express the hope that the transition to this type of company will allow us to solve the accumulated problems, especially in the context of increasing digitalization.

To identify the prospects for the formation of mother-of-pearl companies, it is necessary to clearly understand that formation is a dynamic process, and since most mother-of-pearl companies are formed through the transformation of turquoise companies, we consider it advisable to familiarize themselves with the process of their development in the past. This can be done conveniently by resorting to spiral dynamics.

The theory of spiral dynamics itself, created in 1996 by Graves et al., adopts a classification of the stages of dynamic development in accordance with the color scheme. The initial impetus for the development of the theory was the attempt, beginning in 1952 by Clair Graves, to explain differences in the emergent cyclical levels of existence and motivation of people and their reactions.

As a result of many years of painstaking research into the essence of human development, Graves formulated what was first called the “sequential, cyclic double helix model of adult biopsychosocial development” and later became known as the theory of spiral dynamics or simply as spiral dynamics.

The meaning of Graves’ theory comes down to the fact that in a situation where people are faced with problems that cannot be solved by them at their level of being, they have to do something impossible – make a biological, psychological, social and spiritual “leap” into a new system of a higher level. order. The first model, published by him in 1966, consisted of seven levels of thinking, which by 1974 had matured into a system of 2 stages (the first had 6 levels of thinking, and the second – 2. Two spirals were used in this theory: living conditions on the first, and awakening possibilities on the second. The choice of living conditions was influenced by Maslow’s theory of hierarchical needs. Since 1975, Beck and Cowan joined Graves, as a result of which in 1996 they released a book – the fruit of their collaboration there – “Spiral Dynamics: Managing Values, Leadership and Change.”

To make Graves’ theory more attractive, Beck and Cowan suggested using the color scheme shown below.

It is noteworthy that the colors of this range themselves raise many questions. Firstly, they almost completely coincide with the spectrum of white, differing only in that instead of blue, beige is presented. Secondly, the order of the colors of the white spectrum differs from the order presented by Beck and Cowan. Let us recall the order of colors in the spectrum of white light: red, orange, yellow, green, blue, indigo, violet.

There are, however, other versions of the color scheme. So, for example, Frederic Laloux not only excluded the yellow color from consideration as an independent level, but also gave these colors a completely non-color interpretation in order to specify the design of spiral dynamics in relation to local organizations. In his interpretation, the beige level is characterized as a reactive paradigm, purple level as a magical one, red level as an impulsive one, blue level as a conformist one, orange level as a competitive one, green level as pluralistic one, and, finally, turquoise level as an evolutionary paradigm (Laloux, 2014).

Let us return, however, to the two-stage color scheme as originally proposed by the authors of spiral dynamics, complementing it with turquoise color, and then with mother-of-pearl color. Let us remind you that a substitute for the blue color of the spectrum is the color beige.

First stage.

1) Beige A-N. Survival. Instinctive.

First level characteristics:

- automaticity, reflexivity;
- satisfaction is paramount;
- driven by instincts and genetics;
- weak awareness of oneself as a separate being (not differentiated);
- minimal impact on or control over the environment.

2) Purple B-O. Family ties. Clan.

Characteristics of the second level:

- submission to the desires of mystical spiritual beings;
- demonstration of loyalty to elders, custom, clan;
- protection of sacred places, objects, rituals;
- connection with everyone to find safety;
- life in an enchanted, magical village;
- search for harmony with the forces of nature.

3) Red C-P. The power of strength. Self-centered.

Characteristics of the third level:

- in a world of those in power and those without power, it is good to be in power;
- avoiding shame, protecting reputation, being respected;
- immediate satisfaction of feelings and impulses;
- relentless struggle to overcome obstacles;
- do not take into account possible consequences.

4) Blue D-Q. The power of truth. Focused.

Characteristics of the fourth level:

- search for meaning and purpose in life;
- sacrificing oneself for the sake of future reward;
- putting things in order;
- impulse control and recognition of guilt;
- ensuring compliance with the principles of righteous life;
- the divine plan distributes people to places.

5) Orange E-R. Rivalry. Multidimensional.

Characteristics of the fifth level:

- desire for autonomy and independence;
- search for a good life and material abundance;
- process through searching for the best solutions;
- improving the quality of life thanks to science and technology;
- game to win and enjoy competition;
- training in proven ways.

6) Green F-S. Interpersonal connections. Relative.

Characteristics of the sixth level:

- exploration of oneself and others internally;
- development of a sense of community and unity;
- share community resources with everyone;
- liberation of people from greed and dogma;
- decision-making based on consensus;
- refresh spirituality and bring harmony to the world.

Second stage.

7) Yellow G-T. Flexible flow. Systemic.

Characteristics of the seventh level:

- acceptance of the inevitability of flows and forms of nature;
- focus on functionality, competence, flexibility and spontaneity;
- search for a natural combination of contradictory “truths” and “uncertainties”;
- gaining personal freedom without harm to others or unnecessary personal interests;
- experience the fullness of life on Earth with such diversity in many dimensions;
- need for integrative and open systems.

8) Turquoise H-U. Global vision. Holistic.

Characteristics of the eighth level:

- merging and harmonizing a strong team of people;
- focus on the benefit of all living beings as integrated systems;
- expanded use of the tools and capabilities of the human brain/mind;
- I am part of a larger, conscious, spiritual whole that also serves itself;
- global networks as a routine;
- actions in the spirit of minimalism, so less is actually more.

A feature of turquoise companies is the replacement of vertical hierarchy with horizontal interaction of employees who prefer to achieve the common goal of the company in accordance with three principles, namely: self-government, integrity and the presence of a system of evolving goals. This is precisely the advantage of such organizations. But there are also potential disadvantages here. The fact is that the leveling approach adopted in such organizations can dull the desire of employees to achieve career growth, fraught with the possibility of their professional impoverishment, which, coupled with other unfavorable factors, can lead to a negative impact on the effectiveness of the organization - even to its destruction.

In the case of a noticeable number of such actions, the advantages of turquoise companies, such as, say, the involvement of employees in internal management processes, can become deliberate disadvantages, depriving inclusiveness of its

ability to self-govern. As L.V. Kuropatkina asserts with reference to the authors of the theory of spiral dynamics, “the turquoise worldview does not exclude destructive actions, as a result of which the recreation of the vertical hierarchy of power and control may occur and the emergence in the future of a new round in the model of spiral dynamics (Kuropatkina, 2022, p. 207).

To the abovementioned eight colors of the spectrum, as was said, G.B. Kleiner added another, ninth, level, calling it mother-of-pearl, to convey the meaning of companies that are more advanced than turquoise organizations (Kleiner, 2020). It was the turquoise organizations that served as the prototype for the creation of mother-of-pearl companies.

Let us present the characteristics of the latter by analogy with spiral dynamics and, in addition to it, as the ninth level of spiral dynamics (see: Kuropatkina, 2023).

9) Mother-of-pearl. Greater adaptability. Systemic.

Ninth level characteristics:

- adaptability to changes in external conditions, as well as the internal state of the company, bearing in mind the activities of each employee, team of departments and the company as a whole:

- expanding the range and increasing the flexibility of formal and informal, hierarchical and non-hierarchical management models used in its different segments;

- creative activity of all company participants;

- the ability of intra-company institutions to coordinate this activity.

Thus, mother-of-pearl organizations are able to ensure maximum long-term efficiency of each employee, his commitment to his company, as well as the company’s loyalty to the employee (Kuropatkina, 2023, p. 25). In this regard, mother-of-pearl companies are superior to turquoise companies, which, although aimed at harmonizing the workforce, are still not to the same extent as mother-of-pearl companies.

The prospects for the formation of mother-of-pearl companies also largely depend on the institutional environment that will be formed in and around the formed companies. When an adequate environment is formed, institutional strengthening will take place, otherwise it will be difficult not to avoid institutional weakening, perhaps even to the point of institutional undermining (Yerznkyan, 2017). Generally speaking, the concept of institutional strengthening or reinforcement is associated primarily with endogenous institutional changes and institutional reproduction, but can also be associated with other institutional phenomena. In any case, in the process of forming the desired companies, it is necessary to keep the fact of institutional reinforcement under special control.

In passing, we note that institutional strengthening is not an end in itself, but “a means towards achieving the desired (in relation to Russia) goal – moderniza-

tion of the economy and its transformation into an “economy with a human face” – based on a system of intermediate institutions producing controlled incremental and coordinated changes” (Yerznkyan, 2017, pp. 34-35). Such a desirable economy is based on a meaningful scientific paradigm (the term Sergei Yu. Glazyev used for a general assessment of the scientific creativity of Academician Dmitry S. Lvov) and pursues an economic policy in the general interests of the economy as opposed to a liberal policy characterized by meaninglessness and vacuity (Glazyev, 2008).

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公司對外經濟策略考量全球經濟發展週期  
**TAKING INTO ACCOUNT THE CYCLES OF GLOBAL ECONOMIC  
DEVELOPMENT IN THE COMPANY'S FOREIGN ECONOMIC  
STRATEGY**

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註解。 全球發展的波動性給公司帶來了挑戰，他們需要找到工具來考慮外部因素對業務有效運作的影響，而這可以透過制定和實施靈活和適應性的策略來實現。 同時，發展的周期性不斷提供新的動力（挑戰和機會），需要在製定策略決策時予以考慮。 因此，在本文中，筆者在研究週期性概念的基礎上，為參與對外經濟活動的企業確定了在經濟週期的各個階段形成戰略發展方向的目標。

關鍵字：世界經濟週期性發展、商品超級週期、經濟週期階段、公司對外經濟策略、適應性。

***Annotation.** The volatility of global development poses the challenge for companies to find tools to take into account the impact of external factors on the effective functioning of business, which is possible through the development and implementation of a flexible and adaptive strategy. At the same time, the cyclical nature of development constantly provides new impulses (challenges and opportunities) that require consideration in making strategic decisions. Accordingly, in this article, the author, based on studying the concepts of cyclicity, sets himself the goal of forming directions for strategic development at each stage of the economic cycle for companies participating in foreign economic activity.*

***Keywords:** cyclical development of the world economy, super cycles of commodities, stages of the economic cycle, foreign economic strategy of the company, adaptability.*

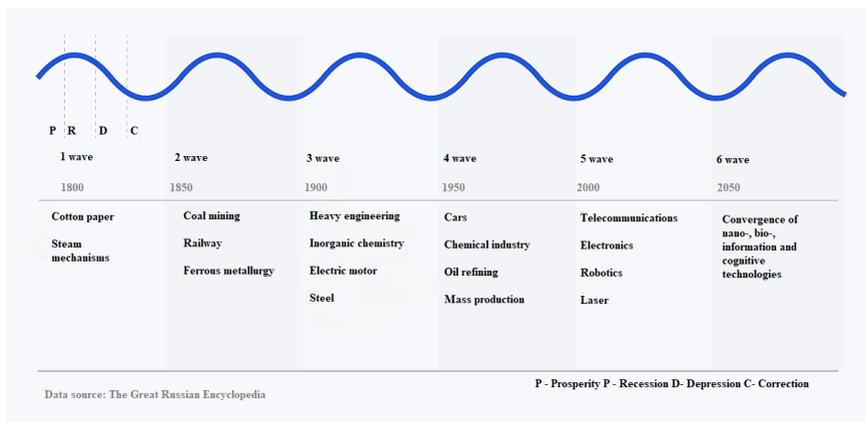
The modern world economy is a global system of production, distribution and consumption of material goods and services. It is characterized by a high degree of integration and interconnection between national economies, exchange of goods, capital, labor and information. At the same time, it is subject to the influence of transformational changes occurring under the influence of various trends, which

creates the conditions for cyclical development. This affects all participants in the world community and creates the need to take into account the macroeconomic dynamics of trends in scientific, technological, social, political, and environmental development in the strategies of companies operating in global markets.

The economic cycle represents fluctuations in the level of economic activity, realized through the phases of boom and bust in the economy under the influence of various factors (deepening processes of integration and liberalization; strengthening of the international division of labor, mass application and rapid development of information and communication technologies, software, nanotechnologies, composite materials etc.) [1 - 138].

There are several theories that explain the emergence and development of cyclicity in the global economy:

- Kondratieff cycles theory was developed by Russian economist N.D. Kondratiev at the beginning of the 20th century. It assumes that there are long cycles lasting about 50-60 years associated with innovative changes in the economy [2]. Each cycle includes phases of growth, decline, depression and recovery (see Figure 1). Around the 20s of the 21st century, the fifth Kondratieff wave should have ended (low inflation rates, low interest rates, a decrease in the rate of economic dynamics - characterizes the attenuation of the wave of the cycle). Moreover, the chain of launching a new cycle is always based on the emergence and development of new technology, which stimulates the demand for investment.

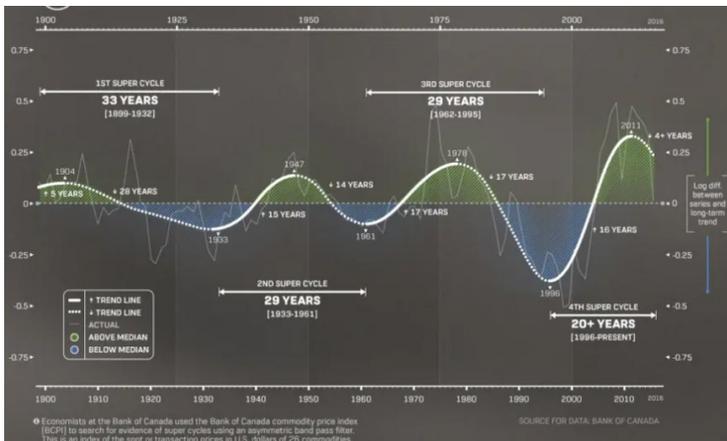


**Figure 1.** Long Kondratieff waves in the global economy [3]

- Juglar cycles theory was proposed by the French economist Clémence Juglar. It is based on the idea that business cycles last about 8-10 years and are associated with fluctuations in investment and inventories.

- Kitchin cycles theory was developed by the American economist Joseph Kitchin. She claims that there are short cycles of about 3-5 years associated with fluctuations in inventories and commodity prices.

- Elliott wave theory was based on the work of American analyst Ralph Nelson Elliott. He believed that markets follow wave patterns consisting of five waves up and three waves down. It is assumed that these waves can be applied to economic cycles. It was he who came up with the concept of the commodity super-cycle. At its core, this concept is a correlation between the dynamics of stock and commodity markets. The Bank of Canada made an empirical substantiation of super-cycles by comparing prices for 26 commodities in 2016 and identifying a trend: super-cycles begin 10-15 years from the beginning of the Kondratieff wave and last approximately 25-35 years (see Fig. 2)[4]



**Figure 2.** Commodity super-cycles in the global economy (Central Bank of Canada research)[4]

The unfolding of the super-cycle goes through the following mechanism: rising commodity prices, rising global inflation, rising interest rates... “Higher prices for raw materials stimulate increased exploration and production of minerals, which takes years and sometimes decades to implement. After some time, the world becomes oversupplied, prices fall and production declines. This period is accompanied by zero interest rates and global deflation. Then the cycle repeats again...”[5]

Thus, in January 2022, the World Bank noted that the sharp drop in energy prices in 2020 and the rebound in 2021 are an example of commodity cycles. Starting in 2021, the global economy will enter a new “super-cycle” driven by

artificial intelligence and decarbonization, according to Peter Oppenheimer, head of European macro research at Goldman Sachs. [6]

The main problem with defining a super-cycle is that it is impossible to take into account all factors when building a model. For example, according to Alexey Belogoriev, deputy director of the Institute of Energy and Finance, the collapse in gas prices in 2019-2020 was largely due to the commissioning of a large number of LNG projects in previous years, that is, the market was overheated and based on previously made investment decisions, for 2022-2024. This marks the “bottom” of the commissioning cycle for new LNG plants. A new peak in commissioning will occur in 2025-2027, and may again lead to “overstocking” of the market and a sharp decline in prices [7].

To mitigate the impact of super-cycles on the world economy, governments and international organizations are introducing measures to stimulate the economy, regulate financial markets and cooperate in international trade. However, the cyclical nature of development remains an integral part of the modern world economy and requires constant study and analysis to predict and minimize their negative consequences.

Each stage of cycles in global and national economies represents a different set of conditions and requires the development and implementation of specific strategies for companies. Let us denote the strategies adaptive to each stage of the super-cycle.

The economic growth:

- Expanding production capacity and investing in new projects to meet growing demand.
- Developing and promoting new products and services to gain share in a growing market.
- Development of new markets and expansion of the company’s geographical presence.

Recession:

- Reduce costs and optimize business processes to reduce costs and maintain profitability.
- Developing more affordable and competitive products to retain the customer base.
- Diversify and look for new opportunities in other sectors or regions that are more recession-resistant.

Recession:

- Reducing costs and production capacity to cope with declining demand.
- Debt restructuring and seeking external financing to ensure financial stability.
- Search for new markets or clients in more established sectors.

Recovery:

- Increased investment and renewed expansion of production capacity to take advantage of improving market demand.
- Strengthening marketing efforts and developing new promotional strategies to increase sales.
- Reviewing business models and aligning them with changing market requirements.

Of course, the specific strategies companies adopt will depend on their industry, competitive environment, and other factors. It is also important to note that these strategies can be combined and modified depending on the specific situation and company goals.

Accordingly, to develop a company strategy adaptive to modern condition, it is necessary to implement the following methodological techniques:

- Analysis of the cyclical nature of the industry in the home country and in other countries. This will reduce the risks of a decline in demand, production, rising prices for raw materials, materials, components, etc. through the development of foreign economic activity.

- Scenario approach in strategic planning: taking into account scenarios for the development of target markets and the world economy as a whole, proposed by international organizations, as well as government agencies of countries, will allow the company's strategy to take into account possible downturns and booms in the market, as well as become more flexible and adapt to the changing economic situation.

- Diversification of the product portfolio and sales/supply markets as well as counterparties) in order to mitigate the impact of the recession on the financial performance of the company by more fully satisfying the demand that formed during a specific period of time in the cycle.

- Flexibility in inventory management can reduce losses from unexpected booms or busts. This aspect is especially important for companies that produce goods with a high level of seasonality in demand, or whose production is based on the use of exchange-traded raw materials, the price dynamics for which become the epicenter of the super-cycle.

- Investments in innovation allow you to maintain competitive advantages in the face of emerging challenges, creating new opportunities, as well as take a leading position in the market, even in less stable periods of economic activity.

Overall, taking the cyclical nature of the global economy into account when developing a company's strategy will help improve its resilience to economic fluctuations and increase its competitiveness. This requires careful analysis and planning, but will ultimately help the company navigate through the various phases of the business cycle successfully.

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支援管理決策過程的資訊和分析系統  
**INFORMATION AND ANALYTICAL SYSTEMS FOR SUPPORTING  
THE MANAGEMENT DECISION-MAKING PROCESS**

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註解。石油天然氣工業的現代化發展伴隨著各種類型和形式的資訊的增加。首先，這適用於地質勘探過程，其主要任務是維持公司碳氫化合物儲量的平衡。產生數位資訊的過程是管理決策過程中專業資訊和分析系統的開發和隨後廣泛實施的基礎。文章以俄羅斯幾家最大的公司為例，檢視各種資訊系統支援管理決策的能力。

關鍵字：資訊和分析系統、石油和天然氣生產企業、管理決策、地質勘探計劃、資產組合。

**Annotation.** *The modern development of the oil and gas industry is accompanied by an increase in information of various types and forms. And, first of all, this applies to the geological exploration process, the main task of which is to maintain the balance of hydrocarbon reserves in the company. The process of generating digital information served as the basis for the development and subsequent widespread implementation of specialized information and analytical systems in the management decision-making process. In the article, using the example of several largest Russian companies, the capabilities of various information systems for supporting management decision-making will be examined.*

**Keywords:** *information and analytical systems, oil and gas producing enterprises, management decisions, geological exploration program, asset portfolio.*

The current state of the Russian oil and gas industry is characterized by a reduction in the resource base of traditional hydrocarbon sources and the need to maintain current levels of hydrocarbon (HC) production in order to achieve strategic indicators of companies. This circumstance necessitates the development of various measures to develop the resource base of existing assets, involve geological objects not covered by drilling in the extraction process, and acquire new

geological exploration assets in regions falling within the area of interest of companies. All this, in turn, serves as the basis for drawing up geological exploration strategies (GRR) aimed at maintaining the balance of hydrocarbon reserves.

Currently, oil and gas producing enterprises, in order to increase the efficiency of management decisions in the formation of exploration programs, are actively developing a methodology based on information and analytical systems (IAS). The latter make it possible to reduce routine operations on basic geological, economic and technological calculations, probabilistic modeling of indicators that are involved in justifying geological exploration programs.

The introduction of specialized information and analytical systems (IAS) into the management decision-making process makes it possible to solve problems in the field of:

- regional-zonal forecast of the prospects of territories for the search for hydrocarbon deposits;
- qualitative and quantitative assessment of the resource base of exploration assets;
- structured storage of information in digital form;
- making management decisions in the geological exploration process.

The results generated by such systems also allow companies to develop strategic exploration programs. Next, using the example of several largest Russian companies, the capabilities of IAS will be examined.

Over the past few years, PAO Gazprom has been carrying out activities aimed at creating a unified Project Management System and geological exploration project portfolios to ensure the process of developing geological exploration programs [1]. The system contains various functional subsystems - "Accounting for the uncertainty of reserve volumes", "Evaluation of geological risk and EMV indicator", "Optimization of the exploration portfolio", "Risk analysis of the exploration portfolio", etc. Working together, the subsystems allow for a comprehensive analysis of the company's licensed areas (exploration assets) and form conclusions about the feasibility and scope of their further development.

The company uses the developed System to form exploration portfolios and their subsequent static and dynamic optimization.

The company PAO Rosneft has developed an information system "Evaluation of subsoil areas", which quickly analyzes both individual and clustered assets [2]. The system accumulates current data on unallocated subsoil areas from open sources, generates maps of geological exploration, infrastructure, well stock, 2D/3D seismic surveys, license and auction areas. The software is based on import-substituting technologies, has fast calculation tools and a flexible architecture. Currently, the information resource "Evaluation of Subsoil Plots" has been put into commercial operation at the Company's enterprises.

In 2020, PAO LUKOIL launched an investment project for the development of the information system “Probabilistic Assessment of Prospective Hydrocarbon Resources” (IS VOPRU), [3]. Earlier, in 2019, IS PAPHR, as a result of trial operation when performing a geological and economic assessment of promising hydrocarbon resources, showed its effectiveness. Thanks to the speed of calculations, structured data storage and the maximum elimination of the “human factor”, the quality of project assessment has significantly improved. This IP is actively used in the company’s subsidiaries. It is planned to expand the functionality of the system to perform probabilistic assessments of resources of categories D0 (prepared) and D1 (prospective) according to the Russian classification. The implementation of PAPHR will become even more accurate and will be carried out according to both Russian and international standards, including distributed data collection and management, performing calculations and preparing reports. It should also be noted that the system will be able to function in English, which will simplify collaboration with international audit companies.

Similar systems are being developed by other oil and gas producing enterprises. However, despite the presence of objective advantages, the systems described above also have disadvantages. Among the latter are the following:

- “mechanistic” nature of the analysis, inability to take into account the results of conceptual geological modeling in full;
- lack of “geological” tools for forming groups (portfolios) of potentially similar exploration objects (according to the characteristics of the geological structure and development history, type of reservoirs and traps, location relative to hydrocarbon generation centers and their migration routes, etc.). The formation of groups of exploration objects occurs on the basis of a mathematical apparatus that takes into account the similarity of the values of technical and economic indicators;
- inability to take into account the synergy effect from the formation of exploration portfolios.

Thus, considering the advantages and disadvantages of IAS, based on their current level of automation, it can be noted that they should be considered primarily as an effective tool at the initial stage of developing strategic geological exploration programs. Such analytical systems provide specialists making management decisions in companies with geological and economic indicators of the efficiency of development of exploration assets and, thereby, help reduce the risks of obtaining negative results.

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俄羅斯聯邦強制執行數位化的若干問題  
**SOME ISSUES OF DIGITALIZATION OF COMPULSORY  
ENFORCEMENT IN THE RUSSIAN FEDERATION**

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抽象的。本文探討了執法程序中數位化的實施和法律監管的當前問題以及該領域的發展前景。

關鍵字：法律、司法、執法程序、執法行動、數位化、數位貨幣、數位法。

**Abstract.** *the article examines current issues of implementation and legal regulation of digitalization in enforcement proceedings and prospects for the development of this area.*

**Keywords:** *law, justice, enforcement proceedings, enforcement actions, digitalization, digital currency, digital law.*

In the modern world, information technologies have begun to play a significant role and become an integral part of people's lives, so they are increasingly trying to introduce digitalization into all areas. In the process of digitalization of various spheres of public relations, Russia is among the leading countries. In particular, Russia took 10th place in the World Bank GovTech Maturity Index in 2022. Russia's maturity index was 0.897 points<sup>1</sup>. The following were assessed: the level of development of basic government systems, such as the state cloud and other platforms; development of public services, availability of electronic services for citizens; development of state digitalization institutions, innovation policy, strategies and laws; level of citizen engagement, government openness and feedback.

In 2019, as part of the implementation of the federal project "Digital Public Administration" and the implementation of such a program as "Digital Economy", which was developed by the Federal Bailiff Service of the Russian Federation

<sup>1</sup> Ministry of Digital Development, Communications and Mass Communications of the Russian Federation / Statistics <https://digital.gov.ru/ru/events/42223/> (access date: 01/10/2024).

together with the Ministry of Digital Development of the Russian Federation, the implementation of the program was launched. The main goal of the program was to increase the efficiency of compulsory execution of executive acts. Also, within the framework of this program, its main concept was created, namely the super service “Digital Enforcement Proceedings” and the Departmental Digital Transformation Program of the FBS of Russia for 2021–2023 was approved.

Further development of this area will make enforcement proceedings more convenient for all its participants, since it will reduce the need for personal interaction and will allow performing the necessary actions for enforcement proceedings in an online format, for example, receiving information about the progress of enforcement proceedings.

The introduction of information technology in enforcement proceedings will have a positive impact on the implementation of enforcement documents, because the claimant will be able to minimize his interaction with the debtor or the bailiff service and, as quickly as possible, receive from the debtor what he is entitled to, since the form of interaction is not important in this matter, but the result is important, namely the fastest and most optimal way to execute a court decision and acts of other bodies and institutions.

Such methods of interaction are inevitable in the modern world, where everyone is trying to achieve the most effective and fastest way to exchange information in all spheres of life. All this will increase the overall efficiency of enforcement proceedings and will become an important guarantee of the implementation of court decisions and acts of other entities.

Digitalization is actively used in relations developing in the civil sphere, and mainly affects the material and legal side. At the same time, procedural relations also need to be improved and use all the prospects and opportunities of digital technologies.

In this matter, the problem arises that procedural relations by their nature are public in nature and, therefore, must be regulated by a clearly established procedure, therefore any changes associated with digital technologies at a certain stage must be systemic in nature and take into account the basic principles of production and rights of the parties<sup>2</sup>.

The legal regulation of digital assets is established in the Federal Law “On digital financial assets, digital currency and on amendments to certain legislative acts of the Russian Federation” dated July 31, 2020 N 259-FZ<sup>3</sup>. The provisions

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<sup>2</sup> Valeev D.Kh., Nuriev A.G. Electronic document management in the field of justice in the digital economy // Bulletin of Perm University. Legal sciences. 2019. No. 45. URL:<https://cyberleninka.ru/article/n/elektronnyy-dokumentoorobot-v-sfere-pravosudiya-v-usloviyah-tsifrovoy-ekonomiki> (access date: 09.01.2024)

<sup>3</sup> Federal Law of July 31, 2020 N 259-FZ «On digital financial assets, digital currency and on amendments to certain legislative acts of the Russian Federation» URL: <https://www.szrf.ru/szrf/doc.php?nb=100&issid=1002020031010&docid=18> (access date: 12/25/2023).

contained in this law also correspond to the provisions of the Civil Code of the Russian Federation (Civil Code of the Russian Federation)<sup>4</sup>. In Art. 141.1 of the Civil Code of the Russian Federation stipulates that digital rights are the obligations and other rights named in the relevant law, the content and conditions of which are determined in accordance with the rules on information systems.

Thus, digital rights are part of property legal relations. The law on enforcement proceedings contains a chapter devoted to the collection of the debtor's property, and in the future it would be advisable to include new objects of property rights in it in order to facilitate the task of bailiffs associated with foreclosure on certain types of property.

Federal Law No. 259-FZ<sup>5</sup> defines the regulation of digital currencies. In turn, digital currency and digital financial assets have significant differences.

Digital currency has no obligated persons, since digital currency for its functioning does not require a centralized management system, but a specific server or several users who may not be related to each other. In the case of digital financial assets, there is always a specific legal entity responsible for the circulation of the asset; in this matter, there are persons who bear obligations.

Another problem is that in paragraph 4 of Art. 68 Federal Law “On Enforcement Proceedings”<sup>6</sup> recognizes digital currency as property. The Law on Digital Assets enshrines the following concept: digital currency is a set of electronic data (digital code or designation) contained in an information system that is offered and can be accepted as a means of payment that is not a monetary unit of the Russian Federation, a monetary unit of a foreign state or an international monetary or unit of account, and as an investment and in respect of which there is no person obligated to each owner of such electronic data, with the exception of the operator and nodes of the information system, who are obliged only to ensure compliance with the procedure for issuing these electronic data and carrying out actions in relation to them to enter (changing) records in such an information system according to its rules.

At present, there is no clear procedure for collecting digital currency, since there is no mechanism for regulating its use in the market<sup>7</sup>. At the same time,

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<sup>4</sup> Civil Code of the Russian Federation dated November 30, 1994 N 51-FZ (as amended on February 25, 2022) (as amended) // [pravo.gov.ru](http://pravo.gov.ru) (access date: December 25, 2023).

<sup>5</sup> Federal Law of July 31, 2020 N 259-FZ (as amended on July 14, 2022) “On digital financial assets, digital currency and on amendments to certain legislative acts of the Russian Federation” (as amended and supplemented, entered into force on 01.12.2022) // [pravo.gov.ru](http://pravo.gov.ru). (access date: December 25, 2023).

<sup>6</sup> Federal Law of October 2, 2007 No. 229-FZ “On Enforcement Proceedings” URL: <https://fssp.gov.ru/2032946/> (access date: December 25, 2023).

<sup>7</sup> Dobrina T. B. Digitalization of enforcement proceedings in Russia. Foreclosure of digital assets // Skif. 2021. No. 4 (56). URL: <https://cyberleninka.ru/article/n/tsifrovizatsiya-ispolnitelnogo-proizvodstva-v-rossii-obraschenie-vzyskaniya-na-tsifrovye-aktivy> (access date: 12.25.2023).

digital currency is recognized as a cryptocurrency issued on the territory of the Russian Federation; the legislation establishes the procedure for its issue.

The problem with cryptocurrency, from the standpoint of enforcement proceedings, is the complexity of its regulation, since access to it is possible using a digital code and it is impossible to determine who currently owns it, which gives the user anonymity, while it can be stored separately dedicated server-attack, and on any personal computer. There is also the question of assessing its value; not a single cryptocurrency has a constant exchange rate to the national currency. Another problem is its exchange rate, because there have been frequent cases of sharp collapse or growth of various cryptocurrencies on the market.

All these problems currently make it impossible to introduce cryptocurrencies into the category of property that can be recovered in enforcement proceedings.

The prospects and capabilities of the service, which is being created under the Digital Enforcement Proceedings program, are aimed at solving existing problems in the work of bailiffs and parties to enforcement proceedings, for example, the digitalization of obtaining information about the progress of enforcement proceedings. This allows many procedural issues to be resolved remotely, since the service will be available at any time convenient for the party to the process.

Such innovations will reduce the burden on bailiffs and significantly reduce the costs of conducting enforcement proceedings for the parties. Also, if the parties consider that their rights have been violated, they will be able to submit complaints or petitions without obstacles in the order of subordination (to the senior bailiff, to the territorial departments and the Federal Bailiff Service), which in turn makes the entire process more fair and open.

The possibilities for digitalization of enforcement proceedings are constantly expanding. For example, on December 21, 2021, Federal Law No. 417-FZ “On Amendments to Certain Legislative Acts of the Russian Federation” was adopted<sup>8</sup>, it regulates the making of decisions on certain issues of enforcement proceedings in an automatic mode, that is, decisions are made without the participation of the bailiff himself, signed with an enhanced qualified electronic signature. These applications can be submitted using the State Services portal, where a form for the corresponding application or petition is provided for filling out. The possibility of submitting standard applications indicates the development and implementation of artificial intelligence technology in enforcement proceedings, but in this matter one should not forget about the risks of technical failure. In this matter, it is worth canceling that all complaints and questions from citizens will be dealt with directly by the bailiff himself and the effectiveness of enforcement proceedings depends on the actions and level of professionalism of the employee.

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<sup>8</sup> Federal Law of December 21, 2021 No. 417-FZ “On Amendments to Certain Legislative Acts of the Russian Federation” URL: <https://www.szrf.ru/szrf/doc.php?nb=100&issid=1002021052010&docid=8> (access date: 05.11.2023).

Therefore, there is a need for clarification at the level of higher courts on the issue of the relationship and combination of the use of digital notification methods and standard alerts when assessing the legality of actions (inaction) and decisions of FBS officials.

In turn, all of the above innovations will allow the parties to receive timely and up-to-date information on the progress of enforcement proceedings, which in turn will allow a number of issues to be resolved correctly and in a timely manner.

The main goal of creating a digital service in enforcement proceedings is to make information about enforcement proceedings more accessible to all parties; one of these areas is the creation of an electronic register of enforcement documents. This helps reduce the number of personal contacts for filing applications to initiate enforcement proceedings and, therefore, will reduce the time spent in the process of providing the necessary documents.

State policy is aimed at relieving the workload of bailiffs in order to increase the efficiency of their work by reducing the time required for enforcement procedures. In addition, digital technologies reduce the separation of citizens and officials, as participants in enforcement proceedings, from their main activities.

The provision of various services using the registry is regulated by law, namely Federal Law No. 478-FZ of December 27, 2019 “On amendments to certain legislative acts of the Russian Federation regarding the implementation of the registry model”<sup>9</sup> - the registry model means the provision of a public service in which the result of the service is an entry in a legally significant electronic registry. The opportunity to use the register is provided in the field of public services.

The technologies regulated in this law will help simplify the procedure for initiating enforcement proceedings - the basis for initiating enforcement proceedings will be the corresponding entry in the register and there will be no need to present writs of execution and an application to the bailiff service. This is an important innovation, since entries in the electronic register will acquire the force of executive documents.

The created register is an electronic state resource that will be necessary for recording executive documents; there is also the possibility of voluntary execution using this register, which should lead to a reduction in cases of recourse to enforcement proceedings<sup>10</sup>.

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<sup>9</sup> Federal Law of December 27, 2019 No. 478-FZ “On amendments to certain legislative acts of the Russian Federation regarding the implementation of a registry model for the provision of public services for licensing certain types of activities” // URL: <https://www.szrf.ru/szrf/doc.php?nb=100&issid=1002019052010&docid=36> (date of access: 01/09/2024).

<sup>10</sup> Kirsanova E. V. Digital transformation of enforcement proceedings // Prologue: magazine about law. 2022. No. 3 (35). URL: <https://cyberleninka.ru/article/n/tsifrovaya-transformatsiya-ispolnitelnogo-proizvodstva> (access date: 12/25/2023).

The Ministry of Justice of the Russian Federation is developing amendments to all procedural codes so that entries in the register become the basis for initiating enforcement proceedings.

Such a system will significantly simplify the process and allow bailiffs to devote more time to enforcement actions that will be necessary for a particular case. In this matter, we should not forget that all innovations related to digitalization are aimed at creating electronic document management, and not an autonomous system for the implementation of judicial proceedings. It will still depend on the bailiffs and their actions. Although in the future the creation of a register can be envisaged for the exchange of data with banks in order to write off funds from the debtor's account, in this case it is necessary to think about protecting citizens from unlawful debiting of funds. Since the law currently allows the creditor to contact the bank directly to collect funds from the debtor, the procedure for informing bailiffs or courts about errors or violations must be strictly regulated.

In his work V.A. Gureev points out that “the need for digital transformation of enforcement proceedings is associated in modern realities not only and not so much with the abstract idea of the transition to digital public administration, but with the objectively existing inability to effectively administer incoming enforcement proceedings”<sup>11</sup>.

Thus, digitalization of enforcement proceedings helps to optimize many processes and simplifies the exercise of the claimant's right to timely and complete execution of the enforcement document.

At the same time, a certain risk arises when implementing access to justice in the digital economy, since the constitutional right to judicial protection contains the right to sue, the right to correct a miscarriage of justice and the right to enforce a decision. With the introduction of electronic document management and elements of electronic justice, it is necessary to develop legal instruments that will help reduce the influence of the technical and organizational side, which in turn is always probable and it is impossible to completely eliminate its errors.

The introduction of any digital innovations must be comprehensive and in order for them to work in the long term, it is necessary not only to introduce digital technologies in all areas, but to correctly create conditions for their use and adaptation, if the need arises.

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<sup>11</sup> Gureev V. A. Certain aspects of digitalization of domestic enforcement proceedings // *Laws of Russia: experience, analysis, practice.* – 2021. No. 12. URL: <https://bik.sfu-kras.ru/elib/view?id=edselr-edselr.47299371&service=eds> (access date: 12/25/2023).

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愛國主義和公民範式下的青少年軍事愛國主義教育  
**MILITARY-PATRIOTIC EDUCATION OF YOUTH IN THE  
PARADIGM OF PATRIOTISM AND CITIZENSHIP**

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註解。 本文探討了俄羅斯透過在愛國主義和公民範式的範式下在高等教育機構中應用軍事愛國主義教育實踐來實施現代教育進程的一些特徵。

關鍵字：愛國、公民、教養、教育、人格文化、精神道德價值、價值意義。

**Annotation.** *The article considers some features of the implementation of the modern educational process in Russia through the application of military-patriotic education practices in educational institutions of higher education in the paradigm of patriotism and citizenship.*

**Keywords:** *patriotism, citizenship, upbringing, education, personality culture, spiritual and moral values, value meanings.*

Issues of raising children and youth do not lose relevance at all times, in any era. Upbringing, like education, fulfills a very important social mission, which is associated with the fate of each individual and, ultimately, with the fate of the entire society as a whole, since it is designed to solve problems of a global scale in the comprehensive preparation of children, our young generation, for independence, for gaining opportunities for self-realization, to their formation as full citizens. Domestic teacher-researchers note that achieving these goals is possible exclusively through the formation of a holistic worldview of the younger generation, for which the concept of “patriotism” will not be an abstract term, but will become an integral characteristic, way of life and criterion of behavior, which

will be based on knowledge, understanding, respect and active commitment to the spiritual values of our people, originally formed in the Russian tradition, where moral dominants determine the essence of all processes occurring in society and the state, at all levels, regarding each person and citizen. The richness of traditions of our multinational people, unique, unique multiculturalism, pride in the achievements of domestic science, Russian culture and art, knowledge of the culture of the peoples of the world should become the unshakable foundation on which the socially significant activity of our youth, their creative enthusiasm, desire to create, and tirelessly improve will develop. their small Motherland and our great Fatherland, show a desire for self-development and constant self-improvement, a sense of justice and respect for the law will be formed, a sense of justice and legal culture will be instilled, strict adherence to the norms of morality and ethics, love for the nature of the native land [14].

In the study “Civil-patriotic model of youth education in modern Russia”, a team of authors, analyzing the current situation in world geopolitics, notes that at the moment in Russia colossal work is underway to search for the ideological component of the civil-patriotic education of our young generation. The reason for this search was, as scientists note, factors associated with domestic and foreign political events in Ukraine, where, starting in 2014, Nazism not only revived after the horrors of fascism in the first half of the twentieth century (the period of the Second World War and the Great Patriotic War), but and in fact became the ideological basis of the current Ukrainian state. It is impossible to be outside observers of the impending catastrophe of the spread of fascism; opposition to Nazism and fascism must be carried out exclusively through persistent, active and firm strengthening of the idea of citizenship, which is the cornerstone of true patriotism in our country, in the Russian state [11].

Many modern researchers who study the processes of formation of the worldview of young people note that today the determination of the meaning of life of young people and their social orientation are increasingly influenced by innovative processes spreading in the culture of the 3rd millennium; thoughts are increasingly expressed about the need to create a fundamentally new paradigm focused for the emergence of a fundamentally new, humane and responsible, thinking not in narrow personal terms, but in social categories and scales, oriented towards the civilizational realities of the 21st century. This is exactly what is discussed in the studies of Arustamov E.A., Leonov V.V., Shabanova M.V., Leonov I.V., Koksharov M.V. and others, who write that modern education and upbringing are becoming the most powerful state strategic resource, with the help of which the sovereignty, freedom of our Motherland, and the security of Russia are actually guaranteed. It is education, its high quality level, that ensures the achievement of the most important indicators of efficiency and effectiveness of reforms that are

being implemented in modern Russian society, and is present in people's minds as an absolute value, as a moral, individually and socially significant imperative. It should be emphasized that it is education, its harmoniously built system, which combines the traditional humanity of education and innovative approaches to learning, that makes it possible to solve a set of problems not aimed at improving the quality of the country's main strategic resource – human capital. Improved and updated taking into account modern requirements of society, the specifics of the modern Russian educational space are focused on identifying the key conditions for educating young people in the spirit of patriotism and active, engaged citizenship, and young people gaining valuable experience in activities focused on the benefit of society. At the same time, the concept of “patriotism” moves from the category of goals into the category of the most important social value, on which, as on the strongest and most reliable foundation, as on an unshakable basis, the spiritual and moral unity of Russia is built [12]. It is this approach to the interpretation of the understanding of patriotism that explains the priority of one of the key tasks in the sphere of higher education in Russia at the current moment, which is to recognize the priority of the formation of the spiritual and moral basis of the process of upbringing and education. Providing the widest opportunities for the successful process of self-realization of youth, continuous spiritual self-improvement of the individual comes to the fore and becomes the most important factor in updating the Russian higher education system [22].

The legal impetus for intensifying civil and military-patriotic education in the Russian education system was received after the adoption of amendments to the Constitution of Russia on July 1, 2020 (Article 71 of the Constitution of the Russian Federation, which regulates aspects entirely within the jurisdiction of the federal government, received a qualitatively important addition in the form of a norm, reflecting the fixation of unified legal approaches to the unification of the system of upbringing and education in Russia, which is meaningfully reflected in the innovation introduced by Article 67.1 of the Constitution of the Russian Federation: «Children are the most important priority of the state policy of Russia. The state creates conditions conducive to comprehensive spiritual, moral, intellectual and physical development of children, instilling in them patriotism, citizenship and respect for elders” [1]), for the practical implementation of which the Federal Law “On Education in the Russian Federation” was supplemented on July 31, 2020 by Art. 12.1, which established the norm about the special role of upbringing in the educational process and the inseparability of the processes of teaching and upbringing [24].

Researchers S.A. Glotov and Skvortsov I.P. claim: “Patriotism is not produced automatically, but requires constant systematic work of all social institutions” [20]. These issues are discussed at all government levels, including at the highest

– as stated by the President of Russia V.V. Putin’s Address to the Federal Assembly, with which he addressed the highest representative body of power of Russia on February 21, 2023, and in Decree of the President of the Russian Federation of November 9, 2022 No. 809. It approved the Fundamentals of State Policy for the preservation and strengthening of traditional Russian spiritual- moral values [5], where it is noted that traditional values include not only life, dignity, human rights and freedoms, citizenship, family protection, but also patriotism, service to the Fatherland and responsibility for its fate.

The Concept of Patriotic Education of Citizens of the Russian Federation, which is one of the most important legal acts regulating the corresponding area of educational activity in modern Russia, notes that “the main goal of the Concept is to determine the place and role of educating patriotism among Russian citizens as the most important area of activity of society and the state.” [8]. In the aforementioned, without exaggeration, one of the fundamental documents regulating the activities of educational organizations for the upbringing of children and youth, special emphasis is placed on the fact that patriotic education, being an integral part of the general educational process, is a systematic and purposeful activity of government bodies and public organizations for the formation in citizens of a high patriotic consciousness, a sense of loyalty to their Fatherland, readiness to fulfill civic duty and constitutional duties to protect the interests of the Motherland [24].

At the same time, attention is focused on the most important component of patriotic education - military-patriotic education, which is aimed, first of all, at the formation of unconditional readiness to perform military service as a specific, special type of public service.

Today, in the most difficult situation for us Russians, when the fight against elements openly hostile to Russia, especially international terrorism and its accomplices, has reached its maximum aggravation, everything related to the patriotic education of our citizens must be dictated and determined, first turn, our national interests, the priorities of the Russian state, and fully contribute to ensuring the most active participation of our citizens in comprehensively ensuring the security of our state from continuously emerging external and internal threats.

The categories of efficiency and effectiveness of educating a citizen and a patriot, the essence of the spiritual foundations of patriotism as the foundation and most important condition for the very existence of the state and society were at one time studied by many Russian thinkers, public figures, writers and philosophers. Nikolai Aleksandrovich Berdyaev has an interpretation of patriotism as a certain phenomenon, presented from a philosophical and pedagogical position, through the prism of which he evaluates patriotism as a dominant basis in the process of formation and development of both an individual person and the entire people of Russia: “All our political achievements are in direct dependence on the degree of

our patriotic inspiration, on the growth of responsible national consciousness in Russian society and people. Patriotism is a great school of citizenship in a time of danger for the Motherland. Russia's maturity for world life and global role will be directly proportional to the conscious civic patriotism it displays" [21]. The above words, voiced more than a hundred years ago, do not lose their relevance now, when the fascist enemies of Russia are constantly striving to cause serious damage not only to the territorial integrity of our state, but also to its security in spiritual and moral terms, as a result of which Russia is currently in a state of extremely aggravated civilizational confrontation with the collective West and requires the mobilization of all available physical resources and the moral spirit of Russians, based on the high spirituality and moral purity of our people.

Summarizing the analysis of the theoretical aspects and practical features of the formation of patriotism among young people in modern sociocultural conditions, S.A. Glotov. and Skvortsov I.P. consider it necessary to note that it is the growing dialectical contradictions between the processes of globalization growing in the world and the desire of modern Russia to preserve sovereignty, national and cultural identity that have made the problem of patriotism central: "Patriotism, national and cultural identity are extremely important for the formation of Russian statehood, political culture and political consciousness, for the educational process in educational institutions of various levels» [20].

Tsibulnikova V.E. concludes that it is citizenship and patriotism as the key system-forming values of modern society that are determined by the internal position of the individual, his system of priorities and the value-semantic sphere, in which the attitude towards the Fatherland as the highest value is expressed in direct service to it, in a sense of true patriotism, in caring, reverent preservation of historical memory, passing it on through the centuries to new and new generations [23].

Practical aspects of the formation of patriotism and citizenship among young people in educational organizations of higher education are most effectively implemented through the use of military-patriotic education practices, implemented not only within the framework of the implementation of activities provided for by educational programs and educational calendar plans, but also by specially created organizational ones in educational institutions of higher education structures and departments whose priority goal is to form and develop in students the best qualities of a citizen and patriot, the ability to take an active part in the continuous process of creation, to actively act towards the comprehensive strengthening of Russian society and the state. Such units are designed to purposefully instill in students the desire and readiness to confidently and successfully perform specific functions directly related to ensuring the sovereignty of the state, the national and military security of the country in all areas of activity, and to provide every possible assistance in the formation of moral, psychological and physical readiness

for military service in the ranks of the Armed Forces of the Russian Federation. A clear example of such a structure is the first specialized faculty created in Russia, currently the only one in the country - the Faculty of Integrated Security and Fundamentals of Military Training of the Russian State Social University. RIA Novosti, in a message dated July 5, 2023, notes: “RSSU became the first civilian university in the country to create a faculty that has no analogues, accumulating modern knowledge on the security of society and the state. The faculty united the Center for Military-Patriotic Education and four departments:

- national security, countering extremism and terrorism;
- basics of military training;
- comprehensive security assurance of the organization;
- anti-corruption activities and public counteraction.”

In accordance with the Regulations on the Center for Military-Patriotic Education, its key tasks include:

- systematic pedagogical activity to implement education among students as a way of developing patriotism, citizenship, a special sense of pride in the achievements of their great Motherland, instilling sincere love for its culture and traditions, for nature and native land, respect for human rights and freedoms, for family and traditional family values, the formation of a positive attitude towards creative work, hard work, preparing students to fulfill the honorable duty of a citizen of Russia - service in the ranks of the valiant Armed Forces of our state, the acquisition by students of a modern level of knowledge in the field of military-patriotic education;

- participation, together with district military commissariats, in the implementation of organizational activities for conducting training camps stipulated by the Federal State Educational Standards with students who are studying the basics of military training, participation in the organization of sporting events at various levels, including passing the standards of the All-Russian Physical Culture and Sports Complex “ Ready for work and defense” (RWD-»GTO»), with the aim of obtaining specific skills and relevant knowledge aimed at practical preparation of students for military service.

In the process of implementing the identified goals and assigned tasks, the Center for Military-Patriotic Education of the RSSU has organized meaningful interaction with a number of structures and organizations that are subjects of military-patriotic education in Moscow and the Moscow Oblast, in particular, with the All-Russian children’s and youth military-patriotic social movement «Yunarmiya», RAAFNVS of Moscow , military commissariats of Moscow and the Moscow region, cadet corps of Moscow, military educational scientific centers of the Ministry of Defense of the Russian Federation, educational institutions of all levels of education, youth public organizations of Moscow and the Moscow region, public,

veteran and religious associations, museums and exhibition complexes, library and educational organizations and other subjects of military-patriotic education of youth and students, which is presented clearly below.



**Figure.** Main areas of interaction  
Center for Military Patriotic Education  
Faculty of Integrated Security and Fundamentals of Military Training RSSU

It is important to note that today, at all levels of government without exception, the fact of the need to develop and formulate common approaches not only to the implementation, but also to the steady all-round development of the process of civil and military-patriotic education is recognized. Thus, in one of the speeches of the Deputy Chairman of the Government of the Russian Federation, Plenipotentiary Representative of the President of the Russian Federation in the Far Eastern Federal District

Yu.P. Trutnev gave a capacious objective assessment of the special importance of civic-patriotic education in the current extremely difficult geopolitical situation: “Patriotism is very important. If we do not educate patriotism, this niche is occupied by our enemies; they simply agitate against Russia” [21].

Patriotism in general, including its spiritual, moral and civil component, as well as the military-patriotic direction of education at the Russian State Social

University is given special importance and is given a particularly significant role, as is clearly evidenced by the fact that all activities at the RSSU associated with various aspects of military-patriotic education, is organized and purposeful in nature, and at the moment is entirely concentrated around a significant memorable date for all our people, a key milestone in the history of our Motherland - the approaching globally significant glorious anniversary - the 80th anniversary of our Great Victory in the Great Patriotic War, as well as in systematically carried out planned coverage and solemn reading of all significant events associated with the heroic-patriotic component of the history of our state and multinational Russian society.

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歷史心理學方法在衛國戰爭期間疏散過程研究中應用的相關性  
**THE RELEVANCE OF THE APPLICATION OF METHODS OF  
HISTORICAL PSYCHOLOGY IN THE STUDY OF EVACUATION  
PROCESSES DURING THE GREAT PATRIOTIC WAR**

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註解。 所提出主題的相關性在於，作者是最早嘗試從社會史和歷史心理學的角度來考慮伏爾加河地區疏散過程的人之一。 歷史學家在研究蘇聯其他地區（烏拉爾、西伯利亞）衛國戰爭期間發生的移民過程時積極使用這種方法。

結論是，難民的心理狀態在一個人在新居住地的社會適應過程中發揮著重要作用。 正是由於缺乏心理幫助和支持，一些疏散人口拒絕接受新的生活條件，阻礙了工作活動的開展，也導致了與當地居民發生衝突局勢。

這項研究的現實意義在於，研究和利用蘇聯疏散人口的經驗將有助於規劃當今時期的疏散措施，例如在軍事緊急情況或其他緊急情況下。

關鍵字： 衛國戰爭； 疏散； 難民； 伏爾加河地區； 歷史心理學； 社會適應； 後部。

***Annotation.** The relevance of the presented topic lies in the fact that the author is one of the first to attempt to consider the evacuation process in the Volga region from the perspective of social history and historical psychology. This approach is actively used by historians when studying migration processes that took place during the Great Patriotic War in other regions of the USSR (Ural, Siberia).*

*It is concluded that the psychological state of the refugee played a significant role in the process of social adaptation of a person in a new place of residence. It was the lack of psychological help and support that caused rejection among some of the evacuated population of their new living conditions, prevented the establishment of work activity, and also contributed to the emergence of conflict situations with the local population.*

*The practical significance of the study lies in the fact that the study and use of Soviet experience in evacuating the population will help in planning evacuation measures in today's time, for example, in the context of a military emergency or other emergency situations.*

***Keywords:** The Great Patriotic War; evacuation; refugees; The Volga region; historical psychology; social adaptation; rear.*

During the difficult years of the Great Patriotic War, millions of citizens of the USSR were forced to evacuate from their homes, villages, towns and cities to safer regions of the country. Evacuation of the population is a complex and responsible process, the result of which depends on proper organization and planning. It is especially important to take into account the individual needs and characteristics of each evacuee, regardless of his age and health.

There is no doubt that the evacuation, as well as the difficulties and problems generated by this process, became an additional psychological test for millions of Soviet people. Indeed, Soviet citizens had no idea where they were being taken, how long the evacuation would last, or what awaited them deep in the rear.

One of the regions receiving the evacuated population were the republics and regions of the Volga region - the Gorky region and the Chuvash Autonomous Soviet Socialist Republic,

Trains with refugees began arriving in June 1941. According to the decision of the Council of People's Commissars of the USSR dated July 5, 1941, "On the procedure for evacuation of the population in wartime," a network of evacuation points of 1st and 2nd classes was deployed in the cities of the region and at junction railway stations, as well as at piers, to receive refugees. Taking into account the specifics of the regions, the evacuated population in the Gorky region was located mainly in cities and regional centers, and in Chuvashia - in rural areas<sup>1</sup>.

Here are a few figures that show the rapid dynamics of the arrival of refugees in the regions and republics of the Volga region. From June 28 to July 25, 100,000 people passed through the evacuation point in Gorky alone, of which 80,000 people were in transit and sent to other regions. By September 7, 1941, 135,875 people arrived in the Gorky region, by May 1, 1942 - 143,831 people. On December 1, 1942, there were 185,885 refugees.<sup>2</sup>

As of April 1, 1942, 70,715 refugees were settled in the cities and regions of the Chuvash Autonomous Soviet Socialist Republic. Characterizing the gender and age composition of the evacuees, it should be noted that there is a large proportion of children - 30,960 people (under 15 years old) and women - 30,896 people<sup>3</sup>.

Most of the evacuees were from the RSFSR, Ukrainian and Belarusian SSR. In addition to them, there were also people from other union republics and regions of the USSR. A special group includes citizens of foreign countries, as well as citizens of the Lithuanian, Latvian and Estonian SSRs, who relatively recently

<sup>1</sup> Fedotov V.V. Evacuated population in the Gorky region (1941-1945). //Manuscript.2019. No. 6. P. 76-80

<sup>2</sup> State government institution of the State Socio-Political Archive of the Nizhny Novgorod Region (GKU "GOPANO"). F.3. Op. 1. D. 2411, L. 19

<sup>3</sup> Budgetary institution State Historical Archive of the Chuvash Republic (BU GIACHR). F.-203. Op. 26. D. 32. L. 8

became part of the USSR. The history of this group of citizens being evacuated could become a separate topic of research.

The Gorky region and the Chuvash Autonomous Soviet Socialist Republic received 86 orphanages and boarding schools during the war years. By 1943, over 80 thousand children under the age of 14 were accommodated here. Thus, the figures show that half of the evacuated population were children - the least socially protected group of the population.

Refugees were brought to the region in two different organizational ways: planned (organized) and emergency (unorganized) evacuation. Planned evacuation was carried out with the aim of preparing the population and organizations for possible emergency situations, and emergency evacuation was carried out under unforeseen circumstances, most often caused by a sharp change in the situation at the front, when it is necessary to respond to an ongoing event as quickly and effectively as possible. As a rule, most of the evacuated population arrived as a planned evacuation, these included workers and management personnel who moved to the rear along with their enterprises and organizations, children's institutions with their pupils, government and party employees and members of their families, representatives of the intelligentsia, scientists and education.

It is necessary to understand that a person who was evacuated often did not have the opportunity to decide to stay at home or evacuate. Enterprise workers were obliged to relocate to the East along with their production. Citizens who evaded could be brought to legal liability, including criminal liability.

The cities predominantly housed labor collectives of evacuated industrial enterprises and employees of various departments. About 60 thousand people were stationed in the cities of the Gorky region, together with enterprises - 9575; in rural areas – 113,211<sup>4</sup>.

This approach to the placement of evacuees led to the fact that a significant part of the refugees - women with children, as well as elderly people - were located in villages and hamlets. Documents show that this decision had a negative impact on the level of social security of evacuated citizens. Firstly, life in rural areas was many times more difficult than in the city, and secondly, the distance from cities became one of the reasons that did not allow the authorities to quickly and immediately respond to conflict situations that arose.

Statistical data, as well as letters and memoirs of eyewitnesses of those events, allow the researcher to identify a complex of material and everyday difficulties and psychological problems that arose among refugees during their stay in evacuation, as well as ways to resolve them.

The first issue on the agenda was the issue of accommodating refugees and finding the necessary living space. Archival materials indicate that the main

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<sup>4</sup> State government institution Central Archive of the Nizhny Novgorod Region (GKU "TsANO"). F. R – 5344. Op. 1.D.59. L. 2

method of accommodating refugees was moving evacuated citizens into public and private housing stock, which was popularly called “densification.” Living in such an environment was extremely difficult. Overcrowding and lack of basic hygiene items created conditions for the emergence of infectious diseases. Often, homeowners resisted and opposed such a neighborhood. Facts and evidence of such events will be given below. The premises of schools and kindergartens were partially converted into housing for evacuees; warehouses and other types of non-residential premises, as well as buildings of social and cultural institutions, were converted. Nevertheless, the issue of housing remained relevant until the re-evacuation of the population began and resolved itself as the refugees returned to their previous place of residence.

The task of employing evacuees became no less important, since its solution made it possible to improve the material and financial situation of the evacuees. In July 1941, a decree “On work with evacuees” was adopted. The local party and Soviet authorities, the Government of the USSR and the Central Committee of the All-Union Communist Party of Bolsheviks set the task of providing all able-bodied evacuated citizens with work in enterprises, organizations, institutions and collective farms of the region within a week. Of course, it was impossible to implement this resolution in such a short period of time, but this once again proves that employment issues have always been under the control of government agencies.

By the end of 1942, in the Gorky region, out of the total number of evacuees (178,859), 75,717 people were able to work, of which 51,512 people were employed. The bulk of the evacuees worked on collective and state farms - 23,948 people, in enterprises - 18,941 people, in institutions - 8,263 people<sup>5</sup>.

The fastest solution was to find employment for refugees who arrived in the region along with evacuated enterprises and institutions. Their work began as production capacity was deployed in a new location. Citizens located in rural areas were employed on collective farms.

How effective were the measures taken? As we can see, on average in the region and throughout the country as a whole, 80-90 percent of refugees were employed. The reason that not all citizens were provided with work, according to the author, lies in the following: firstly, difficulties arose with refugees who arrived individually, pensioners, disabled people, housewives and citizens who did not have specialties and were located in the village; secondly, the lack of places in kindergartens and nurseries made it difficult for women to find employment; thirdly, the lack of warm clothing made it impossible to work in winter; fourthly, the lack of competence of local leaders at various levels, who, when accommodating refugees, did not take into account the availability of labor vacancies in the regions of the region and the republic.

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<sup>5</sup> State government institution Central Archive of the Nizhny Novgorod Region (GKU “TsANO”). F. R – 5344. Op. I.D.2883. L. 133

This led to the fact that citizens with higher technical education, engineers, teachers, were sent to rural areas, where such education and professions were, in principle, not in demand. Or the other extreme, when women were placed in villages that were not suitable for heavy physical labor and for this reason could not work on collective farms, although there was a need for labor there. “Evacuated MSU workers Associate Professor N.V. Kalyanov, his wife, a biologist, and others had an appointment in Kazan, but were sent with a train to the Charnukhinsky district, where they perform physical work on the collective farm and therefore express dissatisfaction with this.”<sup>6</sup>.

According to the author, in order to reconstruct a complete picture of the history of the evacuation of the population, it is relevant to use the methods of historical psychology (the method of historical reconstruction, source analysis, genetic), which will allow us to more deeply study the emotional state of a person who survived a sudden evacuation, which could take place under German air raids, moving thousands of kilometers deep behind the lines and placing in an unfamiliar area.

The author agrees with the opinion of the Russian historian M.N. Potemkina that the psychological and emotional state of a person during evacuation can be characterized as post-traumatic stress disorder, which is a severe mental condition with characteristic symptoms: irritability, anxiety, alienation, constant mistrust, increased conflict, fear.

The inconsistency of the situation lies in the fact that, on the one hand, the person understood that evacuation is salvation, it is a chance to survive for him and his family, and on the other hand, it poses a lot of new questions and complex problems for him, where to live, where to look for work, how to provide for your family, etc.

Let's not discount the property issue either. When evacuating, citizens were forced to leave their homes and acquired property, because the size of luggage that a refugee could take with them was strictly regulated (no more than 50 kg).

The process of moving itself was accompanied by the most difficult trials. Often, in the chaos of evacuation, people lost their children and families were separated. There were frequent cases when trains with refugees in the front line were bombed by fascist aircraft. Overcrowding of carriages, shortage and sometimes lack of food, poor sanitation contributed to the occurrence of diseases and became the causes of death of evacuees both along the route and at evacuation points. Undoubtedly, stress and morale of refugees can also be attributed to mortality factors.

The evacuated population, in its overwhelming majority, had a much harder time in material, every day and psychological terms than the indigenous popu-

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<sup>6</sup> State socio-political archive of the Nizhny Novgorod region (GOPANO). F. 3. Op. 1.D. 2411. L. 25

lation. A long stay in difficult material and living conditions, lack of work and communication with family and friends, and the callousness of officials affected both a person's physical health and his behavior. Unfortunately, a certain part of the evacuees saw only one way out of this situation - suicide and examples of this condition can also be traced through the letters and memoirs of refugees.

In addition, such a depressive state could become one of the causes of conflict situations that arose in the process of communication, life and work with the local population. But the local population often saw evacuees as citizens - people who want to take away their piece of bread, housing, work, and limit social rights already curtailed by the war. "In the village of Sosnovaya, evacuated Grichukhina, the family of a serviceman, lives with the owners who are trying to kick her out, turned to the chairman of the village council, he not only did not help her, but also called her "Hitlerites"; "there was a case of beating of the evacuated citizen Amelina in the village of Izhekei. The secretary of the village council persuaded the teenagers and when she left the meeting, the teenagers threw logs and stones at them."<sup>7</sup>

Contacting the authorities to protect your rights did not always give the desired result. According to sources, they were not always provided with any assistance; many leaders turned a blind eye to the requests of refugees. Excerpt from an archival document: "In the Factory Village Council, citizen Shikhmatova beat evacuated citizen Kuprina L.V., who lived in Shikhmatova's house. An employment inspector for the evacuated population drew up a report against her and submitted it to the prosecutor's office of the Cheboksary district. When checking the progress of this case, it turned out that all this material was lying with the prosecutor, no action was taken on it only because there was no written statement from the victim."<sup>8</sup> This blatant case of inaction became the subject of consideration by the Council of People's Commissars of the Chuvash Autonomous Soviet Socialist Republic. In the same village council, other cases of rude treatment of refugees were revealed. The above facts became the subject of investigation by the NKVD of the USSR, which once again proves the argument that issues of social adaptation of evacuated citizens are always under the control of the state.

An important source for studying this issue is the letters and memoirs of refugees. They provide an opportunity to understand how refugees lived, what they thought, and their psychological and emotional state. Let me quote a number of letters from evacuated Moscow residents, from which the "secret" stamp was removed. Here are excerpts from Lydia Rovenko's letter to her husband, a colonel of the Red Army: "I curse the day and hour that pushed me into this abyss - Chu-

<sup>7</sup> Budgetary institution State Historical Archive of the Chuvash Republic (BU GIACHR). F.-203. Op. 26. D. 7. L. 25

<sup>8</sup> Budgetary institution State Historical Archive of the Chuvash Republic (BU GIACHR). F.-203. Op. 26. D. 32. L. 14

vashia, the kingdom of savages and animals - I feel that I will die here if I don't manage to leave soon. I beg you, find an opportunity to tear me out of this damned, ill-fated Chuvashia" (the author's spelling has been preserved), a letter from citizen Deniskina, who lives in the village of N.-Kubasy, Sundyr district of the Czech Autonomous Soviet Socialist Republic: "We live very poorly, everything is expensive. We want to get to the Russians, but the Chuvash hate us. We don't know how to live further. If we live here, we will die of hunger" (author's spelling preserved)<sup>9</sup>. Truly, a letter full of despair from evacuated Moiseeva, stationed in the city of Alatyř; "You can only get a job as a cleaner; is it possible to stay here for life? No, it's better to go to the Sura (a tributary of the Volga), it's definitely better not to smoke the sky..." (author's spelling preserved)<sup>10</sup>.

Let us not go to extremes, arguing that such cases and sentiments were widespread among refugees, but at the same time they were not isolated.

Such a nervous situation gave rise to a desire to return home as soon as possible. When the re-evacuation of the population began, thousands of refugees were ready to return to their homeland at their own expense and in violation of numerous regulations and prohibitions.

So, we see that, in contrast to the solution of material, social and everyday problems, issues of the psychological state of evacuated citizens did not become the subject of close attention from the authorities. At the same time, there were also cases of false appeals from evacuated citizens, when the life situation was presented in a negative light for the purpose of leaving the region. The study of archival documents, letters and memories of refugees once again convinces that social adaptation in a new place directly depended on a person's psychological well-being.

What helped people survive and overcome this ordeal? According to the author, several circumstances can be highlighted here: firstly, the war united the people for the sake of saving the Fatherland, people stopped paying attention to their own problems and difficulties, and some, having lost their relatives and friends at the front, shared their last piece of bread with the evacuated as a child, thereby trying to smooth out the pain of his losses.

Secondly, successes at the front and faith in victory served as a stimulus and inspired people, making them forget about their difficulties and adversities.

Thirdly, throughout the war, state and party authorities tried to keep under control the issues of providing material and psychological assistance to refugees, paying great attention to ideological work, emphasizing the collectivism of the Soviet people.

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<sup>9</sup> Budgetary institution State Historical Archive of the Chuvash Republic (BU GIACHR). F.-203. Op. 11. D. 67. L.L 9-10

<sup>10</sup> Ibid.LL.11-12

Further study of the topic of evacuation of the population using methods of historical psychology will allow us to fully restore the heroic and sometimes tragic picture of the stay of evacuated citizens on the Volga land, to understand and comprehend the price that our people paid for the Victory.

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巴什科爾托斯坦共和國體育教育與體育部門負責人人物 (1923–2023) (紀念巴什科爾托斯坦共和國體育部成立100週年)

**PERSONALITIES OF THE HEADS OF PHYSICAL EDUCATION AND SPORTS DEPARTMENT OF BASHKORTOSTAN (1923-2023) (TO MARK THE 100<sup>TH</sup> ANNIVERSARY OF THE MINISTRY OF SPORTS OF THE REPUBLIC OF BASHKORTOSTAN)**

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抽象的。本文考察了在共和國 100 年歷史中擔任過體育教育和體育部門負責人並為巴什科爾托斯坦體育教育和體育運動的發展做出貢獻的個人。

關鍵字: 巴什科爾托斯坦共和國體育部、體育、體育、委員會主席、部長。

**Abstract.** *The article examines individuals who have held the position of head of the republic's physical education and sports department over its 100-year history and who have contributed to the development of physical education and sports in Bashkortostan.*

**Keywords:** *Ministry of Sports of the Republic of Bashkortostan, physical culture, sports, committee chairman, minister.*

July 17, 2023 is the centenary of the publication of the Resolution of the Presidium of the Bashkir Central Executive Committee on the creation of the Supreme Council of Physical Culture and Sports of the *Bashkir Autonomous Soviet Socialist Republic*. Currently, the legal successor of the body of physical culture and sports of the region is called the *Ministry of Sports of the Republic of Bashkortostan*.

A huge role, to a greater or lesser extent, in the development of the industry belonged to the heads of the department supervising physical culture and sports of one of the most numerous and economically developed subjects of the RSFSR, and later the Russian Federation.

To understand and appreciate the contribution of each individual to the formation and development of physical education and sports in the republic, it is necessary to plunge into the history of the country and the republic.

Based on archival documents, literary sources, and the memories of contemporaries, it is possible to determine where the first steps of republican sports began.

In his book “Unforgettable Starts,” one of the organizers and managers of republican sports, I. E. Dizenko, wrote: “I realized that I shouldn’t be surprised when I read an article by a correspondent for the magazine “To Sports,” who, having visited Bashkiria in 1912 year, I decided to share my impressions. “It’s amazing,” he wrote, “that when the world returned to the Olympic ideas, in this huge region they didn’t even hear anything about physical culture.”

Only some 11 years have passed, and physical culture and sports are becoming a matter of national importance in the republic.

On July 17, 1923, by decision of the All-Russian Central Executive Committee, by decree of the Presidium of the Bashkir Central Executive Committee, a republican organization was created, which was called the Supreme Council of Physical Culture (SCPC) under the Central Executive Committee of the Bashkir Autonomous Soviet Socialist Republic. The first chairman was Ali Osmanovich Teregulov.

Teregulov Ali Osmanovich was born in 1899 in the city of Belebey. Participant in the war with the White Poles, awarded the Order of the Red Banner and a personalized weapon. After the civil war, he taught Russian to Muslim children.

After working at the Supreme Council of Physical Culture, A. Teregulov worked in Moscow for five years at the People’s Commissariat for National Affairs, and later as a representative of Bashkiria in the All-Russian Central Executive Committee. During the Great Patriotic War, he was deputy commander of a medical unit. Awarded the Order of the Patriotic War, 1st degree, and six medals. In 1947, he was demobilized and moved to Ukraine, where he worked in the system of medical institutions and healthcare in senior positions. In recent years he worked as deputy director at the First Institute of Gerontology of the USSR Academy of Medical Sciences in Kyiv.

Unfortunately, little information has been preserved about some of the heads of the sports department who held this position.

In March 1935, by decision of the regional committee of the All-Union Communist Party (Bolsheviks), Ishmukhametov was relieved of his post as chairman of the All-Union Sports Council under the Bashkir Central Executive Committee. Kharis Kalmetyev was appointed Chairman of the Committee on Physical Education and Sports of the BASSR in 1936.

Kalmetyev Haris Salikhovich was born in 1897, in the village of Buzdyak, Belebeevsky district, Ufa province (now Buzdyaksky district of the Republic of Belarus). He graduated from the Buzdyak elementary public school. Member and chairman of the Bashklavl Court (1922-29). Secretary of the BashCEC apparatus, deputy chairman of the BashCEC 91929-1936).

The events of the late 1930s affected many athletes and sports workers in Bashkortostan. In 1937, Chairman Kh.S. was among those repressed. Kalmetyev. He was removed from work, arrested and shot on November 27, 1937, on charges of “espionage” (rehabilitated on May 21, 1956).

In 1938, Brunetkin was appointed chairman of the then-renamed body of the Committee on Physical Culture and Sports under the Council of Ministers of the Bashkir Autonomous Soviet Socialist Republic.

From 1941 to 1942 Experienced specialist Vladimir Vladimirovich Golub was appointed to the position of chairman. A native of Prague, a member of the “Sokol” Czech gymnastics society. He went through a difficult path from a participant in the First World War, a prisoner of war in Russia, to accepting Russian citizenship and serving for the benefit of his newfound Motherland. After the Civil War, he headed the Vsevobuch center (the main department of general military training and the formation of reserve units of the Red Army) in the Ufa province. Vsevobuch was mainly concerned with military and general physical training.

Before the Great Patriotic War (from 1939 to 1941), the leadership of physical culture and sports work in the republic was entrusted to Dmitry Sergeevich Borisov, who volunteered to go to the front at the beginning of the war. After the end of the war, Dmitry Borisov returned to his position as chairman and worked there from 1946 to 1951.

During the war years from 1942 to 1946. The republican sports committee was headed by D.S. Kruglov.

Information about the head of the republican sports committee from 1946 to 1952 is absent.

From 1952 to 1953 the post of chairman was held by N.K. Rozanov.

From 1953 to 1957, the chairman of the Committee on Physical Education and Sports under the Council of Ministers of the BASSR was Khusain Aglyulevich Fatkullin. Born on November 21, 1926 in the city of Kustanai, Kazakh SSR.

Before working as chairman, he was closely associated with sports activities and healthcare.

He worked as a coach at the Ufa sports club named after. Gastello in weightlifting (1944-1949), head of the military-physical education department of the Chernikovskiy city committee of the Komsomol (1949-1950), chairman of the Chernikov city sports committee, Sterlitamak regional committee for physical education and sports (since 1951), deputy minister of health of the BASSR (since 1953).

During his work as chairman of the executive committee of the city Council of Workers’ Deputies of Salavat in 1963-1970. Kh. Fatkullin became one of the initiators of the all-Union campaign-competition of cities of health and sports.

Later, using his rich organizational experience in Salavat, Kh. Fatkullin began to introduce a system of scientifically based state planning of physical education and sports throughout the republic, and created public sports committees.

He was the first of the republic's sports workers to receive the academic degree of Candidate of Pedagogical Sciences. He was the first in Bashkortostan to be awarded the title "International Judge". Member of the Union of Journalists of the USSR. Awarded the Order of Friendship of Peoples (GDR, 1975), the medal "For Labor Valor".

Ivliev Anatoly Nikitich - headed the Bashkir Republican Sports Organization in 1957-1972.

Although not a specialist in the physical culture and sports field by training, thanks to his organizational skills he made a great contribution to the development of sports in the Bashkir Autonomous Soviet Socialist Republic. In a short period of time, A. Ivliev managed to improve the work of the coaching staff, new sports facilities were put into operation, results in mass sports increased, Bashkir sports became one of the leading sports in the RSFSR.

Tigin Yuri Nikolaevich headed the Committee on Physical Culture and Sports under the Council of Ministers of the Bashkir Autonomous Soviet Socialist Republic from 1972 to 1977. Yu. Tigin was a master of sports of the USSR in cross-country skiing.

From 1965 to 1971 he headed the Ufa city sports committee, then, as an instructor in the propaganda and agitation department of the Bashkir regional committee of the CPSU, he supervised the sports organizations of the republic. "Excellence in physical culture of the USSR." Agzamov Gulus Agzamovich headed the Committee on Physical Culture and Sports under the Council of Ministers of the Bashkir Autonomous Soviet Socialist Republic from 1977 to 1991.

He began his career as a physical education teacher.

He made a great contribution to the development of national and folk sports.

Honored Worker of Physical Culture of the Republic of Belarus, awarded the medals "For Valiant Labor in the Great Patriotic War of 1941-1945", "For Labor Valor", "For Labor Distinction", "Excellence in Physical Culture of the USSR".

In 1991, V.N. Samorodov became the Chairman of the State Committee of the Republic of Bashkortostan for Physical Culture and Sports. After the transformation of the State Sports Committee of the Republic of Belarus on October 12, 2002 into the Ministry of Physical Culture, Sports and Tourism of the Republic of Bashkortostan (Ministry of Sports of the Republic of Belarus), until 2009 he was a minister.

Samorodov Vladimir Nikolaevich - born on January 9, 1947 in the village of Kazadayevka, Sterlitamak region of the BASSR. He went through all stages of sports activity: athlete, coach, government functionary, head of a public organization. He was a member of the executive committees of the Russian Olympic and Paralympic Committees. He was honored Trainer of Russia. Chairman of the executive committee of the Council of Russians of Bashkortostan, deputy. Chairman

of the Assembly of Peoples and the Public Chamber of Bashkortostan. He was awarded the Orders of Friendship, Honor, and Salavat Yulaev. Badge of honor "For merits in the development of physical culture and sports", "For merits in the development of the Olympic movement in Russia". He was honored Worker of Physical Culture of the Russian Federation and the Republic of Bashkortostan.

On March 16, 2009, the Ministry of Physical Culture, Sports and Tourism of the Republic of Bashkortostan and the State Committee of the Republic of Bashkortostan for Youth Policy were reorganized by merging into the Ministry of Youth Policy, Sports and Tourism of the Republic of Bashkortostan.

A.N. Nikerin was appointed Minister of Youth Policy and Sports of the Republic of Bashkortostan.

Nikerin Alexander Pavlovich - born on June 30, 1961 in the Meleuzovsky district of the Republic of Bashkortostan. After graduating from the Sterlitamak Technical School of Physical Education, he worked as a teacher at the 8-year school of the Meleuzovsky Regional Educational Institution of the BASSR (1978-1979), then as a teacher at the Sterlitamak Technical School of Physical Education (1983-1984), as a teacher at the Department of Physical Education at the Bashkir State University (1984-1991). Chairman of the Committee on Physical Culture and Sports of the Administration of the Kirov District of Ufa (2001-2005), Ufa Urban District (2005-2009), Deputy Minister of Physical Culture, Sports and Tourism of the Republic of Belarus (2009) Minister of Youth Politics, sports and tourism of the Republic of Belarus worked from 2009 to 2012.

On February 10, 2012, A. I. Ivanyuta was appointed to the post of Minister of Youth Policy and Sports of the Republic of Bashkortostan by Decree of the President of Bashkortostan

**Ivanyuta Andrey Ivanovich** - born on August 2, 1966 in Ufa. Graduated from the Ufa Law Institute of the Ministry of Internal Affairs of the Russian Federation, the Bashkir Academy of Public Service and Administration under the President of the Republic of Bashkortostan. He worked in positions related to physical education, sports and tourism, director of the sports club "Vader" (Ufa), head of the tourism department of the RPO "Department of Sports Events of the Republic of Belarus". He was awarded medals "For Courage", "For Excellence in the Protection of Public Order", and departmental awards of the Ministry of Internal Affairs of the Russian Federation.

In October 2018, **Ruslan Tagirovich Khabibov** was appointed to the post of Minister of Youth Policy and Sports of Bashkortostan. Born on May 3, 1974 in Samara. Graduated from the Perm Military Aviation Technical School and the Bashkir State University.

Since 1999, he has worked in positions related to youth policy in Ufa, as director of a Ufa school, in the administration of the Kalininsky district of Ufa and the

administration of Ufa, and in the Ministry of Education of Bashkortostan. Since 2014, Deputy Minister of Youth Policy and Sports of the Republic of Bashkortostan.

Since 2021, after the reorganization of the Ministry of Youth Policy and Sports of Bashkiria, R. Khabibov has been holding the position of Minister of Sports of the republic.

Thus, each of the leaders made his personal contribution to the development of the republican physical education and sports movement.

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現代條件下社會夥伴關係有效性的主要因素  
**THE MAIN FACTORS OF THE EFFECTIVENESS OF SOCIAL  
PARTNERSHIP IN MODERN CONDITIONS**

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註解。 文章討論了社會和勞動關係問題。 今天，對勞動領域問題的監管，包括建立最有可能發生衝突的僱員與雇主關係，是根據《俄羅斯聯邦勞動法》進行的，該法規定了至少嚴格的立法規定。 機制和最大限度的契約機制，這在理論上是相當合理的。 然而，合約機制的有效性需要更大程度地發展勞動者的公民活動和雇主的社會責任。

關鍵字: 社會過程、合作、社會保護、互動議題、社會、政治制度。

**Annotation.** *The article discusses issues of social and labor relations. The regulation of problems in the sphere of labor, including building employee-employer relationships, which are among the most potentially conflicting, is carried out today on the basis of the Labor Code of the Russian Federation, which provides for a minimum of strict legislatively established mechanisms and a maximum of contractual mechanisms, which is theoretically quite justified. However, the effectiveness of contractual mechanisms requires a greater degree of development of civil activity of workers and social responsibility of employers.*

**Keywords:** *social processes, cooperation, social protection, problems of interaction, society, political system.*

Chapter 1 of the Constitution of the Russian Federation states: “The Russian Federation is a social state, the policy of which is aimed at creating conditions that ensure a decent life and free development of people.” The proclamation of Russia as a social state is an unconditional step forward in the development of Russian statehood.

The socio-political conditionality of the interaction between trade unions and government authorities in solving problems of social protection of workers is determined by theoretical and methodological positions that make it possible to comprehensively study the problems of interaction between trade unions and government bodies in solving problems of social protection of workers.

The activities of trade unions reveal the socio-political need and conditionality of interaction between trade unions and government bodies. This need is based on the most important objective principle of social development - the relationship between economic and social processes and, accordingly, economic and social policies. Effective management of social processes is always possible only with strict adherence to this principle, but there are stages in the life of society when it becomes paramount. This stage, of course, is the transition to market relations, accompanied by crisis phenomena in all major spheres of society. At this stage, the political aspect of the relationship between economic and social development sharply intensifies: it is this that largely determines the direction and nature of political relations and processes in society.

The main element of the political system of society is the state. Along with political parties, movements and organizations, the state is one of the actual political institutions that make up the totality of structural elements of the political system of society. A characteristic feature of the state is its organizational connection with politics, its determining role in the formation and implementation of economic and social policies.

The state acts as a central political institution that regulates all aspects of social life. Modern society cannot exist without government regulation, since an economy focused on creating market relations does not itself stimulate the emergence and development of values that are beyond market interests. These values include justice, social harmony, honesty, spirituality, etc., without which sustainable development of any society is impossible.

State policy in the field of regulation of social, labor and related economic and political relations involves solving the following main tasks:

- creation of conditions conducive to the emergence, development of independent activity and interaction of independent organizations of workers and employers, as well as individual and collective producers of goods;
- deployment of mechanisms of multilateral cooperation and social partnership with the participation of state and non-state organizations and associations, ensuring the conclusion of agreements between workers and employers, individual and collective producers at different levels;
- improving the legal framework of labor relations and social partnership.

No less important are other elements of the political system, among which trade unions occupy a definite place. Trade unions belong to non-political associations that make up the totality of structural elements of the political system of

society. Such associations arise and develop not due to directly political reasons, but due to social, economic and other similar reasons. Politics is never the direct goal of their creation and functioning. This is what distinguishes these associations from actual political organizations, the state, and political parties.

The political activity of trade unions does not form the basis of their functioning and in this sense is, if not secondary, then at least not the main one. However, this does not mean belittling the role and importance of trade unions in the structure of the political system of society, because in this case we are talking only about the absence of a dominant political aspect in their activities, and not about denying it as such in general. Trade unions, being the most massive and structured organization, are more capable of influencing the state of social stability than any political party or political social movement. It is trade unions, by virtue of their mission, that are called upon to actively influence the social policy of the state. State bodies in relations with employees and representatives of their interests - trade unions - act simultaneously both as an employer and directly as a state authority.

The relationship between the state and trade unions has a political aspect; the nature of these relationships largely determines the level of social tension in society, the development or, on the contrary, the prevention of social conflicts.

The political aspect of mutual relations between the state and trade unions is determined not simply by their interaction and cooperation, but by the influence of hired workers through the trade unions representing their interests on the social policy of the state. In this way, a kind of “control from below” is exercised over the political system and social policy pursued by the state.

The importance of the social partnership system is that the main parties to the agreement and regulation of social and labor relations - the state, employers and trade unions representing the interests of workers - act as equal partners. The most important characteristic feature of the interaction between trade unions and government bodies within the framework of the social partnership system, on the principles of social partnership, is that this interaction is carried out on an equal basis, that both the state and trade unions in this case have equal rights in the development, conclusion, implementation of relevant agreements, in responsibility for their implementation.

Today, the most important tool of trade union activity is the conclusion of collective agreements and agreements, within which employees and employers negotiate the terms of work, its remuneration, and social protection measures. However, many employers do not participate in associations and therefore evade the execution of industry and territorial agreements. Today, it is enough for them to send a substantiated refusal to the relevant authority. I consider it necessary to make changes to labor legislation, making the agreement mandatory for all enterprises of the industry or region, if it is signed by trade unions and employers

representing the majority of workers and the majority of enterprises in the region or industry.

The need for the establishment and development of social partnership is determined by the political situation in the country, the need for its development and stabilization. Strong tripartite agreement significantly reduces the likelihood that the promises of right-wing and left-wing extremists will be taken seriously by the general population.

The political aspect of the functioning of the social partnership system lies in its role as the foundation of social order in society; it contributes to the consolidation of all healthy forces in society to overcome socio-economic difficulties, maintain social and political stability, prevent social conflicts that inevitably acquire a political character and significance. Social partnership creates the foundation for the formation of civil society, in which various social groups form a stable social unity with different, often conflicting interests.

Achieving social partnership and implementing its principles in Russia is not just a desirable preferred option, but the only possible and reasonable way to resolve contradictions in the sphere of social and labor relations in the Russian Federation in a civilized manner! It is obvious that solving the problem of maintaining social stability is possible only if there is an effective system of social partnership.

The emerging system of social partnership in Russia is associated with fundamental changes in labor relations, with the creation of a new mechanism for concluding collective bargaining agreements and agreements, and the use of civilized procedures for resolving individual and collective labor disputes and conflicts. Hence, the problem of interaction between trade unions, employers and government bodies becomes extremely important. All parties involved in the social partnership system are today, to one degree or another, engaged in searching for a coordinated strategy of existence and interaction.

It is obvious that the key problem of the trade union movement in Russia at the present stage is strengthening the role of trade unions. Only strong Trade Unions can effectively resolve issues of protecting workers' rights. Systematic and consistent work is needed to strengthen Trade Unions both vertically and horizontally. At the same time, changes and additions to the Charters of Trade Unions and other regulatory documents are necessary.

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7.1~18歲急性腎衰竭晝夜節律指數  
**CIRCADIAN INDEX IN ACUTE RENAL FAILURE AT THE AGE OF  
7.1-18 YEARS OLD**

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抽象的。 在20名7.1-18歲的少尿期急性腎衰竭受試者中，發現CI指數下降至1個單位，顯示心臟功能明顯受損，由於不當的治療導致心臟自主神經去神經支配。神經系統對心肌收縮的調節。考慮到較小方向偏差的持續性，我們可以說兒童心肌收縮力降低，患者心肌發生不可逆的變化，發生CHF。在整個觀察過程中，發現2組心率晝夜節律中段持續增加，3組更明顯。心率晝夜節律末期最顯著轉變（倒轉）的持續時間（以天為單位）與疾病的嚴重程度相對應，第3組為12天。心率和DBP之間的直接相關性表明存在不利影響晝夜節律中位數指標DBP增加對心臟功能的影響很可能是血管痙攣持續傾向的特徵，即使在相對不受治療效果影響的第1組患者中也是如此。

關鍵字：晝夜節律指數，急性腎衰竭，兒童。

**Abstract.** *In 20 subjects with acute renal failure in the stage of oligoanuria at the age of 7.1-18 years, a decrease in the CI index to 1 unit was found, which indicated a significant impairment of cardiac function, autonomic denervation of the heart due to improper regulation of myocardial contractions by the autonomic nervous system. Taking into account the persistent nature of the deviation in a*

*smaller direction, we can say that the contractility of the myocardium in children was reduced and irreversible changes in the myocardium and CHF occurred in patients. A persistent increase in the mesor of the circadian rhythm of heart rate was found throughout the entire observation in 2 groups and more pronounced in 3 groups. The duration of the most pronounced shift in the acrophase of the circadian rhythm of heart rate (inversion) in days corresponded to the severity of the disease, amounting to 12 days in group 3. A direct correlation between heart rate and DBP indicated an unfavorable effect on cardiac function of an increase in the mesor indicator of the circadian rhythm DBP, which most likely characterizes a persistent tendency to vasospasm even in patients of group 1 who were relatively unaffected by the effectiveness of treatment.*

**Keywords:** *circadian index, acute renal failure, childhood.*

**Relevance.** Heart rate variability (HRV) is one of the body's adaptation mechanisms to changing external and internal factors and reflects the degree of tension of regulatory systems to any stressful impact. If CI is elevated, this is a sign of high sensitivity of the myocardium to sympathetic stimulation. In some cases, an enhanced circadian profile is the individual norm of a person accustomed to intense physical activity. A decrease in qi is an unfavorable sign indicating autonomic denervation of the heart. This means that the sympathetic and parasympathetic divisions of the ANS regulate myocardial contractions incorrectly. If the indicator persistently deviates downward, we can say that myocardial contractility has decreased, and the patient has developed irreversible changes in the myocardium and chronic heart failure (CHF). Therapy is based on: timely detection of CHF; individual selection of drugs for the correction of heart failure (cardiac glycosides, diuretics) and their dosage; prevention of acute disorders of tissue blood supply (myocardial infarction, stroke); blood pressure control; for patients with diabetes – maintaining stable blood sugar levels. Since changes in this indicator are most often associated with chronic diseases, unfortunately, it will not be possible to completely get rid of them. However, a properly selected course of treatment and regular doctor's examinations have a positive effect on the patient's quality of life. The circadian index, calculated from the results of Holter or blood pressure monitoring as the ratio of the average heart rate during wakefulness to the average nighttime heart rate, reflects the basic structure of the circadian heart rate rhythm. The CI value is within the range of 1.24 -1.44 USD. (M 1.32 + 0.06) is an indicator of the stable autonomic organization of the circadian rhythm of the heart. A decrease in CI less than 1.2 is observed in diseases associated with autonomic "denervation" of the heart and is associated with a poor prognosis and a high risk of sudden death in patients at risk. An increase in the circadian profile of the heart rate (increase in CI above 1.5) is associated with increased sensitivity of the

heart rate to sympathetic stimulation [1-6]. However, in the literature there is not enough information on the study of CI in the phase of oligoanuria in children aged 7.1-18 years.

**Goal of the work.** To study and evaluate the state of the circadian index, changes in the circadian rhythm of heart rate during the oligoanuria phase in children aged 7.1-18 years

**Material and research methods.** We studied hourly heart rate monitoring data in 20 children with acute renal failure who were admitted to the ICU of the Russian Research Center for Emergency Medicine in the anuric phase at the age of 7.1 to 18 years. Before admission to the clinic, all patients received anti-inflammatory therapy aimed at treating pneumonia, acute glomerulonephritis, acute intestinal infections, acute respiratory infections, and HUS. Due to severe progressive respiratory failure, patients received invasive mechanical respiratory support as indicated on the first day. All patients underwent hemodialysis, under the control of hemodynamics, acid-base balance, respiratory system, supportive, antibacterial, anti-inflammatory, syndromic corrective intensive therapy in accordance with existing recommendations in the literature. A favorable outcome with restoration of full functional activity of the kidneys and discharge from the hospital was observed in 13 children (groups 1 and 2), an unfavorable outcome – in 7 children (group 3). The first group consisted of patients who received intensive therapy in an ICU for up to 10 days (5 patients), the second group included children with a favorable outcome after intensive therapy for 12–45 days (8 patients), the third group included 7 patients with an unfavorable outcome. The data of the circadian index are presented, the correlation between the circadian rhythm of heart rate and other hemodynamic parameters is studied. The assessment of changes in the components of the circadian rhythm was carried out by obtaining mesor indicators - the average daily level of the studied indicator, the amplitude of circadian fluctuations, the range of daily fluctuations, indicators of acrophase and bathyphase of the circadian rhythm, the duration of the inversion of the circadian rhythm of the studied hemodynamic parameters. The research data were processed by the method of variation statistics using the Excel program by calculating arithmetic means (M) and errors of means (m). To assess the significance of differences between two values, the parametric Student's test (t) was used. The relationship between the dynamics of the studied indicators was determined by the method of paired correlations. The critical significance level was taken equal to 0.05.

**Results and its discussion.**

**Table 1.**

*Average circadian index in the oligoanuric phase at the age of 7.1-18 years*

Groups	Daily heart rate, beats. per minute	Night heart rate, beats per minute	CI, un.
1	83±2	81±1	1,0
2	103±1*	101±1*	1,0
3	120±1*	117±1*	1,0

\*- significant relative to the indicator of group 1

In all subjects, a decrease in the CI index to 1 unit was found, which indicated a significant impairment of cardiac function and autonomic denervation of the heart (Table 1). This means that the sympathetic and parasympathetic divisions of the ANS regulated myocardial contractions incorrectly. Taking into account the persistent nature of the downward deviation, we can say that myocardial contractility in children was reduced and irreversible changes in the myocardium and CHF developed in patients. The average heart rate both in the daytime and in the dark period of the day was increased in group 2 by 25% and in group 3 by 44% relative to the indicator for children in group 1. Thus, despite an almost normal heart rate, signs of chronic heart failure were already observed in group 1, which, as the underlying disease worsened, was accompanied by a pronounced persistent increase in heart rate with consequences characteristic of tachycardia syndrome, which led to progressive “acute” heart failure.

**Table 2.**

*Dynamics of mesor circadian rhythm heart rate*

Days	1 group	2 group	3 group
1	76±3	113±7 <sup>'''</sup>	116±7 <sup>'''</sup>
2	90±6*	102±4*	114±7 <sup>'''</sup>
3	90±4*	96±3*	110±4 <sup>'''</sup>
4	85±3*	93±3 <sup>***</sup>	113±4 <sup>'''</sup>
5	81±4	90±3 <sup>***</sup>	122±4 <sup>'''</sup>
6	86±4	97±3 <sup>***</sup>	121±8 <sup>'''</sup>
7	85±4	96±3 <sup>***</sup>	120±4 <sup>'''</sup>
8	81±4	103±4 <sup>'''</sup>	118±7 <sup>'''</sup>
9	71±1	97±3 <sup>'''</sup>	114±4 <sup>'''</sup>
10	78±4	93±6 <sup>***</sup>	128±4 <sup>'''</sup>
11		96±2	119±5
12		97±3	124±4
13		103±2	121±4
14		110±7	121±5

15		117±2	118±6
16		113±3	119±9
17		111±2	113±4
18		113±4	106±11
19		111±4	109±6
20		107±3	106±5
21		105±4	109±5
22		101±2	144±11
23		102±5	136±16
24		99±3	139±11
25		100±6	132±10
26		100±7	115±14
27		101±4	118±13
28		106±7	114±11
29		101±4	104±14
30		96±4*	120±10

**Table 3.**  
*Average circadian rhythm heart rate*

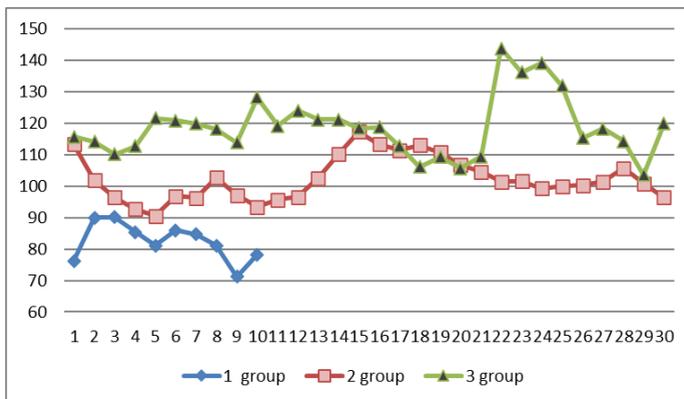
Hours	1 group	2 group	3 group
8	79±6	104±7 <sup>'''</sup>	121±12 <sup>'''</sup>
9	81±5	105±7 <sup>'''</sup>	120±11 <sup>'''</sup>
10	84±6	103±7 <sup>'''</sup>	123±10 <sup>'''</sup>
11	82±6	102±6 <sup>'''</sup>	122±9 <sup>'''</sup>
12	82±9	102±6 <sup>'''</sup>	121±8 <sup>'''</sup>
13	83±8	103±6 <sup>'''</sup>	122±13 <sup>'''</sup>
14	81±6	103±5 <sup>'''</sup>	120±11 <sup>'''</sup>
15	82±7	102±6 <sup>'''</sup>	118±11 <sup>'''</sup>
16	88±7	102±7 <sup>'''</sup>	120±9 <sup>'''</sup>
17	86±7	105±8 <sup>'''</sup>	120±11 <sup>'''</sup>
18	84±8	105±8 <sup>'''</sup>	118±12 <sup>'''</sup>
19	86±6	104±8 <sup>'''</sup>	120±12 <sup>'''</sup>
20	86±6	104±8 <sup>'''</sup>	118±12 <sup>'''</sup>
21	84±5	104±7 <sup>'''</sup>	116±11 <sup>'''</sup>
22	82±6	103±6 <sup>'''</sup>	116±9 <sup>'''</sup>
23	80±4	102±7 <sup>'''</sup>	116±12 <sup>'''</sup>
24	80±3	102±8 <sup>'''</sup>	118±11 <sup>'''</sup>
1	81±3	100±7 <sup>'''</sup>	117±10 <sup>'''</sup>
2	82±3	100±7 <sup>'''</sup>	118±9 <sup>'''</sup>
3	80±4	100±7 <sup>'''</sup>	117±9 <sup>'''</sup>

4	79±5	100±6 <sup>'''</sup>	117±9 <sup>'''</sup>
5	81±5	101±6 <sup>'''</sup>	120±9 <sup>'''</sup>
6	82±3	101±7 <sup>'''</sup>	119±8 <sup>'''</sup>
7	83±5	103±7 <sup>'''</sup>	118±10 <sup>'''</sup>

\*-reliable relative to the indicator for 1 day

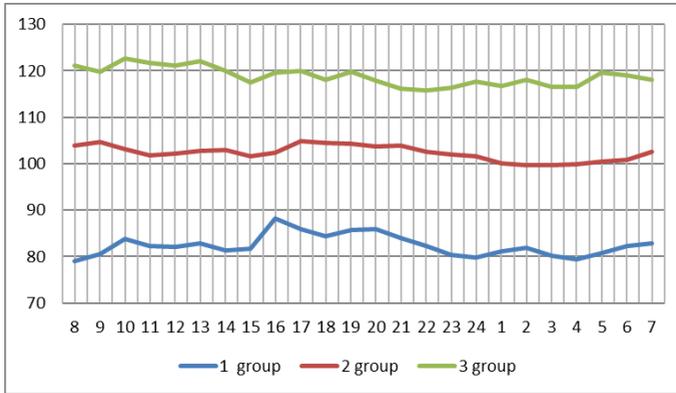
'''-difference is significant relative to the indicator in group 1

In group 1, the increase in the mesor of the circadian rhythm of heart rate on days 2-4 by 18%, 18%, 12%, respectively, decreased almost to normal in the following days (Table 2). In group 2, despite a significantly significant decrease in the mesor of the circadian heart rate rhythm on days 2-12, the heart rate remained prone to tachycardia and exceeded the indicator in group 1 on days 1, 4-10 by 48%, 9% - 19% (p<0. 05). An even more pronounced tendency to tachycardia was found in children of group 3 on days 1-10. Thus, the mesor of the circadian rhythm of heart rate in group 3 was greater than in group 1 on days 1-10 by 52%, 26%, 20%, 33%, 50%, 40%, 41%, 45%, 60%, 64% (p<0.05, respectively). Analysis of the structure of the average circadian rhythm according to the severity of the condition revealed a persistent increase in the mesor of the circadian rhythm of heart rate throughout the entire observation in 2 and more pronounced in 3 groups (Table 3).



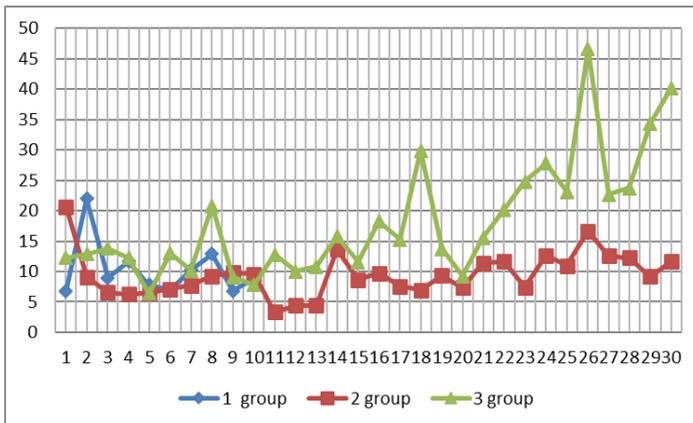
**Figure 1.** Dynamics of the mesor of the circadian rhythm of heart rate, beats per minute.

Circular rhythms of cardiac function turned out to be deformed and were represented by a decrease in the oscillation period to 5.4 days in group 1, 8, 7.6, 6 days in group 2 and 9, 9.5, 6 days in group 3, representing altered low-amplitude waves (Fig. 1).



**Figure 2.** Average circadian heart rate rhythm

In the average circadian rhythm of heart rate, the projection of acrophase of the circadian rhythm of heart rate turned out to be shifted to 16 o'clock in the afternoon, in group 2 at 9 o'clock in the morning and the peak of the second wave was indicated at 17 o'clock, in group 3 the peak of acrophase was at 10 o'clock in the morning (Fig. 2). Despite the severity of the condition and more pronounced cardiac dysfunction, fluctuations were noted in group 3, indicating the functioning of the circadian rhythms of the driver of cardiac function even in the most severe patients with acute renal failure aged 7.1-18 years.

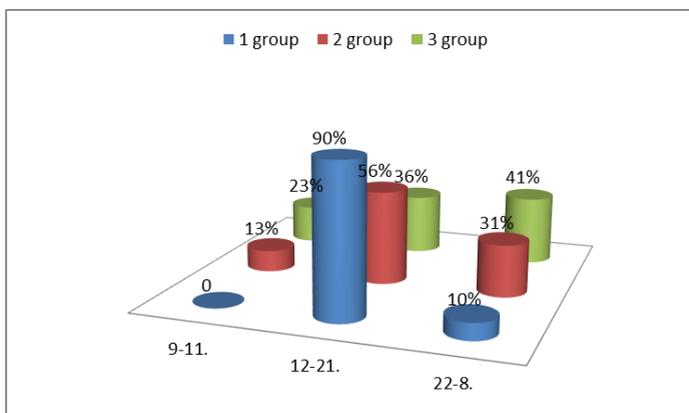


**Figure 3.** Dynamics of the amplitude of the circadian rhythm of heart rate, beats per minute

The most pronounced instability of sinus node function was detected in group 1 on day 2, when the amplitude of the circadian heart rate rhythm increased to 23 per minute. In group 2, the greatest amplitude of the circadian rhythm of heart rate was on day 2. In the following days, the average rate was 10 beats per minute. The most pronounced progressive violation of the regulatory function of the ANS was detected in group 3, when the amplitude of the circadian heart rate rhythm was already 20 per minute on the 8th day, then 30 per minute on the 18th day, and 45 per minute on the 26th day (Fig. 3). The identified difference in group 3 was also due to progressive mitochondrial failure, the energy-deficient state of the myocardium under conditions of hypoxia, hypoperfusion, and a complex of pathogenetic mechanisms of peripheral blood flow impairment, with a predominance of disorders primarily in the renal parenchyma. The duration of the most pronounced shift in the acrophase of the circadian rhythm of heart rate (inversion) in days corresponded to the severity of the disease, amounting to 12 days in group 3. In group 2, the duration of inversion was 9 days and in group 1 – 1 day (Fig. 3). And in percentage terms, a moderate shift in the acrophase peak of the circadian rhythm in the daytime predominated (Fig. 3).

**Table 4.**  
*Duration of heart rate circadian rhythm inversion in days.*

Groups	norm	moderate	inversion
	9-11 hours	12-21 hours	22-8 hours
1	0	9	1
2	4	17	9
3	7	11	12



**Figure 3.** *Duration of heart rate circadian rhythm inversion*

The discovered correlations indicated a decrease in SV with an increase in heart rate in group 1, a decrease in PR in response to an increase in tachycardia, which indicated the preservation of a compensatory vasodilator reaction in response to an increase in heart rate. However, in group 1, the noted direct correlation between heart rate and DBP indicated an unfavorable effect on cardiac function of an increase in the mesor indicator of the circadian rhythm of DBP, which most likely characterizes a persistent tendency to vasospasm even in patients of group 1 who were relatively successful in terms of the effectiveness of treatment.

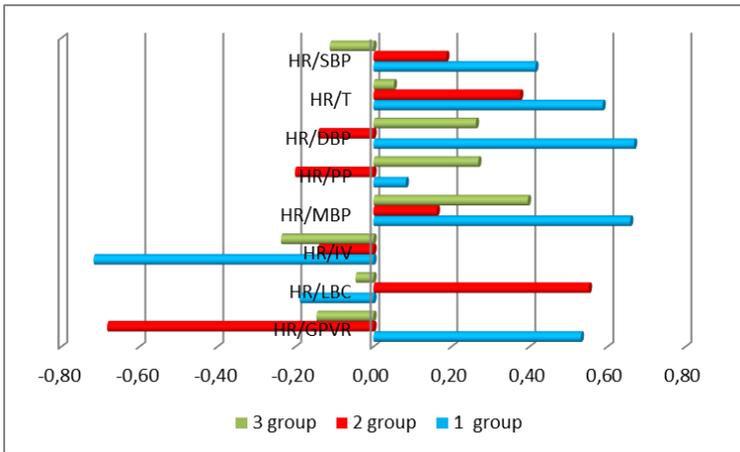


Figure 4. Heart rate correlations.

Conclusion. In all subjects, a decrease in the CI index to 1 unit was found, which indicated a significant impairment of cardiac function, autonomic denervation of the heart due to improper regulation of myocardial contractions by the autonomic nervous system. Taking into account the persistent nature of the deviation in a smaller direction, we can say that the contractility of the myocardium in children was reduced and irreversible changes in the myocardium and CHF occurred in patients. A persistent increase in the mesor of the circadian rhythm of heart rate was found throughout the entire observation in 2 groups and more pronounced in 3 groups. The duration of the most pronounced shift in the acrophase of the circadian rhythm of heart rate (inversion) in days corresponded to the severity of the disease, amounting to 12 days in group 3. A direct correlation between heart rate and DBP indicated an unfavorable effect on cardiac function of an increase in the mesor indicator of the circadian rhythm DBP, which most likely characterizes a persistent tendency to vasospasm even in patients of group 1 who were relatively unaffected by the effectiveness of treatment.

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急性腎衰竭少尿期對7.1~18歲心肌需氧量晝夜節律的影響  
**THE INFLUENCE OF THE OLIGOANURIA PHASE OF  
ACUTE RENAL FAILURE ON THE CIRCADIAN RHYTHM OF  
MYOCARDIAL OXYGEN DEMAND AT THE AGE  
OF 7.1-18 YEARS OLD**

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抽象的。對 20 名 7.1 至 18 歲患有急性腎衰竭的兒童進行了每小時體溫監測數據的研究，這些兒童因無尿而入住俄羅斯急診醫學研究中心 ICU。MOD 晝夜節律的結構成分向上偏差最明顯的是第 3 組；揭示了基礎疾病的嚴重程度對心肌需氧量指標的顯著影響。心臟衰竭，所有兒童的 MOD 與心率之間都存在強烈的直接相關性。涉及心肌需氧量的代償機制在第 1 組兒童中起作用，這有助於腎臟排泄功能的早期恢復。在第 2 組和第 3 組兒童中，在更嚴重的腎損傷條件下，血流動力學適應的生理機制幾乎完全平衡。

**關鍵字：**晝夜節律、急性腎衰竭、心肌需氧量、少尿症、兒童。

**Abstract.** Data from hourly monitoring of body temperature were studied in 20 children aged 7.1 to 18 years with acute renal failure who were admitted to the ICU of the Russian Research Center for Emergency Medicine with anuria. The most pronounced upward deviations in the structural components of the circadian rhythm of MOD were found in group 3; a significant influence of the severity of the

*underlying disease on the indicator of myocardial oxygen demand was revealed. In group 3, the mesor of the circadian rhythm MOD, increased by 25% on day 1, turned out to be the most pronounced, increasing by another 53% by day 22, which finally undermined the compensatory capabilities of the cardiovascular system, causing fatal heart failure. A strong direct correlation between MOD and heart rate was revealed in all children. Compensatory mechanisms involving the myocardial oxygen demand functioned in children of group 1, which contributed to an earlier recovery of renal excretory function. In groups 2 and 3 of children, an almost complete leveling of the physiological mechanisms of hemodynamic adaptation in conditions of more severe kidney damage was revealed.*

**Keywords:** *circadian rhythm, acute renal failure, myocardial oxygen demand, oligoanuria, children.*

**Relevance.** The most important factor determining myocardial oxygen demand is heart rate (HR), while in a noncontractile heart oxygen consumption is only 15-20% of normal resting conditions. Oxygen consumption, as in other tissues, depends on the type of substrate used; indeed, it is greater if predominantly fatty acids are used than when carbohydrates are used. In addition, myocardial oxygen consumption in the subendocardium is 15-20% higher than in the subepicardium. Factors that influence metabolic processes in the myocardium are as follows. Heartbeat. Myocardial oxygen demand almost doubles during atrial pacing, when the heart rate doubles in speed. Aortic pressure. Myocardial oxygen uptake almost doubles as soon as aortic pressure rises from 75 to 175 mmHg. at constant heart rate and stroke volume.

Myocardial inotropism. Myocardial oxygen consumption is approximately doubled by increasing ES or administering norepinephrine at a constant heart rate, aortic pressure, and cardiac output.

SV. Myocardial oxygen consumption increases by approximately 20% when SV increases by 60% at a constant pulse-pressure product (i.e., rhythm frequency multiplied by systolic blood pressure).

Accurate measurement of myocardial oxygen demand requires determination of coronary blood flow and arteriovenous oxygen difference (usually obtained by simultaneously collecting blood samples from the aorta and coronary sinus). Since blood sampling from the coronary sinus is required and measurement of coronary blood flow poses a significant methodological challenge, indirect measures have been proposed. For example, the pulse-pressure product is the simplest indicator and closely correlates with a wide range of quantities, changes in which in myocardial oxygen consumption can be measured. In the early stages of acute renal failure, hypervolemia may be observed, which, as the disease progresses, turns into hypovolemia. The overwhelming majority of patients with acute renal failure de-

velop persistent hypertension, which is formed as a result of impaired renal blood flow, hypoxia of the kidney parenchyma, dystrophy and necrosis of the tubular epithelium, impaired sodium reabsorption with hyperproduction of renin and angiotensin, and decreased production of depressor substances by the affected kidneys. Currently, the genesis of the development of heart failure is explained not only by myocardial damage, but also by damage to the endothelium of the vascular wall. Markers of endothelial dysfunction include a decrease in endothelium-dependent vasodilation, an increase in desquamated endotheliocytes, an increase in the level of endothelin-1, an increase in endothelial angiotensin-converting enzyme, a weakening of the effect of bradykinin, and suppression of the expression/inactivation of NO synthetase. Hemodynamic overload, venous congestion, activation of neurohumoral systems, natriuretic peptides, inflammation, endothelial dysfunction, oxidative stress and its effect on cardiac and vascular remodeling, as well as mechanisms of cellular maladaptation are currently considered the main causes of the pathogenesis of AHF. Direct endothelial dysfunction can also dramatically alter vascular responsiveness by activating endothelial oxidative stress, with the release of cytokines generating reactive oxygen species that directly promote nitric oxide (NO) removal, thereby limiting the potential for vasodilation. These effects are systemic in nature, including both arterial and venous vessels, and contribute to increased mobilization of the central blood volume. This mechanism is combined with modern pathophysiological understanding of hemodynamic disturbances, where increased pulmonary artery pressure can be observed several days to weeks before an episode of acute heart failure (AHF) [1–4].

One of the many indicators of the pathogenetic mechanism of myocardial ischemia leading to the subsequent development of heart failure is the unmet myocardial oxygen demand (MOD). Due to the lack of information about changes in MOD during the anuric phase of acute renal failure in children, we made an attempt to study and evaluate the features of the circadian rhythm of MOD in acute renal failure in children aged 7.1-18 years.

**Goal of the work.** To study and evaluate the features of the circadian rhythm of myocardial oxygen demand during the phase of oligoanuria in acute renal failure in children aged 7.1-18 years.

**Materials and research methods.** Data from hourly monitoring of body temperature were studied in 20 children aged 7.1 to 18 years with acute renal failure who were admitted to the ICU of the Russian Research Center for Emergency Medicine with anuria. Before admission to the clinic, all patients received therapy aimed at treating pneumonia, acute glomerulonephritis, acute intestinal infection, and MODS. Due to severe progressive respiratory failure, patients received invasive mechanical respiratory support (MRS) on the first day as indicated. All patients underwent hemodialysis under the control of hemodynamics, acid-base bal-

ance, respiratory system, supportive, antibacterial, anti-inflammatory, syndromic corrective intensive therapy in accordance with protocols and recommendations existing in the literature. A favorable outcome with restoration of full functional activity of the kidneys and discharge from the hospital was observed in 13 children (groups 1 and 2), an unfavorable outcome – in 7 children (group 3). The first group consisted of patients who received intensive therapy in an ICU for up to 10 days (6 patients), the second group included children with a favorable outcome after intensive therapy for 11–45 days (7 patients), the third group included 7 patients with an unfavorable outcome. The results of the identified changes in the components of the circadian rhythm were carried out by deducing mesor indicators - the average daily level of the studied indicator, the amplitude of circadian fluctuations, the range of daily fluctuations, the indicator of acrophase and bathyphase of the circadian rhythm, the duration of the inversion of the circadian rhythm of the studied hemodynamic parameters. The research data were processed by the method of variation statistics using the Excel program by calculating arithmetic means (M) and errors of means (m). To assess the significance of differences between two values, the parametric Student’s test (t) was used. The relationship between the dynamics of the studied indicators was determined by the method of paired correlations. The critical significance level was taken equal to 0.05.

Results and discussion. Evaluation of the results obtained depending on the severity of the patients’ condition made it possible to identify a significant effect of the underlying disease on the indicator of myocardial oxygen demand. Thus, in group 1, on the day of admission to the clinic, the average mesor value of the circadian rhythm MOD was within normal limits, while in children of group 2 there was an increase in MOD by 23%, and in children with an unfavorable outcome - by 36% ( $p < 0.05$ , respectively). The studied indicator turned out to be significantly increased in the acrophase by 31% in group 2, by 52% in group 3. In addition, the average MOD rate in the bathyphase in group 2 was greater than in group 1 by 29%, and in group 3 by 29%. A significantly significant increase in the amplitude of the average circadian rhythm of MOD in group 3 was revealed by 16%, and the daily range of fluctuations by 27% ( $p < 0.05$ , respectively) (Table 1).

**Table 1.**  
*Average values of indicators of the phase structure of the circadian rhythm of MOD, %*

Groups	Mezor	In acrophase	In bathyphase	Amplitude	Daily range
1	104±6	119±13	89±9	15±5	30±11
2	132±7*	150±10*	118±6*	17±4	32±7
3	140±11*	171±18*	114±11*	31±7*	57±7*

Thus, the most pronounced upward deviations in the structural components of the circadian rhythm of MOD were found in group 3 (Fig. 1), which characterized the dependence of the increase in myocardial oxygen demand on the severity of the underlying disease, indicating and determining the advisability of supplementing intensive therapy with coronary active, metabolite drugs, and medications. support and correction of mitochondrial failure characteristic of the systemic inflammatory response, stress mobilization of sympathoadrenal activity in ARF at the age of 7.1-18 years.

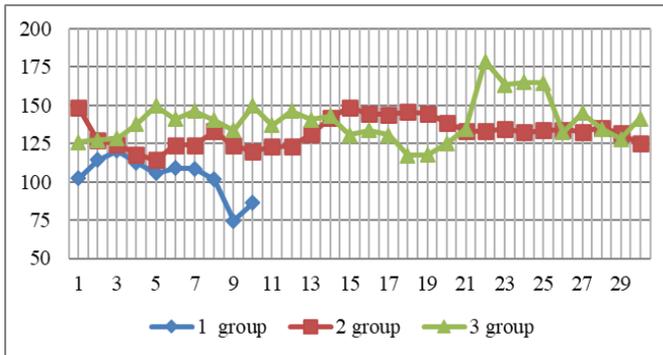


Figure 1. Dynamics of the mesor of the circadian rhythm of the MOD, in %

Table 2. Dynamics of the mesor of the circadian rhythm of the MOD, in %.

Days	1 group	2 group	3 group
1	102±5	148±15*	126±10*
2	114±8	127±6	127±9
3	120±7	125±5	128±4
4	113±6	118±5**	138±9*
5	106±5	114±4**	150±6*
6	109±6	124±6	141±11*
7	109±5	124±5	146±6*
8	102±7	133±6*	140±11*
9	74±2	124±6*	134±8*
10	86±5	120±9***	150±6***
11		123±5**	137±7
12		123±4**	146±6**
13		131±4	141±6
14		142±9	143±9
15		149±5	131±9

16		144±6	134±14
17		144±8	131±7
18		146±7	117±14
19		145±7	118±9
20		139±7	125±13
21		133±10	135±6
22		133±5	179±16"
23		135±9	164±26
24		132±7	165±20
25		134±8	165±14
26		134±9	132±25
27		133±6	145±15
28		135±10	135±13
29		132±8	128±20
30		125±7	141±12

**Table 3.**  
*Average circadian rhythm of MOD, in%.*

Hours	1 group	2 group	3 group
8	102±10	136±11*	146±17*
9	101±12	137±10*	141±18*
10	103±13	134±12*	144±14*
11	102±11	132±11*	141±13*
12	104±15	133±9*	142±15*
13	105±15	133±8*	144±19*
14	104±14	133±7*	141±15*
15	103±14	131±9	137±14*
16	110±12	132±10	140±14*
17	107±12	136±12	142±17
18	105±12	135±9*	140±18*
19	109±12	136±11*	143±17*
20	109±13	135±12	139±17
21	104±12	134±11	136±16
22	103±12	132±10	135±14
23	99±10	131±10*	137±18
24	101±9	131±11	138±17
1	102±7	129±11*	136±17*
2	104±9	127±10	138±14*
3	101±9	126±10	136±15*
4	99±10	128±9	136±15*

5	100±12	130±10	141±15*
6	106±8	131±9	142±15*
7	103±11	132±10	138±15*

\*-significant relative to the indicator in group 1

"-reliable relative to the indicator on 1 day

Over time, no significant changes in MOD were observed in group 1 (Table 2). Initially increased by 46%, the mesor of the circadian rhythm of the MOD in group 2 decreased on days 4, 5, 10, 11, 12 by 30%, 34%, 28%, 25%, 25% ( $p < 0.05$ , respectively). However, in the subsequent days of observation, an increase in the mesor of the circadian rhythm of MOD was revealed by an average of 35-40% (Table 2). In group 3, the mesor of the circadian rhythm MOD, increased by 25% on day 1, turned out to be the most pronounced, increasing by another 53% by day 22, which finally undermined the compensatory capabilities of the cardiovascular system, causing fatal heart failure.

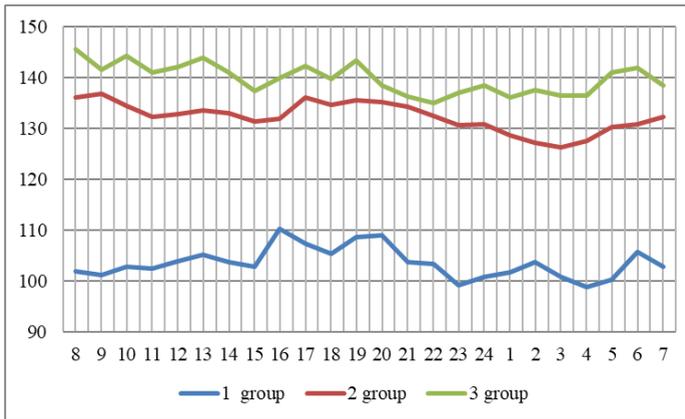


Figure 2. Average circadian rhythm of MOD at 7.1-18 years, in%.

Daily fluctuations in the average circadian rhythm of MOD within the normative values occurred in group 1, at a significantly higher level, differing in monotony in groups 2 and 3 of children (Fig. 2). The projection of acrophase was shifted in group 1 by 4 hours clockwise.

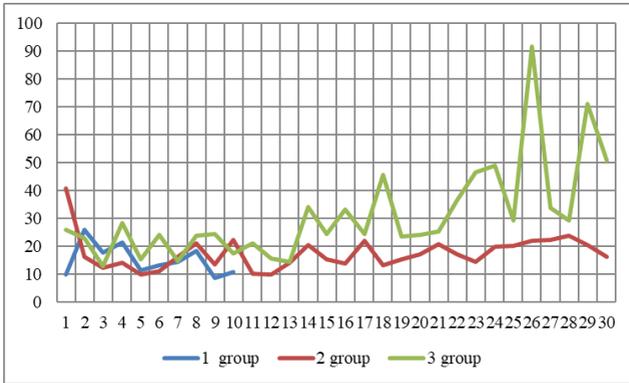


Figure 3. Amplitude of the circadian rhythm of MOD, in%.

In the first 13 days, there were no significant differences between the groups of subjects in the amplitude of the circadian rhythm of MOD (Fig. 3). Significant changes in the initially increased MOD with an increase of another 30-50% of the indicator were observed in group 3 after 20 days of intensive therapy, which confirmed an unfavorable change in coronary blood flow and myocardial contractility in conditions of a significant increase in MOD caused by the severity of the patients' condition, intoxication, hypercatabolism, limited possibilities of detoxification therapy in connection with hemodynamic instability and acute heart failure. Confirmation of significant differences during the day in MOD in later periods of treatment are daily differences in MOD, which reached 100-130% after the 20th day (Fig. 4).

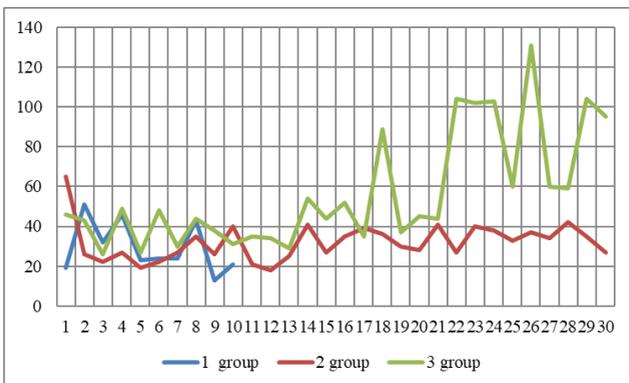


Figure 4. Daily fluctuations in MOD, %.

The longest inversion of the circadian rhythm of MOD turned out to be in group 3 (10 days), in 2 – 6 days, in 1 – 2 days. That is. The severity of the shift in the acrophase peak of the circadian rhythm of MOD corresponded to the severity of the patients' condition.

Correlations of MOD directly depended on heart rate in all children. Thus, a direct correlation was revealed in group 1 (0.94), in group 2 – 0.97, in group 3 (0.93). And also a positive correlation between MOD and TPR was noted in group 1 (0.74), MOD and MAP (0.9), MOD and DBP (0.9), MOD and SBP (0.74). The negative correlation between MOD and SV turned out to be significant (-0.83) in children of group 1. Thus, compensatory mechanisms involving the myocardial oxygen demand functioned in children of group 1, which apparently contributed to an earlier recovery of renal excretory function. While the above-described correlations significantly decreased in groups 2 and 3 of children (Fig. 5), characterizing the almost complete leveling of the physiological mechanisms of hemodynamic adaptation in conditions of more severe kidney damage.

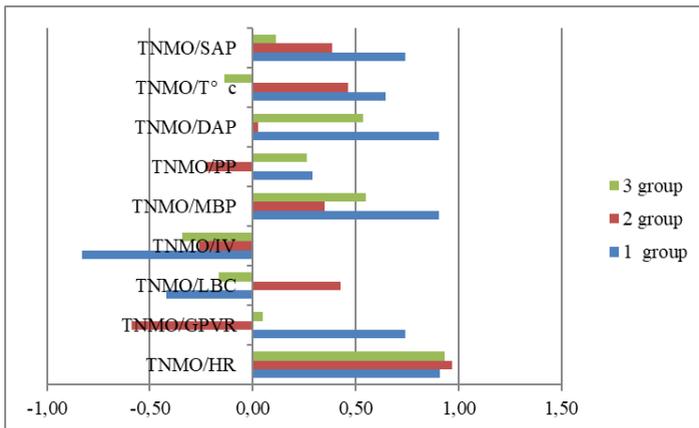


Figure 5. Correlation connections of MOD

**Conclusion:** The most pronounced upward deviations in the structural components of the circadian rhythm of MOD were found in group 3; a significant influence of the severity of the underlying disease on the indicator of myocardial oxygen demand was revealed. In group 3, the mesor of the circadian rhythm MOD, increased by 25% on day 1, turned out to be the most pronounced, increasing by another 53% by day 22, which finally undermined the compensatory capabilities of the cardiovascular system, causing fatal heart failure. A strong direct correlation between MOD and heart rate was revealed in all children. Compensatory

mechanisms involving the myocardial oxygen demand functioned in children of group 1, which contributed to an earlier recovery of renal excretory function. In groups 2 and 3 of children, an almost complete leveling of the physiological mechanisms of hemodynamic adaptation in conditions of more severe kidney damage was revealed.

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秋明州患有冠心病和缺鐵性貧血的老年婦女的體重指數 (QUETELET)  
**BODY MASS INDEX (QUETELET) IN ELDERLY WOMEN,  
TYUMEN, WITH A COMBINATION OF CORONARY HEART  
DISEASE AND IRON DEFICIENCY ANEMIA**

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註解。 本文透過兩種計算方法對秋明州兩組老年婦女的體重指數 (Quetelet) 研究進行了比較分析。 第一組 (OH—主要組) 包括因冠心病 (CHD) 和缺鐵性貧血 (IDA) 而接受門診治療的女性。 第二組 (CG - 對照組) 由同齡女性組成, 她們在檢查時沒有確診血液和心血管系統 (CVS) 疾病。 作者在內科臨床中首次將老年時期分為相等的五年間隔。 形態學上的「剪刀」已經被揭示, 隨著女性通行證年齡的增加, 她們的體重增加, 而體長減少。 提出以兩種計算方式評估 Quetelet 指數。

關鍵字: 女性、老年、冠狀動脈心臟病、缺鐵性貧血、體重指數。

**Annotation.** *The article presents a comparative analysis of the study of the body mass index (Quetelet) in two groups of elderly women in Tyumen by two calculation methods. The first group (OH – the main group) included women receiving outpatient treatment for a combination of coronary heart disease (CHD) and iron deficiency anemia (IDA). The second group (CG – control group) consisted of women of the same age, who at the time of the examination did not have confirmed diseases of the blood and cardiovascular system (CVS). For the first time in the clinic of internal medicine, the authors divided the period of old age into equal five-year intervals. Morphological “scissors” have been revealed, when as the passport age of women increases, their body weight increases, and the body length decreases. It is proposed to evaluate the Quetelet index in two ways of calculation.*

**Keywords:** *women, old age, coronary heart disease, iron deficiency anemia, body mass index.*

Relevance. One of the indicators characterizing physical development (PD) is the body mass index (BMI), the value of which evaluates the degree of correspondence of a person's body weight to his height, which allows indirect assessment of whether the weight is normal, insufficient or excessive (obesity) in relation to established age norms. Knowledge of the dynamics of age-related body weight values allows the doctor to quickly decide on the possibilities of reducing excess weight through the use of diet and various types of physical therapy. Note that the assessment of BMI has been the subject of comprehensive study for many years, including for various types of physical activity [16, 22], coronary heart disease [1, 8], arterial hypertension [3, 15], diabetes mellitus [20], assessment of physical development [10], thrombosis [2], pregnancy [6, 11], menstrual irregularities [12, 23], periodontitis [18], injuries and diseases of the musculoskeletal system [19]. The BMI value is considered depending on the region of residence [4, 7, 21, 32] and the nature of nutrition [9, 17], as well as in students [5, 13].

In modern scientific research, when assessing FR, the mass growth indicator proposed in 1869 by the Belgian sociologist and mathematician, statistician Lambert-Adolph-Jacques Quetelet (February 22, 1796 - February 17, 1874) is widely used, currently used name - Quetelet index. We calculated BMI using the formulas:

$$\text{I. BMI} = \text{weight (in kg)} : \text{height (in cm)}$$

$$\text{II. BMI} = \text{weight (in kg)} : \text{height (in m}^2\text{)}$$

The National Institute of Health (NIH) of the USA has developed an assessment of body mass index, approved by the World Health Organization (Table 1), which we use in practical work with patients.

**Table 1***Estimation of body mass index in humans.*

<b>Body mass</b>	<b>BMI (kg/m<sup>2</sup>)</b>	<b>Risk of disease</b>
Underweight	18.5	Increased
Normal body weight	18.5–24.9	Absent
Excess body weight	25.0–29.9	Increased
Obesity I degree	30.0–34.9	High
Obesity II degree	35.0–39.9	Very high

As for the BMI indicator in elderly women in Tyumen with comorbid pathology in the form of IHD and IDA, then, firstly, there are no such studies in the literature available to us, which was the reason for its study. Secondly, there are no studies that shed light on age-related BMI values in women of the 10th period of ontogenesis, which for the first time we conditionally divided into equal 5-year periods of life. Thirdly, there are no comparative differences in BMI in women with comorbid pathology with their healthy peers.

Of particular interest is the study of this problem in women after their retirement, since it is during this period of their lives that they are more deprived of their usual physical activity and daily professional activities, which significantly reduces the quality of life and overall physical performance.

Object of study. Elderly women with comorbid pathology.

Subject of study. Indicators of body mass index for equal 5-year periods of life in women of advanced age.

Research hypothesis. 1. It has been suggested that during the period of ontogenesis lasting 15 years, the morphofunctional state of women, for example, 56 years old, not only can, but should also differ from the age, for example, 70 years.

2. If the specified period of ontogenesis of women is divided into equal 5-year periods of life, then this will make it possible to carry out therapeutic and preventive measures in a more differentiated manner.

3. “Morphological scissors” are revealed: as the passport age increases, women’s body weight increases and body length decreases.

Purpose of the study: in elderly women of Tyumen, with a combination of IHD and IDA, to assess changes in body mass index over equal 5-year periods of life.

Material and research methods. The first group (MG – main group  $n = 25$ ) included elderly women ( $62.7 \pm 2.4$  years) undergoing outpatient treatment at the Federal State Budgetary Institution Regional Clinical Hospital No. 2 of Tyumen for a combination of chronic coronary artery disease without signs of cardiac insufficiency with IDA. The second group (CG - control group  $n = 27$ ) using a random sampling method consisted of women ( $64.8 \pm 2.3$  years) who did not have clinically and instrumentally confirmed CVD diseases at the time of the examina-

tion. The criteria for excluding women from the study when studying BMI were: oncological and endocrine diseases (diabetes mellitus, hypothyroidism, pathology of the adrenal glands); acute and chronic diseases of the respiratory system; acute respiratory viral infections suffered during the last two weeks; acute and chronic kidney diseases (pyelonephritis, glomerulonephritis); hepatitis; cirrhosis of the liver; pancreatitis; peptic ulcer of the stomach and duodenum; organic diseases of the central nervous system.

When assessing the age of women, we adhered to the scheme of age periodization of human ontogenesis, adopted at the VII All-Union Conference on Problems of Age-Related Morphology, Physiology and Biochemistry of the Academy of Pedagogical Sciences of the USSR in Moscow in 1965. According to this periodization, the period of old age lasts from 56 to 70 years, i.e. 15 years. It is clear that during this period of life in women, for example, at the age of 56 years, morphofunctional indicators not only can, but should also differ from the age, for example, 70 years.

Considering that in the literature available to us we have not found studies characterizing BMI in elderly women living in Tyumen, we divided it into intervals of 5 years. MG: from 56 to 60 years ( $58.6 \pm 1.3$ ;  $n = 10$ ), from 61 to 65 ( $63.4 \pm 1.6$ ;  $n = 8$ ) years, from 66 to 70 ( $67.3 \pm 1.7$ ;  $n = 7$ ) years. CG: from 56 to 60 years ( $58.4 \pm 1.5$ ;  $n = 11$ ), from 61 to 65 ( $63.5 \pm 1.4$ ;  $n = 9$ ) years, from 66 to 70 ( $68.3 \pm 1.7$ ;  $n = 7$ ) years.

The examination was carried out in the first half of the day with the following microclimate parameters in the room: humidity - 56-60%, air speed - 0.3 m/s, air temperature - 19-22°C. In accordance with the requirements of SanPiN 2.1.3.1375-03, illumination in the doctor's office it was within 250 lux.

We especially note that in accordance with the clinical examination rules adopted by the Federal State Budgetary Institution of Health Clinical Hospital No. 2 of Tyumen, all women receiving outpatient treatment underwent a comprehensive clinical, biochemical and instrumental examination. In this report, we focus only on the results of the BMI study.

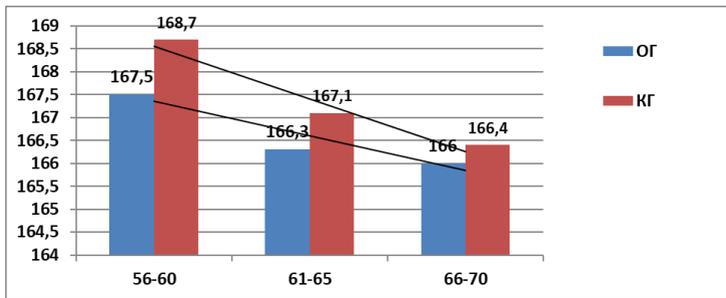
The principles of voluntariness, individual rights and freedoms guaranteed by Articles 21 and 22 of the Constitution of the Russian Federation, as well as Order of the Ministry of Health and Social Development of Russia No. 774n of August 31, 2010 "On the Ethics Council" are observed. The study was conducted in accordance with the ethical standards set out in the Declaration of Helsinki and the European Community Directives (8/609EC) and informed oral consent from women was required.

Results and discussion. Characterizing age-related changes in the basic RF indicators of women in the MG and CG, i.e. length and body weight within one age period of ontogenesis over 15 years, let us note them as so-called. "morphological

scissors”. Their essence is that the body weight of women in the compared groups increased as their passport age increased, while their body length decreased. Thus, over the period from 56 to 70 years, the body length of women in the MG and CG (Table 2, Fig. 1) in absolute values decreased by 1.5 and 2.3 cm, respectively.

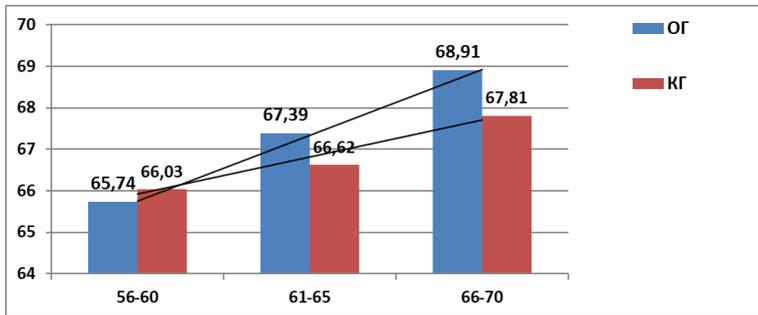
**Table 2**  
*Basic indicators of physical development of women of old age in the MG and CG (M±m)*

Group	Body mass	Body length	BMI
56 – 60			
MG (n = 10)	65,74±2,29	167,5±2,2	I. 396 g/sm II. 19,6239
CG (n = 11)	66,03±2,23	168,7±2,3	I. 391 g/sm II. 19,5935
61 – 65			
MG (n = 8)	67,39±2,42	166,3±2,4	I. 405 g/sm II. 20,2982
CG (n = 9)	66,62±2,27	167,1±2,3	I. 398 g/sm II. 19,9491
66 – 70			
MG (n = 7)	68,91±2,43	166,0±2,5	I. 415 g/sm II. 20,7560
CG (n = 7)	67,81±2,33	166,4 ±2,4	I. 407 g/sm II. 20,3756



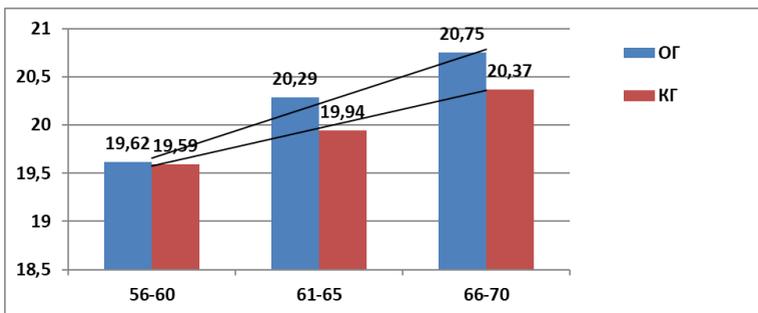
**Figure 1.** Dynamics of body length values within the same age period of ontogenesis in elderly women from the MG and CG.

Over the same period of time, the body weight of women in the compared groups increased (Fig. 2). Thus, over the period from 56 to 70 years, the body weight of women in the MG increased by 3.170 kg in absolute values, and in women in the CG by 1.780 kg.



**Figure 2.** Dynamics of body weight values within the same age period of ontogenesis in elderly women from the MG and CG.

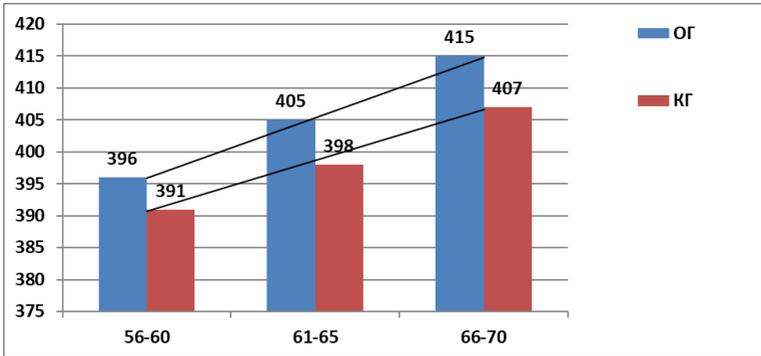
The calculated values of BMI within the same age period of ontogenesis in elderly women from the MG and CG indicated its increase as the passport age increased (Fig. 3).



**Figure 3.** BMI values within the same age period of ontogenesis in women from the MG and CG.

In calculating the Quetelet index, we used women’s body length in m2 and found that it corresponds to normal body weight, since it ranges from 18.5 to 24.9 g/m2. Thus, we note that a body mass index of less than 25 kg/m<sup>2</sup> is “ideal” for the cardiovascular system and, naturally, health [24].

At the same time, in all the women we examined, the Quetelet index exceeded the normative values - 325-375 g/cm, so we can conclude that as the passport age increases, an increase in body weight occurs (Fig. 4).



*Figure 4. BMI values g/cm within the same age period of ontogenesis in women from the MG and CG.*

Thus, in women from the MG for the period from 56 to 70 years, the age-related increase in the Quetelet index in absolute values was 19 g/cm, in women from the CG it was 16 g/cm.

Thus, we can conclude that BMI in women of advanced age, including those with a combination of IHD and IDA, depends on the passport age. At the same time, “morphological scissors” are reliably observed ( $p < 0.05$ ), when women’s body weight in absolute values increases, and body length decreases. For the first time in cardiological practice, the conditional division of the studied 10th period of human ontogenesis, lasting 15 years, into three time intervals of equal duration showed a significant age-related increase in the Quetelet index. In women with a combination of coronary artery disease and iron deficiency anemia, more pronounced age-related changes in the Quetelet index are detected in comparison with healthy women. Therefore, to correct the body weight of women, the doctor should make wider use of physical therapy when conducting rehabilitation treatment on an outpatient basis and recommend expanding the level of physical activity. Considering the simplicity of calculations and the information content of the Quetelet index, it should be used more widely for dynamic control of mass-height relationships.

**Conflict of interest.** The authors declare no conflict of interest.

**Research transparency.** The study had no sponsorship. The authors are solely responsible for submitting the final version of the manuscript for publication.

**Declaration of financial and other relationships.** All authors participated in the development of the topic, study design and writing of the manuscript. The final version of the manuscript was agreed upon and approved by all authors. The authors received no royalties for the study.

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秋明市患有共病的第二性熟婦女的水量動態  
**DYNAMICS OF WATER VOLUME IN WOMEN OF THE SECOND  
MATURE AGE IN TYUMEN WITH COMORBID PATHOLOGY**

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抽象的。本文基於身體組成分析儀 Tanita BC-545N 的讀數以及使用 Watson 的簡單人體測量計算方法的形態學數據。 提供了居住在秋明的第二個成年女性體內總水含量的數據，這些女性患有合併症，包括冠心病（CHD）、缺鐵性貧血（IDA）和 2 型糖尿病（DM2）。為了客觀評估女性個體發育第9期（持續35至55歲）體內的總含水量，該時期有條件地分為相等的5年生命週期：36歲至40歲、41歲到45歲，從46歲到50歲，從51歲到55歲。 所謂的「形態剪刀」的存在，其中患有合

併症的女性的總水含量取決於她們的護照年齡——女性年齡越大，體內水的百分比越低。

關鍵字: 女性, 第二個成年期, 共病病理, 含水量。

**Abstract.** *The article is based on the readings of the body composition analyzer Tanita BC - 545N and on morphological data using the calculated method of simple anthropometric measurements according to Watson. provides data on the total water content in the body of women of the second adulthood living in Tyumen, suffering from comorbid diseases, including coronary heart disease (CHD), iron deficiency anemia (IDA) and type 2 diabetes mellitus (DM2). For an objective assessment of the total water content in the body of women of the 9th period of ontogenesis, lasting from 35 to 55 years, the period is conditionally divided into equal 5-year periods of life: from 36 to 40 years, from 41 to 45 years, from 46 to 50 years and from 51 years old to 55 years old. The presence of the so-called “morphological scissors”, in which the total water content in women with comorbid pathology depends on their passport age - the older the woman, the lower the percentage of water in the body becomes.*

**Keywords:** *women, second adulthood, comorbid pathology, water content.*

**Relevance.** In a modern clinic of internal diseases, especially with comorbid pathology in people of older age groups, it is important to carry out competent medical monitoring of the functional state of the body at various stages of treatment. There is no doubt that the duration and severity of clinical manifestations of various diseases in comorbid pathology specifically affects not only the functional state of the human body, but also its morphological changes, including the component composition of the body, in particular water content. Let us note that for many years, the study of the component composition of the human body in various periods of ontogenesis has received great and worthy attention from domestic and foreign researchers [3, 4, 5, 6, 9, 10].

In recent years, methods based on the use of modern computer technologies and mathematical calculations have become most relevant [11, 12]. At the same time, in the available medical and pedagogical literature we have not found scientific and practical studies that shed light on the component composition of the body, in particular the percentage of water, in women of the second adulthood, permanently living in Western Siberia, suffering from comorbid pathology.

**Object of study:** women of the second mature age, permanently living in the city of Tyumen.

**Subject of research:** age-related values of the percentage of water in the body.

**Research hypothesis.** It has been suggested, firstly, that the percentage of water in women's bodies depends not only on their passport age, but also on the presence of comorbid pathology. Secondly, regardless of the method of studying body

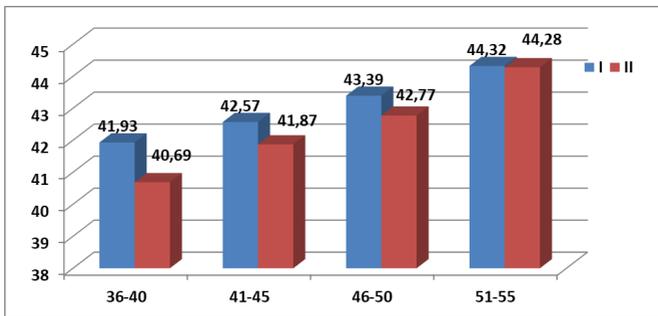
composition, in this case the percentage of water content, the results of the study may be identical. Thirdly, the conditional division of the 9th period of ontogenesis into equal 5-year periods of life will make it possible to detail the percentage of water in the body of women.

**Purpose of the study:** based on the indicators of the Tanita BC – 545N body composition analyzer and on morphological data by calculation using the method according to Watson P.E. to determine the dynamics of the percentage of water in the body of women of the second mature age in Tyumen with comorbid pathology in connection with an increase in the passport age.

**Material and research methods.** The examination was carried out in 37 women (MG – main group) of the second adulthood ( $48.6 \pm 1.7$  years) undergoing outpatient treatment at City Clinical Hospital No. 2 in Tyumen for comorbid pathology, including coronary artery disease, iron deficiency anemia and diabetes mellitus-2. The control group (CG) consisted of 32 women ( $47.7 \pm 1.8$  years), who at the time of examination had no clinically or instrumentally confirmed diseases of the cardiovascular system, endocrine system or blood.

From the anamnesis it was established that all women permanently reside in the city of Tyumen and have not traveled outside Western Siberia.

Considering that the duration of the period of the second mature age is 20 years, we consider it not entirely correct to judge the water content of a woman, for example, 36 years old, and compare it with a woman aged, for example, 54 years. To study the percentage of water in the body, we conditionally divided this period into 5-year life spans (Fig. 1): from 36 to 40 years (MG n = 11, CG n = 10), from 41 to 45 years (MG n = 10, CG n = 8), from 46 to 50 years (MG n = 9, CG n = 8) and from 51 to 55 years (MG n = 7, CG n = 6).



*Figure 1. Age composition of women in the compared groups.*

The total volume of water was studied, firstly, by using the Tanita BC - 545N body composition analyzer, and secondly, anthropometric measurements based on our large-scale research, using the Watson P.E. formula. [14]:

$$VW = 2.447 - 0.09156 \times A + 0.1074 \times BL + 0.3362 \times BW,$$

where: VW– volume of water; A – age (years old); BL– body length (cm); BW – body weight (kg).

The body length is determined by our proposed stadiometer (RF Patent for utility model No. 153076) with an accuracy of 0.5 centimeters. Body weight was measured on a lever scale with an accuracy of 50 g.

During the study, we asked women to: maintain a nightly sleep duration of 8-9 hours; try to stay in the clinic premises at an air temperature between 18-220 Celsius; maintain the usual level of physical activity; do not use medications without a doctor’s prescription; eat at least 4 times a day and drink at least two liters of drinking water; limit table salt in food.

The research results were processed on a personal computer using modern electronic programs (STATISTIKA). The significance of the differences was assessed using Student’s t test, and the differences were considered significant at  $p < 0.05$ . The principles of voluntariness, individual rights and freedoms guaranteed by Articles 21 and 22 of the Constitution of the Russian Federation, as well as Order of the Ministry of Health and Social Development of Russia No. 774n of August 31, 2010 “On the Ethics Council” are observed. The study was conducted in accordance with the ethical standards set out in the Declaration of Helsinki and the European Community Directives (8/609EC) and the informed oral consent of the women.

**Results and discussion.** In the study, we proceeded from the fact that the percentage of water in the female body is its amount of total body weight. The water content of a healthy adult is fairly constant and averages about 60% of body weight [2, 6, 7]. Maintaining an optimal level of water content in the body contributes to the most efficient functioning of functional systems [1, 8]. There is an opinion that it is impossible to reliably accurately determine the water content in the human body [13].

Research has shown (Table 1, Fig. 2) that the body length of women in the period of the second mature age from 36 to 55 years old has changed slightly and only in the direction of its decrease.

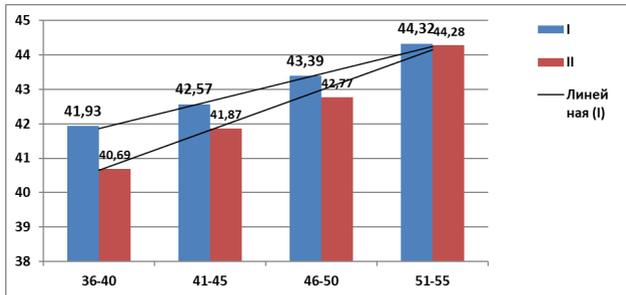
**Table 1**  
*Length, body weight and percentage of water in women of the second mature age in Tyumen (M±m)*

Indicator	Age, years old			
	36-40	41-45	46-50	51-55
Main group				
Body length	168,6±2,4	168,1±2,4	167,3±2,3	166,9±2,3
Body weight	64,26±2,30	66,83±2,39	67,74±2,33	69,31±2,26

% of water:				
I	42,28	40,64	39,55	39,07
II	41,76	39,03	38,82	38,79
Control group				
Body length	169,4±2,4	169,0±2,4	168,2±2,3	167,5±2,3
Body weight	63,86±2,30	66,13±2,39	67,69±2,33	71,07±2,26
% of water <sup>^</sup>				
I	41,93	42,53	43,39	44,32
II	40,69	41,87	42,77	44,28

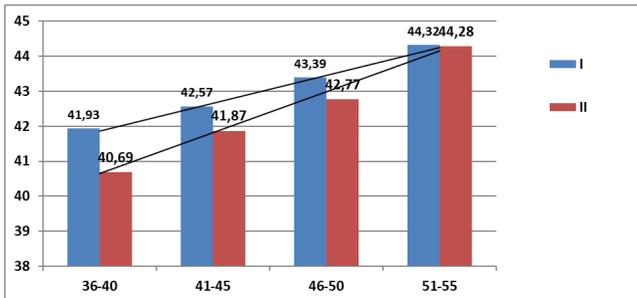
Note: I – water percentage was studied using a Tanita BC – 545N body composition analyzer; II - by calculation using the Watson P.E. formula.

In absolute values, in women from the MG, body length decreased by 1.3 cm, in the CG by 1.9 cm, which is not statistically significant ( $p>0.05$ ).



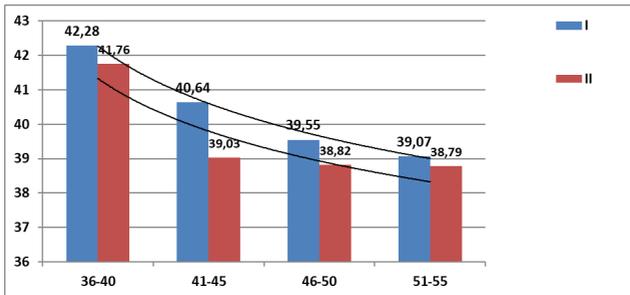
**Figure 2.** Dynamics of age values of body length in women of the compared groups.

As for body weight, due to age over the period from 36 to 55 years in absolute values, in women from the MG it increased by 5.05 kg, in women from the CG – by 7.21 kg (Fig. 3).

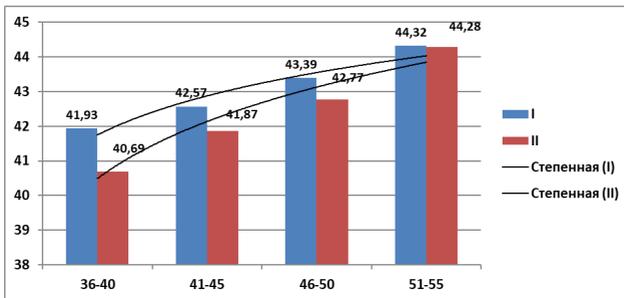


**Figure 3.** Dynamics of age-related values of body weight in women of the compared groups.

Thus, we have identified the so-called “morphological scissors”, when, due to an increase in the passport age of women, their body length decreased and their body weight increased. Let us note that the indicators of the percentage composition of water obtained by the Tanita BC - 545N body composition analyzer and the calculation method using the Watson formula were practically the same (Fig. 4, 5), which we regard as a good indicator that allows us to consider the calculation method for determining water in the body as firstly, simple and very acceptable in a therapeutic clinic in cases of emergency. Secondly, in a way that does not require material costs for examination, which is especially important in the realities of modern life.



**Figure 4.** Dynamics of age-related values of the percentage composition of water in women of the main group, determined by the Tanita BC – 545N body composition analyzer (I) and by calculation using the *Watson P.E.* formula (II).



**Figure 5.** Dynamics of age-related values of the percentage composition of water in women of the control group, determined by the Tanita BC – 545N body composition analyzer (I) and by calculation using the *Watson* formula (II).

The results of the study highlighted an interesting feature, namely that the age-related values of the percentage composition of water in women of the main group, determined by the Tanita BC - 545N body composition analyzer and calcu-

lated using the Watson formula, differ significantly from the indicators in women of the control group. Thus, in women from the MG, the age-related values of the percentage composition of water decreased as the passport age increased, while, as in women from the CG, they increased. We associate this age-related decrease in water in the body, first of all, with the presence of somatic diseases that are difficult in terms of treatment and prognosis - ischemic heart disease, iron deficiency anemia and diabetes mellitus-2. In our opinion, it is the presence of comorbid pathology that significantly affects the physiological course of metabolic processes, and above all, water.

The study, firstly, confirms our hypothesis that the percentage of water in the body of women in the 9th period of ontogenesis reliably depends on two combined factors - passport age and the presence of comorbid pathology. Secondly, the hypothesis that regardless of the method of studying the percentage of water, the results of the study may be identical. Thirdly, the conditional division of the 9th period of ontogenesis into equal 5-year periods of life will make it possible to detail the percentage of water in the body of women.

Based on the research carried out, the following conclusions can be drawn:

1. In conditions where it is impossible to determine the water content in the body using special equipment, it is possible and necessary to use a calculation method that allows you to accurately control the water content at the time of the examination.

2. The percentage of water in the body of women suffering from comorbid pathology depends on their passport age. In clinical therapeutic practice, we propose to consider the 9th age period of human ontogenesis not as a single period (36-55 years), but to conditionally divide it into equal periods of life, which will allow not only to individualize the process of examination and treatment, but also to carry out treatment taking into account the individual passport age.

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醫療服務市場全球化競爭經驗及競爭優勢形成（文獻綜述）

**EXPERIENCE OF GLOBAL COMPETITION AND FORMATION OF  
COMPETITIVE ADVANTAGES IN THE MARKET OF MEDICAL  
SERVICES (LITERATURE REVIEW)**

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抽象的。在文章中，作者對醫療保健融資進行了文獻檢索。給出了歐洲主要國家以及韓國和哈薩克共和國的醫療保健融資範例。

關鍵字：醫學、初級醫療和社會保健、競爭力、組織、融資、保險、按服務收費的醫學。

**Abstract.** *In the article, the authors conducted a literature search on health care financing. Examples of health care financing of leading European countries, as well as Korea and the Republic of Kazakhstan are given.*

**Keywords:** *medicine, primary medical and social care, competitiveness, organization, financing, insurance, fee-for-service medicine.*

The problems of health care development affect not only poor but also rich countries. This is due to inefficient organization of social assistance or inefficient use of resources. Therefore, not all the population gets the necessary access to health care due to inefficient organization of social assistance in some, even developed countries. In other countries, inefficient use of resources is addressed through price increases. The challenges of maintaining and improving human health and health systems are therefore faced by virtually all countries in the world.

Health systems around the world share the common goal of improving the health of the population, but this is not possible without accomplishing the primary objective of providing affordable quality health care. Quality health care can be characterized as accessible, effective, safe, evidence-based medicine, optimal in terms of resources used, adequate to the current level of medical development, leaving the patient with a sense of satisfaction from the interaction with the health

care system. There is no single model of health care. However, there are generally accepted trends in the development of the health care system in the world, and their main models have been formed: state (budgetary), insurance medicine, individual (paid) medicine.

Taking into account all of the above, let us proceed to analyze the health care system by country.

The U.S. health care system developed under free market conditions. It is the only industrialized country that does not guarantee its citizens a universal and comprehensive health insurance system. The United States owns the most expensive health care system in the world. They spend more money on the health care system than other countries. But despite the tremendous successes of the American health care and health care system, it is out of reach for millions of Americans because of its extremely high cost.

U.S. health care spending today is about 17.2% of GDP-6.1% more than the average for other industrialized countries [1]. Total health care spending in this country has been growing faster than GDP and today amounts to more than \$1.8 trillion dollars. Thus, Americans spend less money on housing, food, national defense, or cars [2].

It is the US that is the world leader in health innovation and research. It should be noted that of the 25 most recent Nobel Prize winners in medicine, 18 of them are American citizens or scientists from other countries working in the United States [2]. Half of all new drugs produced worldwide in the last 20 years come from American pharmaceutical companies [2,3]. In fact, Americans have contributed significantly to 80% of important medical inventions over the past three decades [4].

The U.S. spends 18% of all healthcare spending on inpatient care and 49% on outpatient care. In 2014, spending on the provision of drugs and other medical products accounted for 14% of total healthcare spending [5].

It should be noted that despite the highest health care costs in the world, the life expectancy of the white population is lower than in most European countries. As for the country's black population, their life expectancy is comparable to Eastern European countries. Despite the fact that US medicine is the most advanced medicine in the world, 15% of the population cannot use its services and another 15% are underinsured [6]. There is no legal health insurance in the US. Medical costs fall on the shoulders of each individual. Since most of the industry is divided into separate organizations, the government plays a very modest role.

The U.S. health care system is pluralistic in nature, which is evident in the absence of a single centralized administration and many types of medical facilities. All hospitals in America can be divided into 3 groups - they are public, private useful and private "useless". Public hospitals are funded by the federal and state

government. It provides medical services to veterans, disabled, government employees, tuberculosis and mental illness patients. Private for-profit hospitals account for 30% of all hospitals and are a typical for-profit enterprise whose capital is created on a group, individual or shareholder basis. Non-profit private hospitals are initiated by religious or ethnic groups or local residents. They differ from for-profit hospitals in that the revenues generated are placed in the hospital rather than distributed to shareholders. This will improve the quality of care, improve technical equipment, and purchase new equipment. Such activities are encouraged by the state in the form of preferential taxation. However, despite the fact that this type of service is useless, services here are provided for a fee [7].

For some categories of citizens who receive free treatment, the costs are covered by the state or special funds such as Medicare and Medicaid. The goal of the programs is to cover all population groups and provide access to health care services to those who need them. Medicare is a government program that provides health care for people over 65 and people with disabilities. The program also provides disability benefits, inpatient and outpatient care, home care, and hospice care. This insurance program covers emergency medical care, including inpatient care, various diagnostic procedures, home health services, and short stays in a nursing home. This program is partially financed by a special tax on employees, some of which they pay themselves and some of which is paid by the employer. In general, this tax accounts for about 15% of the income of employed Americans. The other part of Medicare is financed by the gross income tax.

The state Medicaid program provides insurance for poor Americans. This program also includes the elderly, disabled, handicapped, pregnant women, and children. Medicaid affects five major activities: inpatient and outpatient care, consultations with various specialists, nursing home stays, laboratory diagnostics, and radiology techniques. Medicaid is funded by the federal and state governments. The federal government pays a share of Medicaid costs from general tax revenues, which is almost half of all costs, the rest is paid. In 1966, the U.S. Congress passed a law reforming Social Security in the United States. Under this law, each state in the country provides the federal government with a health care plan for the Medicaid-covered population. Once this plan is approved, the states will use federal money and their own revenue to fund health care services. Each state has its own Medicaid program, making it difficult to administer.

The ever-increasing cost of Medicare and Medicaid is one of the reasons for the U.S. budget deficit. The modern medical system is characterized by an unresolved interaction between the public and private sectors of the economy. Despite the fact that the state allocates huge funds for this sphere, it has no effective mechanisms to control prices and costs of services and medicines. As a result, medicine, which is almost entirely in private hands, turns out to be very expensive in practice, even if it meets American ideals.

Thus, the large expenditures on health care in the U.S. do not give the proper result, the problem of accessibility of medical care remains unsolved. The US model has both negative and positive aspects. Paid medicine calls citizens to order, obliges them to be attentive to their health.

It is clear that annual preventive check-ups under an insurance policy are much cheaper than starting a disease and treating it in a hospital or turning into a chronic form. Therefore, many academic economists are concluding that the American health care system needs to be reformed [6, 7, 8].

Paul Krugman, an economist and New York Times columnist, believes that health care in France, Britain, and Canada is better organized than in the United States [9]. Doctors also draw attention to the government health care program: America is “one of the industrialized countries where health care for the population is not provided by the state” [8,9].

The experience of health insurance in Germany is interesting. Germany is a country with more than a century of experience in the insurance industry. The first laws on insurance were adopted by Chancellor O. Bismarck in 1883 [6].

According to OECD statistics, total health expenditure in Germany in 2015 amounted to \$365.9 billion. Government spending amounted to 9.4% of GDP or 85% of total health spending. Personal spending amounted to 1.7% of GDP or 15% of total healthcare spending. According to 2015 data, per capita spending is about \$4,506 per year [10].

German health insurance is nationwide. All citizens with an income of less than 46,300 euros (about 60,000 USD) per year must be insured in one of 250 “sick leaves”. High-income individuals can be insured in these health insurance funds if they wish, or they can choose not to use the public system, Buying insurance policies from private firms [11]. each state government. In general, about 90% of the population prefers insurance in health insurance companies. In doing so, they have supplementary insurance that includes a package of services that is not included in the standard package. Health insurance funds are created by the income tax paid by the employer and the employee. The tax rate depends on hmo, but on average it is 15% [6,7].

The package of services included in the insurance includes doctors’ services, treatment of chronic diseases, inpatient care, diagnostic examinations, preventive measures, prescription drugs and partial dental services.

Germany is considered a world leader in providing high quality medical services. The largest medical centers in Europe providing high-tech medical care are located here. In addition to technical equipment of clinics (the equipment is renewed on average every 3-5 years), important factors are high level of specialists’ training, unconditional priority of the interests of the patient in treatment and service.

in the treatment and care of patients. Germany has one of the highest levels of expenditures on the health care system in the world.

The German Social Security Code defines the basic quality requirements that hospitals must meet in order to be eligible to enter the hospital plan and cover their costs. Since 2000, hospitals have been required to have internal quality management programs and to contract with hmo regarding external quality measures. Since that time, hospitals have been encouraged to participate in certification systems. Based on the model of the European Foundation for Quality Management and the European Quality Award System, the hospital evaluation system established by religious organizations, and the German Council for Transparency and Quality in Hospitals, two certification systems combining self-assessment and external evaluation were developed.

Since 2002, the minimum amount of services in Germany has been set by law. The contract partners, i.e. the association of health insurance companies, the German Hospital Association and the federal medical accounts, are required by law to issue a list of planned services that have a clear positive correlation between the volume of services and their quality. At the same time, providers are required to participate in quality control activities with an emphasis on documenting indicators in a form that allows for comparative analysis. In Germany, an independent organization BQS (Federal Bureau for Quality Assurance) for the inpatient sector has been established to help contracting authorities select quality indicators for monitoring and data collection through comparative presentation.

The UK is a prime example of the state model of health care. The main body regulating the health care system in the UK is the National Health Service (NHS).

UK, is the National Health Service (NHS). It is wholly owned by the state and is funded by general tax revenues. Total healthcare expenditure in the UK

According to OECD statistics for 2015 GDP was 9.8% or \$222.1 billion. Meanwhile, government spending accounted for 7.7% of GDP or 79% of total health spending. Personal spending amounted to 2.1% of GDP or 21% of total health spending. According to 2015 data, the average per capita expenditure was about 3423 USD per year [9].

The share of PHC financing in outpatient care is 90%. This means that the UK, like other OECD countries, prioritizes the development of primary health care. A PHC is a team of CPDs (or a team of CPDs) consisting of a GP, a pharmacist, at least one paramedic, a social worker, a psychologist, a dentist and an administrator.

In recent years, the introduction and development of various social programs and the provision of specialized services have become widespread in the UK.

The combination of elements of the budget and insurance model of health care is characteristic of South Korea. It is similar to the American system, in which

90% of medical institutions are private. However, medical services are paid for by a public insurance program under which all citizens contribute. In 2014, spending on pharmaceuticals and other medical supplies accounted for 22.4% of total healthcare spending. At the same time, spending on inpatient care amounted to 20% and outpatient care-34% [12, 13, 14].

Korea has one of the highest life expectancy rates among developed countries: since 1960, it has increased from an average of 52 to 78.8 years for men in 2015, while women's life expectancy jumped from an unprecedented 54 to 85.5 years. These results were made possible by a competent national health care system. An important success factor is the prestige of the medical profession [14].

There are three areas in the South Korean health care system: the state compulsory health insurance (CHI) program, the medical care program, and the long-term care insurance program.

The public health insurance system in Korea has three sources of funding: contributions, government subsidies, and tobacco premiums. Employees contribute 5% of their salary, and the employee and employer bear these costs equally. The state offers 14% of the program's annual planned budget. And the tobacco surcharge is 6% of the total program budget. It should be noted that the mandatory insurance covers 50 to 80% of the cost of treatment, with the remainder paid by the patient.

A medical assistance program was created for low-income families. For this program, the government pays all medical expenses for patients who cannot pay for medical services on their own. After 2004, the medical assistance program was expanded to include the elderly, hard-to-cure and chronic patients, and children under the age of 18. Currently, due to the government's financial difficulties, the medical assistance program is partially funded by Chi.

The long-term insurance program includes elderly people with functional limitations in daily life (Alzheimer's disease, Parkinson's disease, paralysis after a stroke, etc.). the introduction of this type of insurance was a forced measure by the government, which was faced with a dramatic aging of the population and a change in the traditional family structure. The long-term insurance program is financed by the payments of the insured persons, state subsidies and co-payments of the persons included in the program. The government finances 20% and service users pay 15-20%.

A distinctive feature of Korean health care is that patients can visit any doctor or any medical facility, including hospitals of their choice. While patients can visit clinics, hospitals, and general hospitals (including dental hospitals and traditional medicine centers) for PHC services, specialized care is provided at tertiary hospitals.

Patients choose their health care provider without significant restrictions on choice [16].

Although the MLA program includes free dental care, because many treatments are not included in the MLA program, the level of personal expenditures of citizens to receive this care remains relatively high. The government plans to expand the Chi program to include some additional dental services such as prosthetics.

In summary, the Republic of South Korea has made some progress, especially in achieving universal MLA coverage in such a short period of time. Achievements also include providing the population with quality health care at relatively low cost and ensuring unrestricted free access to health care facilities.

Health care models considered in the world practice show that each of them has its advantages and disadvantages. The models have been studied with the purpose of the possibility of applying the experience of these countries in the practice of Kazakhstan. The health care system in Kazakhstan retains administrative management methods, principles of allocation of funds mainly for the maintenance of the network, budget control, fixed salary. This leads to the fact that doctors can control statistics, hiding the real situation. The profession of a doctor remains inefficient and unattractive for the doctor himself, he feels the most unprotected link when he has to work in almost all specialized services and keep a large volume of reporting documentation.

For example, the provision of doctors per 10 thousand population is only 4 doctors, that is, one doctor has to serve 2,500 people, while in OECD countries the average number of population per 1 doctor is 1,500 people. The average monthly salary of a doctor is 115 thousand tenge (350 USD) [16, 17].

Kazakhstan is just introducing mechanisms of health insurance. The Law on Compulsory Medical Insurance was adopted on November 16, 2015, according to which the sources of financing are deductions and contributions and other sources not prohibited by the legislation of the Republic of Kazakhstan [17]. However, deductions and contributions employers and individual entrepreneurs begin to make from 1.07.2017, the state - from 1.01.2018 and the population - from 1.01.2019. State contributions amount to 4% of the average monthly salary and will increase to 7% by 2025. Contributions will increase from 2% of payroll in 2017 to 5% in 2020. Salaried employees pay 2% of their salary. And contributions of individual entrepreneurs will increase from 2% of income in 2017 to 7% in 2020.

As we can see, the amount of healthcare financing in Korea and Kazakhstan is different. Compared to other OECD countries, South Korea has a relatively low level of health care expenditures, but there is a steady tendency to its growth for comparison, let us give examples: in 2020, total health care expenditures in Kazakhstan amounted to 3.6% of GDP, and in Korea - 7.6% of GDP [1].

Summarizing the review and analysis of various models of health care in the world practice, we consider it appropriate to find some golden mean among the

health care systems considered for Kazakhstan. Thus, the health care of Kazakhstan in its health care model can combine some aspects of the Korean system with its comprehensive coverage of the population by MHI and the U.S. system with disciplined responsibility for one's health, as well as with the model of public financing of Germany. The main challenge is to develop a mechanism to incentivize improvement in the quality of medical services while controlling the amount of money spent. This can be achieved by optimizing the Consumption of health services by both users and producers, as well as by introducing evidence-based medicine. Currently, there is a period when the number of chronic and non-communicable diseases is steadily increasing. Therefore, the promotion of public health is only possible by shifting from the prevailing trend of treating diseases to expanding the range of preventive measures.

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身心障礙兒童工作上的人事問題

## PERSONNEL ISSUES IN WORKING WITH DISABLED CHILDREN

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抽象的。本文討論了腦性麻痺殘疾兒童的工作人員問題。這項工作探討了殘疾兒童的社會化、教育過程和復原問題，以及合格專家的培訓問題。據透露，該領域有必要對所有滿足殘疾兒童及其家庭現代需求的領域進行現代化改造。

關鍵字：人員、腦性麻痺、社會化、復健、殘障、資金。

**Abstract.** *this article discusses the issue of personnel in working with disabled children diagnosed with cerebral palsy. The work examines the problem of socialization, educational process and rehabilitation of disabled children, as well as the training of qualified specialists. It was revealed that in this area it is necessary to modernize all areas that meet the modern needs of disabled children and their families.*

**Keywords:** *personnel, cerebral palsy, socialization, rehabilitation, disability, funds.*

Cerebral palsy (CP) is a disease of young children that causes a number of disorders associated with brain damage. Consequences are identified according to the severity of the lesion, from mild to severe, such as coordination, cognitive, speech, developmental delays, and various disorders of the musculoskeletal system.

The number of children with disabilities worldwide reaches 17 million. This issue remains global for all countries of the world. Today there is no single answer on how to achieve long-term and stable results in the treatment of this disease. Of the many developments and treatment methods, there are some that have not been proven effective. This situation leads to disunity and disorientation among parents about which method is better and why.

The same issue arises in the training of personnel to work with disabled children. In Russia, on the basis of existing universities, institutes, and rehabilitation centers, a number of programs have been developed aimed at training specialists in pedagogy, psychology, defectology, rehabilitation and habilitation of children with various types of disabilities. Charitable organizations and foundations

conduct advanced training courses, online courses and trainings that include an integrated approach to theoretical and practical skills in working with disabled children.

The purpose of training is to provide high-quality and effective care. The main tasks of personnel training include:

Improving the qualifications and competence of teachers of higher and secondary educational institutions, primary school teachers, training specialists in working with modern technologies and innovative methods of habilitation and rehabilitation of disabled children, training volunteers and tutors. Tutor (English tutor - mentor) is a special pedagogical position in which a specialist ensures the development of individual educational programs for pupils and students and accompanies the process of individualization and individual education at school, university, and in additional education systems. In Russia, the job responsibilities of a tutor and the requirements for him are regulated by order of the Ministry of Health and Social Development of the Russian Federation.

Personnel training also includes programs for specialists working with families of disabled children, aimed at developing the social and communication skills of parents for successful interaction with society and integration of their children into a collective environment. The socialization of disabled children remains today a serious issue for society and the state as a whole.

A confirmed diagnosis of cerebral palsy is given to a child every year in Russia. Up to one year, the child is under the supervision of the attending physician and a number of specialists involved in his development until the age of one. These are rehabilitation specialists, massage therapists, kinesiotherapists, hydro-rehabilitation specialists and others. During this period, it is important to carry out a number of activities, the task of which is to encourage the child to develop his skills.

The development of a baby during the first year of life goes through several stages:

1. The newborn period from 0-1 month is an adaptation stage for the baby.
2. At 1-3 months, the baby begins to develop motor skills, head control, simple movements in the arms and legs, attempts to change body position, and rollovers.
3. Visual-motor coordination and walking are actively developing, and the skill of socialization is being developed when interacting with people around him.
4. 4-8 months, the active period for the child to demonstrate the skills of sitting and crawling, fine motor skills, speech development through attempts to pronounce syllables, communication skills.
5. 9-12 months, this is the period of standing and walking. Active use of gestures and speech for communication, hygiene, nutrition and self-care skills.

This is a general idea of the development of a child from 0 to one year, which may vary depending on individual characteristics and the pace of development.

But diagnostics in early childhood can reveal specific non-progressive motor disorders, the absence of one or another skill, which should alert parents and specialists who observe the child up to one year in order to prevent gross changes in development and promptly refer the child to the rehabilitation department, where comprehensive treatment will be taken activities aimed at acquiring by the child those skills that he does not possess. The sooner rehabilitation begins, the more actively the child begins to participate in the process of his development.

After the diagnosis of cerebral palsy is made, its form is determined. The use of various symptom complexes and examinations makes it possible to draw up a patient's rehabilitation card individually for each child for a certain period of time. Evaluating the effectiveness of these measures subsequently requires making adjustments to the rehabilitation program and further monitoring. Professionals who interact with the family of a disabled child must be prepared to work with such children and show empathy and competence in this matter. Professional psychologists and psychotherapists should work with the family. An important issue is in determining and prescribing rehabilitation programs and assessing the child's condition over a long period of time until adulthood.

In Russia, with the support of the state, many new centers for inclusive education are opening, and the quality of services provided to disabled children is improving.

“Accessible Environment” is a state program aimed at creating conditions for the integration of disabled children into society, ensuring accessibility in various spheres of life, with equal opportunities in education, healthcare, social protection, labor and other areas. The “Accessible Environment” program is long-term, its objectives are constant development and adaptation in accordance with the changing needs of disabled children and society as a whole.

The issue of training personnel to work with disabled children in Russia remains open, which indicates the need for more detailed consideration and improvement, as well as modernization of certain areas that meet the modern needs of disabled children and their families.

One of the areas of modernization is the educational process and training of specialists ready to work with disabled children. Existing educational materials are not suitable for learning by children with disabilities, which leads to learning difficulties and misunderstandings in the interaction between teachers and parents, so the development of adapted programs is necessary. The school's excessive demands for results give rise to school-family conflict.

The opportunity for a disabled child to receive education remotely, using on-line platforms and other electronic resources, makes it easier for parents to learn, but another issue arises - socialization. The child remains in a closed environment, away from society.

Contact with peers does not allow a disabled child to feel alone, and perhaps not immediately, but it increases his motivation to study over time. The exchange of information, as well as the desire to keep up with peers, are a good incentive for the development of the mental and physical abilities of a child with disabilities.

At the stage of education of a disabled child, primary school teachers in correctional classes are required to have the skill of forming groups of students who are similar in level of development. This will create conditions under which all students will feel equal, and the child's adaptation to the educational process and his assimilation of the material will proceed evenly.

Working material for specialized schools, adapted textbooks, workbooks, should be developed depending on the level of education and educational programs.

In Russia there remains a large shortage of personnel to work with children with cerebral palsy, with visual and hearing impairments. Audio and video materials adapted to the perception of information should be developed for them. It is also necessary to actively implement already developed interactive applications and programs that will allow the use of visual, audio and tactile stimuli to support learning and development.

Many authors who contributed to the development and developed methods and materials for working with disabled children in Russia, this is the basis on which correctional education relies today - one of the most famous and recognized authors in this area can be called A.N. Bernstein, V.I. Lubovsky, G.A. Volkova, E.M. Mastjukova, K.L. Semenov.

In the field of rehabilitation and habilitation, there is also an important issue regarding personnel training; there are not enough specialists sufficiently qualified in the field of etiology and pathogenesis of the disease in children with cerebral palsy.

The specialist must have various professional qualifications and understand that each child diagnosed with cerebral palsy is an individual, and the approach to him requires more than basic education and work according to a template can provide. Creative potential in a specialist's work should be established at the initial stage of training, where situational tasks are considered aimed at developing an individual approach to working with disabled children depending on their age, gender, degree of disability and other developmental characteristics.

State support for specialists to receive education using foreign methods recognized in Russia is important. Rehabilitation centers widely use methods such as Vojta therapy, Bobath therapy and others, but training for specialists in Russia and abroad is paid. An important task in the training of rehabilitation specialists is the introduction into the educational course of those methods that are evidence-based in Russia and increase the result.

Professionals trained to work with disabled children and their families must have a high level of education and morally stable qualities that contribute to ethical and professional behavior in the field of inclusion. Such as empathy, competence, responsibility, respect and tolerance, self-control and emotional stability.

醫學生日常壓力的研究  
THE STUDY OF EVERYDAY STRESS IN MEDICAL STUDENTS

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抽象的。在社會和政治方面發生劇烈變化的背景下，青年人的壓力感知問題具有重要的理論和實踐意義。這項工作的目的是根據醫學生的壓力感知程度來確定日常壓力。根據感知壓力的水平，確定了日常壓力源的具體情況及其對醫學生的重要性。基於這種特殊性，提出了減輕醫學生壓力水平的主要手段。

**關鍵字：**醫學生、日常壓力、壓力體驗程度、壓力感知。

**Abstract.** *The problem of youth perception of stress in the light of intense changes in the social and political aspects is relevant both theoretically and practically. The purpose of the work is to determine everyday stress in accordance with the level of stress perception of medical students. Depending on the level of perceived stress, the specifics of everyday stressors and their significance for medical students were identified. Based on this specificity, the main means of reducing stress levels for medical students are shown.*

**Keywords:** *medical students, everyday stress, level of stress experience, perception of stress.*

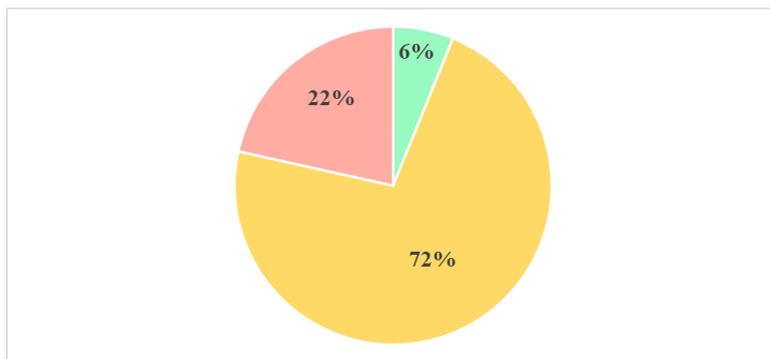
In the modern world, the economic and political situation has changed significantly in recent years, which causes concern for relatives and uncertainty about the future. Every person in everyday life encounters negative events, which are referred to as everyday stress [2, 3, 6, 7, 9]. Currently, a lot of attention is paid to the study of stress and stress resistance [1, 2, 3, 4, 5, 6, 7, 8, 9], but at the same time,

the specifics of stress perception by students - future medical workers, are not fully represented. for whom stress resistance is a professionally important quality [4, 8].

**The purpose of this study** was to define daily stress according to the level of perceived stress. The survey involved 65 first-year medical students from one of the Ugra universities. The average age of respondents is 19 years old, mostly interested in creativity or sports (89%), some students (19.5%) combine study with work. The survey was focused on assessing a specific period of students' lives (the last 4 months). The survey used the following methods: "Perceived Stress Scale-10" (PSS) [1], "Everyday Stressors Questionnaire" by M.D. Petrash, O.Yu. Strizhitskaya, L.A. Golovey, S.S. Savenyshev [7].

As part of the study, using the "Perceived Stress Scale-10" method, the level of stress perception by students was determined: 1 – low level (0-33%); 2 – average level (34-66%); 3 – high level (67-100%) (diagram 1).

**Diagram 1**  
*Percentage of respondents according to perceived stress levels (%)*



□ - low level (0-33%), □ - average level (34-66%), □ - high level (67-100%).

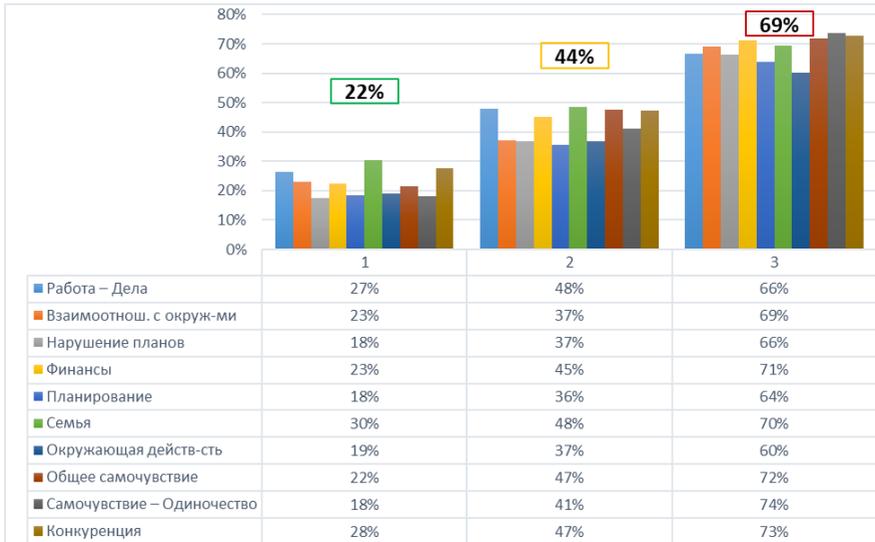
More than half (72% of respondents) have an average level of perceived stress. In accordance with these levels of stress perception, a list of everyday stresses was analyzed (Diagram 2).

The most stressful areas for students of the 3rd groups are experiences related to family, work/study and the need for competition. It should be noted that concerns about competition in the field of educational activities are relevant for all three groups, while groups with medium and high levels of stress are characterized by concerns about well-being. Thus, if for a group with a low level of perception of stress, competition is a trigger for adaptation processes, then for students of

other groups, less stress-resistant, competition is a depletion of personal resources, and even becomes a condition of isolation (loneliness). The least stressful for medical students is disruption of plans; the differences are statistically significant at  $p \leq 0.05$ , according to Fisher's test. This fact requires additional clarification, either planning has not been formed and is not a significant criterion for organizing one's time, or students are so labile that they easily rearrange their plans.

**Diagram 2**

*Everyday stressors according to perceived stress level*



*Note: Group 1 – low level of perceived stress; group 2 – average level of perceived stress; group 3 – high level of perceived stress.*

**Table 1**

*Everyday stressors according to level of perceived stress (%)*

Indicators	Group 1 (low perceived stress)	Group 2 (average level of perceived stress)	Group 3 (high level of perceived stress)
Work-businesses	27	48	66
Relationships with others	23	37	69
Violation of plans	18	37	66
Finance	23	45	71
Planning	18	36	64
Family	30	48	70

Surrounding reality	19	37	60
General health	22	47	72
Well-being - loneliness	18	41	74
Competition	28	47	73

Let's analyze the results of each group in more detail. In the group with a low level of perceived stress, there is a similarly low level of respondents' exposure to various stresses - an average of 22%. They are characterized by the presence of competition as a trigger for adaptation and lability, and, accordingly, the basis for resisting stress.

In the second group, respondents show an average level of exposure to stress - 44% of the maximum value. Many students note the absence of quarrels, conflicts during studies, and low sentimentality when reading books or watching films. An increased level of concern for loved ones is also visible in the area of responsibilities - the worry of being able to complete assigned tasks on time. Respondents in this group are characterized by tension in all components of everyday stressors and there is no differentiation of stressful situations (all areas are important).

In the third group, the indicators in all areas of observation are significantly higher than the average values (69%). The subjects had an intense feeling of loneliness, a fear of quarreling with someone, sleep disturbances, a feeling that they were getting sick, a lack of time to rest, and a lack of pleasure from leisure time. They have a high level of perception of stress in all areas of life. Loneliness and isolation, which cause a stressful state in students, indicate undeveloped communication skills.

Based on the analysis of everyday stress among medical students, we will formulate the main directions for counteracting stress:

- creation of your own system of orientation in the system of educational tasks, involving optimization of the educational process (creation of mind maps);
- expanding the list of areas of activity, mastering the "new" is a personal resource for psychological health and increasing the level of self-acceptance and development of communicative means;
- shifting the emphasis from competitiveness in educational activities to increasing orientation in the criteria of professionalism.

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預測霍奇金淋巴瘤患者骨礦物質密度降低的預防措施的模型  
**MODEL FOR PREDICTING PREVENTIVE MEASURES FOR  
REDUCED BONE MINERAL DENSITY IN PATIENTS WITH  
HODGKIN'S LYMPHOMA**

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註解。 關聯。 骨代謝受損直至發展為骨質疏鬆症，並與低能量骨折風險增加有關，可能會降低接受病因治療的年輕 HL 患者的生活品質。 這項研究的目的。 創建一個模型來預測接受致病治療的霍奇金淋巴瘤患者骨質疏鬆併發症的發展，以便採取旨在防止骨組織質量損失的措施。 材料與方法。 進行了一項回顧性橫斷面研究，納入 118 人，其中對照組 30 人，確診 HL 患者 88 人。 研究結果與討論。 使用遞歸劃分法進行生物統計分析，形成預後模型，以確定研究因素對最終結果的影響程度。 根據開發演算法的結果，對接受病原治療的 HL 患者是否需要預防骨質疏鬆症做出決定：0 - 未指示預防措施，1 - 指示預防措施。 決策樹使我們能夠建立一個相當有效的預後模型，使我們能夠預測 HL 患者在病因治療後預防骨質疏鬆的需要。 結論。 所開發的預後模型可以優化預防措施領域的決策，以減少 HL 患者的 BMD 和礦物質代謝紊亂。

關鍵字：骨質疏鬆症，預防措施，何杰金氏淋巴瘤。

**Annotation. Relevance.** *Impaired bone metabolism up to the development of osteoporosis, associated with an increased risk of low-energy fractures, potentially reduces the quality of life of young patients with HL who have received pathogenetic treatment. Purpose of the study.* *Creation of a model for predicting the development of osteoporotic complications in patients with Hodgkin lymphoma who received pathogenetic treatment, in order to initiate measures aimed at preventing loss of bone tissue mass. Material and methods.* *A retrospective*

*cross-sectional study was conducted, which included 118 people, of which 30 people were the control group and 88 patients with a confirmed diagnosis of HL. **Research results and discussion.** A biostatistical analysis was carried out using recursive partitioning methods to form a prognostic model in order to determine the degree of influence of the studied factors on the final outcome. According to the results of the developed algorithm, a decision is made on the need to prevent osteoporosis in patients with HL who have received pathogenetic therapy: 0 – preventive measures are not indicated, 1 – preventive measures are indicated. The decision tree allows us to build a fairly effective prognostic model that allows us to predict the need for osteoporosis prevention in patients with HL after pathogenetic therapy. **Conclusion.** The developed prognostic model makes it possible to optimize decision-making in the field of preventive measures to reduce BMD and mineral metabolism disorders in patients with HL.*

**Keywords:** osteoporosis, preventive measures, Hodgkin's lymphoma.

### **Relevance.**

Medical prediction models, which determine the likelihood of developing a certain complication over a certain period of time, are important for modern healthcare. At the same time, in hematology, a large number of different prognostic models are used using machine learning technology to predict the response to treatment and determine the risk of complications [1].

Hodgkin's lymphoma (HL) is a potentially curable hematological disease in oncology. However, the use of modern protocols of pathogenetic therapy, including cytostatic and immunological drugs, as well as glucocorticoids, can increase the lifespan of this patient group. One of the complications of antitumor therapy is the disruption of bone tissue metabolism, with a predominance of resorptive processes in the bone, due to factors such as the direct influence of tumor cytokines, the use of cytostatic drugs and glucocorticoids, as well as endocrine deficiency, hypodynamia, and others [5].

A decrease in bone mineral density (BMD) is probably more associated with pathogenetic therapy in patients with HL and has a long-term course and a mild state [6]. Disorders of bone metabolism with the development of osteoporosis are most often observed in patients who, in addition to standard courses of polychemotherapy, received autologous hematopoietic stem cell transplantation (autoHSCT) [3]. Impaired bone metabolism up to the development of osteoporosis, associated with an increased risk of low-energy fractures, potentially reduces the quality of life of young patients with HL [4]. Unfortunately, the mechanisms of development of osteoporotic changes in bone tissue in this category of people with HL are multifactorial and have not been sufficiently studied.

At the same time, early diagnosis and prevention of osteoporosis in patients with HL who received pathogenetic therapy remain very relevant for modern hematology.

**Purpose of the study.**

Creation of a model for predicting the development of osteoporotic complications in patients with Hodgkin lymphoma who received pathogenetic treatment to initiate measures aimed at preventing bone loss.

**Materials and methods of research.**

The study involved 118 people, of whom 88 received pathogenetic therapy for HL, and 30 were in the control group. The diagnosis of HL was made through histological and immunohistochemical examination of a peripheral lymph node biopsy. Patients with HL were divided into two main groups of 44 people depending on the scope of pathogenetic treatment. In the first group, patients received only standard polychemotherapy, and in the second group - standard polychemotherapy and, in addition to it, auto-HSCT. The study groups are comparable in gender and age, anthropometric data

To assess the condition of bone tissue, all study participants underwent dual-energy absorptiometry with calculation of BMD, T- and Z-scores in three main measurement areas: lumbar spine, femoral neck, proximal femur, and the trabecular bone index, used to predict risk, was also calculated occurrence of low-energy fractures.

Based on all the data obtained, biostatistical analysis was carried out using recursive partitioning methods to form a predictive model. In order to determine the degree of influence of the studied factors on the final outcome, a machine learning method called a decision tree was used. According to the results of the developed algorithm, a decision is made on the need to prevent osteoporosis in patients with HL who have received pathogenetic therapy.

**Research results and discussion.**

To create a predictive model, all variables were categorical and binary, i.e. had only two possible values. For example, the gender variable had only two values: male and female, which were converted into a dummy variable with values of 0 and 1, where females were represented as 1 and males as 0. Before conducting the analysis, all variables were transformed in a similar manner. Quantitative variables were converted into categorical ones based on clinical and diagnostic data for the convenience of interpreting the application of the obtained predictive model. For example, the disease stage, presented in a quantitative form from stage II to IV. The new binary variable received the values: II and III disease stages - 0, stage IV disease - 1.

Before starting to create the forecast model, we randomly divided it into test (20%) and training samples (80%), which allows us to obtain more accurate data. The biostatistical analysis method was built on the recursive division of categorical variables to obtain a predicted solution using the “Decision Tree” machine learning algorithm, the structure of which corresponds to the results of the need for preventive measures.

Selecting the categorical variables that define the prognosis endpoint is an important task in constructing a prognosis model. In our study, the following variables were empirically determined: gender, stage of the disease, densitometric study results, trabecular bone index value, chemotherapy regimens, and smoking status. Based on the results of application of the prognostic model, two possible outcomes are formed: preventive measures are indicated or not for this patient. Developed the prognostic model makes it possible to assess the degree of influence of selected risk factors on the likelihood of developing osteopenia/osteoporosis and predicts the likely outcome, allowing a decision to be made on the need for preventive measures [6].

Thus, preventive measures for osteoporosis are more likely in male patients with HL with stages III and IV of the disease, with an intermediate or high risk of developing low-energy fractures based on the level of trabecular bone index, who received pathogenetic treatment (except for ABVD regimens).

The need for these measures occurs less frequently in female patients with stage II of the disease who received standard chemotherapy according to the ABVD regimen and who have a low risk of low-energy fractures.

In order to control the quality of the created algorithm, we used it to calculate the likely need for preventive measures in patients from the formed study groups. The results are correlated with actual data in each specific case.

The constructed predictive model of the need for preventive measures to reduce BMD in patients with HL who received pathogenetic therapy allows us to assess the most important risk factors for osteoporosis and timely prescribe preventive measures.

The predictive accuracy of the model was tested on a test sample (18 patients, 20%). The effectiveness of the constructed model was assessed, its information content was studied, sensitivity and specificity parameters were determined, shown in Table 1.

**Table 1**  
*Informativeness of the model of the need for prevention (0 – not needed, 1 – needed)*

<b>Model quality criteria</b>	<b>Index</b>	<b>Validation</b>
Sensitivity	100.0%	100.0%
Accuracy	98.6%	100.0%
Specificity	97.0%	100.0%
Overdiagnosis	3.0%	0.0%
Hypodiagnosis	0.0%	0.0%

As can be seen from Table 1, the prediction model developed by us has excellent quality (90-100%), high accuracy (98.6%), specificity (97%) and sensitivity (100%). In other words, the value of our prediction model is that it has high sensitivity, specificity and accuracy.

Predicting the development of complications depends on a variety of factors, some of which cannot always be analyzed [3]. In our study, the creation of a predictive model of the need for preventive measures is one of the examples in real clinical practice. The Decision Tree technology allows you to quickly identify important predictors to achieve a forecast result, but is not a universal forecasting method.

In the process of creating a model for predicting the development of complications in patients with HL who received pathogenetic therapy, two main tasks were solved: first, the search for important predictors that influence the outcome being studied; the second is the creation of a forecasting model to predict outcomes.

The prognostic model we developed for the need for preventive measures to reduce BMD in patients with HL who received antitumor treatment is characterized by high parameters of accuracy, specificity and sensitivity [6], which is of high value in determining the need for the prevention of osteoporosis. This model correctly predicted indications for osteoporosis prophylaxis in 97% of patients.

Thus, the generated prognostic model can be used in clinical practice to assess the presence of indications for the initiation of preventive measures for osteoporosis in patients with HL after pathogenetic therapy.

### **Conclusions.**

The prognostic model allows us to determine indications for prescribing timely prevention of osteoporotic changes in bone tissue in patients with HL who have received pathogenetic therapy. This method allows you to optimize decision-making in the field of preventive measures to reduce BMD and mineral metabolism disorders in patients with HL.

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不同類型光伏電池透過冷卻的電效率分析

## ELECTRICAL EFFICIENCY ANALYSIS OF DIFFERENT TYPES OF PHOTOELECTRIC BATTERIES THROUGH COOLING

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註解。本研究比較了不同類型的冷卻 PEB 與傳統非冷卻 PEB 的性能。在這種情況下，與傳統的冷卻單晶PEB相比，發現功率增加了1.5W (3.2%)，單晶PEB的黑色保護塗層增加了1.7W (4%)，增加了0.3W (~ 1%) 對於多晶PEB。

此外，也發現冷卻的單晶PEB的填充因子比傳統的未冷卻的PEB高25%。

關鍵字: 單晶、多晶、光電電池、開路電壓、短路電流、填充因子、功率。

**Annotation.** *This study compares the performance of different types of cooled PEBs versus conventional uncooled PEBs. In this case, compared to the conventional cooled monocrystal PEB, it was found that the power increased by 1.5W (3,2%), the black protective coating increased by 1.7W (4%) for the monocrystal PEB, and by 0.3W (~1%) for the polycrystal PEB.*

*In addition, it was found that the fill factor of the cooled single crystal PEB was 25% higher than that of the conventional uncooled PEB.*

**Keywords:** *monocrystal, polycrystal, photoelectric battery, open-circuit voltage, short-circuit current, fill factor, power.*

It is known that the coefficient of performance (COP) of photoelectric batteries (PEB) drops sharply as their temperature increases [1-4]. Although there are several types of PEBs today, their general temperature dependent behaviour is the same [5]. Their efficiency decreases as their temperature increases compared to standard test conditions (STC,  $T=25^{\circ}\text{C}$ ). Therefore, there are problems with the performance of PEBs in hot climate regions. To avoid this problem, researchers have created combination devices designed to cool PEBs in different ways.

We will focus on examples of scientific research on cooling PEBs in countries with a climate close to the conditions of Uzbekistan.

[6] A water-based cooling system in northern Iran compared a 150W monocrystalline photothermal battery (PTB) with a maximum capacity of 150W

to a conventional PEB. The average uncooled efficiency of conventional PEB was 13.83%. To cool the panel, its electrical efficiency increased to 14.84% when water was transferred from its heat collector (HC).

In the study [7], coolers were installed on the back of the PEB to cool it. For more efficient PEB cooling, holes have been drilled in the upper and lower parts of the case. The cooling system works in automatic mode:  $\Phi\Theta\text{B}$  Above  $50^{\circ}\text{C}$  the coolers start working and below  $50^{\circ}\text{C}$  the coolers shut down. Turning on and off the coolers is done by the temperature sensor.

[8] focused on the production of more electricity by cooling the FEB using heat sink metals. For this, copper and aluminium plates are installed behind the PEB. The metal plates distributed the heat accumulated on the rear surface of the FEB to the air during the day (they acted as a radiator). Cooling the PEB using copper plates increased the efficiency by 4-6% compared to aluminium. Studies aimed at cooling FEB in such a passive way, various designs of cooling plates are presented in many studies [9-11].

In recent years, to improve the efficiency of different types of PEBs in natural conditions, we have installed HCs on their backs and are conducting experimental tests [12-13].

We conducted our next experiment in the days of July 2023.

The main aim of this experiment is to test different types of FIBs with a power of 50W under real conditions. In addition, by comparing the electrical parameters of PTBs with conventional PEBs of the same type, it is necessary to determine the electrical changes.

The research work was carried out using a mobile device mounted on a two-axle trailer of PEBs. The number of SCs in each PEB installed on it is 36, with a power of 50W at AM 1.5, and they differ by the type of silicon used and the colour of the back coating (Fig.1).



**Figure 1.** Measurement of PEB and PTB parameters in natural conditions

The device construction allows the FEBs to be manually repositioned around the horizontal and vertical axes.

The electrical parameters of PEB and PTB were measured in Tashkent conditions (at the heliopolygon of the Physical-technical institute) during the day in the mode of pointing to the sun by hand. In this case, the front surface of PEBs is directed to the sun by the operator every 15-20 minutes in order to ensure direct sunlight (90°).

The study was carried out in the period from 9:00 to 16:00 in the daytime based on the regime described above. The electrical parameters of the FEBs installed on the portable device were measured on July 12, 2023, under the conditions of air temperature of 40-43°C, and wind speed of 4-6 m/s.

The time dependence of solar radiation intensity and short-circuit currents incident on the surface of traditional and cooled FEBs on this date is shown in Fig. 2.

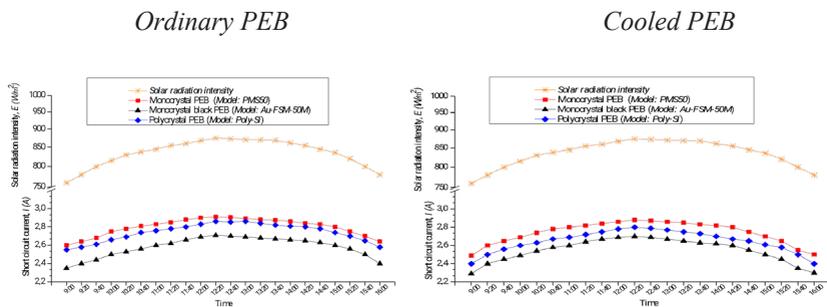


Figure 2. Time dependence of solar radiation intensity and short-circuit currents

At the beginning of the experiment (at 9<sup>00</sup>), water with a temperature of 20-25°C was sent to the HC of PTBs. The panel temperature is kept from rising sharply as a result of the water sent to the HCs carrying away the heat accumulated behind the PTBs. However, the temperature of ordinary PEBs increases during the experiment. As a result, their open circuit voltage (OCV) decreases in accordance with the temperature.

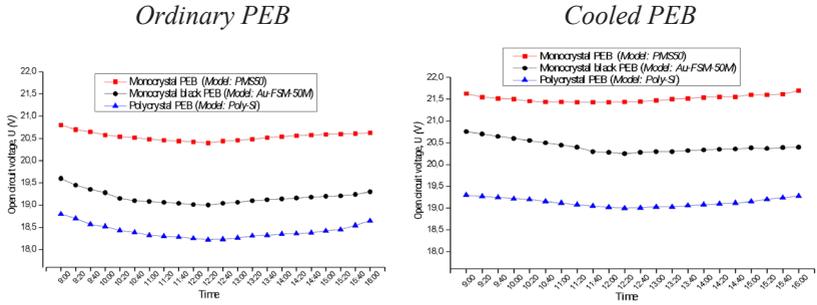
The equation for the dependence of OCV at temperature T is written in the following form:

$$U_{o.c.}(T) = U_{o.c.0} + \beta(T_0 - T) \tag{1}$$

where,  $U_0$  is the normal open circuit voltage at standard temperature (25°C);  $\beta$  –voltage temperature coefficient (mV/°C);  $T_0 = 25^\circ\text{C}$ .

When the temperature of the solar cell increases for every degree above 25°C, the voltage decreases linearly to -2.3mV/°C [14].

Figure 3 shows the time dependence of ordinary and cooled PEBs open circuit CV during the test.



**Figure 3.** Time dependence of open circuit voltages of PEB and PTB during the day

Arithmetic average values of OCV of ordinary and cooled PEBs were calculated using the graph presented in Figure 3. According to calculations, the OCV of ordinary and cooled monocrystalline PEBs was  $\sim 20.5\text{V}$  and  $\sim 21.5\text{V}$ ,  $\sim 19.2\text{V}$  and  $\sim 20.5\text{V}$  for black-coated monocrystalline PEBs, and  $\sim 18.4\text{V}$  and  $\sim 19\text{V}$  for polycrystalline PEBs, respectively.

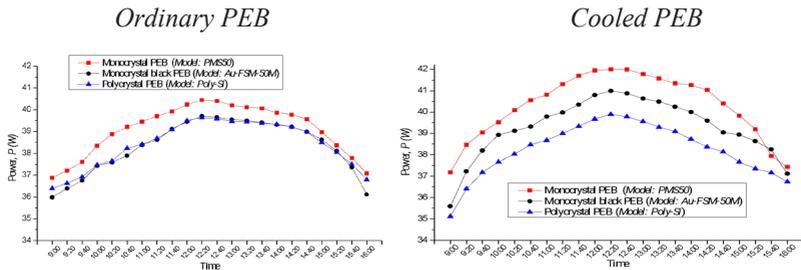
Figure 4 shows the time dependence of electric power in the mode of manually directing ordinary and cooled PEBs to the sun during the day.

The power  $P$  of ordinary and cooled PEBs is determined by the following formula:

$$P = I_n \cdot U_n = FF \cdot I_{sh.c} \cdot U_{o.c} \quad (2)$$

here,  $I_{sh.c}$  - short circuit current,  $U_{o.c}$  – open circuit voltage. FF is the fill factor of the volt-ampere characteristic (in modern solar cells it is 0.8 or greater).

Using the above information, the power of ordinary and cooled PEBs was calculated and a graph of the dependence of the capacity on the time of day was drawn (Fig. 4).



**Figure 4.** Time dependence of the power of PEBs in the mode of manually directing PEBs and PTBs to the sun during the day

As can be seen from the graph in Fig. 4, the maximum values of the powers of ordinary and cooled FEBs were:  $\sim 40.5\text{W}$  and  $42\text{W}$  for monocrystal,  $\sim 39.3\text{W}$  and  $\sim 41\text{W}$  for black monocrystal with protective coating, and  $\sim 39.6\text{W}$  and  $\sim 39.9\text{W}$  for polycrystal.

During the experiment, the volt-ampere (VAC) and volt-watt (VWX) characteristics of all types of conventional and cooled FEBs were measured when the sun reached the zenith point. However, in order to reduce the volume of data, we have presented VAC and VWX graphs of only the back protective white monocrystal-line FEBs among different types of FEBs (Figures 5, 6).

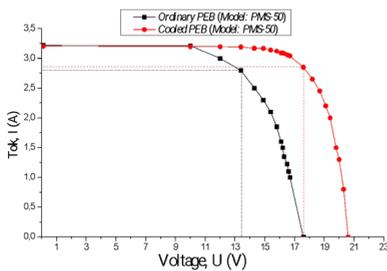


Figure 5. VAC plots of ordinary and cooled PEBs

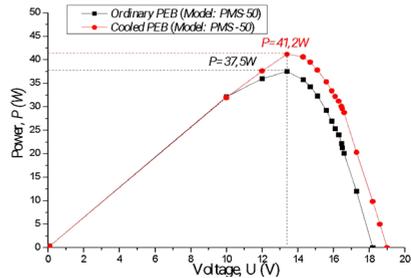


Figure 6. VWC graphs of ordinary and cooled PEBs

Using the data presented in Figure 5, we calculate the fill factor (FF) of ordinary and cooled PEBs. For this, we use formula 3.

$$FF = \frac{I_n \cdot U_n}{I_{sh.c} \cdot U_{o.c}} \quad (3)$$

In this case, if the current and voltage at the maximum power point for a simple PEB are equal to  $I_n = \sim 2,8\text{A}$ ,  $U_n = \sim 13,4\text{V}$  in the corresponding connection (Fig. 5), taking into account that the values of short circuit current and OCV are equal to  $I_{sh.c} = \sim 2,91\text{A}$  and  $U_{o.c} = \sim 20,4\text{V}$ , using formula 3, it follows that  $FF_{PEB} = 0,63$ .

For a cooled PEB (PTB), if  $I_n = \sim 2,8\text{A}$  and  $U_n = \sim 17,6\text{V}$  taking into account that  $I_{sh.c} = \sim 2,88\text{A}$  and  $U_{o.c} = \sim 21,44\text{V}$ , using the above formula, it can be calculated that  $FF_{PEB} = 0,79$ .

In Figure 6, the ordinary and cooled PEB values at the maximum power point measured at zenith were  $P = 37.5\text{W}$  and  $P = 41.2\text{W}$ , respectively.

### Conclusion

Different types of cooled PEBs were compared against the capacities and efficiencies of conventional uncooled PEBs of the same type. In this case, the power was increased by  $1.5\text{W}$  (3,2%) for monocrystal PEB,  $1.7\text{W}$  (4%) for black coating monocrystal PEB, and  $0.3\text{W}$  ( $\sim 1\%$ ) for polycrystal PEB. In addition, it was found

that the fill factor of the cooled monocrystal PEB was 25% higher than that of the conventional uncooled PEB. As a result of the experimental test carried out under natural conditions, the power at the maximum power point of FIBs with a heat collector is 3.7W higher than that of ordinary FEBs.

According to the results of the experiment, among the different types of conventional PEBs, the most effective PEB type in the Tashkent region is monocrystal PEB.

Regions of the republic have unique climate conditions that are not similar to each other. Therefore, we think that it would be appropriate to select a type of PEB with high efficiency for this area, using the portable photovoltaic device presented in the study, before establishing a large-capacity PES in these areas.

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使用不同解析度的編碼器獲取起重機電力驅動瞬態過程資訊的實驗評估  
**EXPERIMENTAL ASSESSMENT OF THE USE OF AN ENCODER  
OF VARIOUS RESOLUTIONS TO OBTAIN INFORMATION  
ABOUT TRANSIENT PROCESSES IN A CRANE ELECTRIC DRIVE**

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抽象的。實驗研究了編碼器解析度對馬達轉速測定精度和瞬態過程時間的影響。給出了所獲得的數據與理論計算的相應參數的比較。識別並評估了由於編碼器的設計特徵而導致的測量參數的誤差。對於特定的起重機驅動裝置，對編碼器的分辨率有合理的要求。

**關鍵字：**速度測量、起重機驅動、動態參數決定、起重機操作安全。

**Abstract.** *The influence of encoder resolution on the accuracy of determining the speed of an electric motor and the time of the transient process in it was experimentally studied. A comparison of the obtained data with the theoretically calculated corresponding parameters is presented. The error of the measured parameters due to the design features of the encoder was identified and assessed. In relation to a specific crane drive, there is a reasonable requirement for the resolution of the encoder.*

**Keywords:** *speed measurement, crane drive, determination of dynamic parameters, safety of crane operation.*

In modern safety devices, there is a tendency to increase the number of sources of primary (sensor) information to increase the list of determined operational parameters and their quality [1, 2]. Thus, one of the informative parameters about the operation of a crane is the speed of its drives, for measuring which encoders are most widely used [3]. However, at present, the functionality of encoders is limited

to the implementation of a feedback function to expand the control range with a frequency control circuit of the crane.

The construction of a new generation of crane safety devices determines the task of determining the speed of its mechanisms in transient processes [4] of starting / braking, as well as in steady-state areas of movement. Determining engine parameters based on theoretical dependencies is associated with an error connected with the accuracy of calculating the parameters included in the dependency and their changes during the operation of the crane (lubricant degradation, wear of parts, measurement and repositioning of gaps, etc.). This makes it necessary to directly measure the speed of electric engine of crane mechanisms.

Pulse sensors are used in various areas of industry [5] and, accordingly, have a wide range of characteristics selected based on the tasks, the main is the number of pulses per revolution.

The purpose of the study is to assess the influence of the resolution of the encoder on the accuracy of determining the time of the transient process and speed in a crane electric drive.

A comparison was made of the speed of movement of the crane mechanism for a characteristic section of the work cycle (start-up + steady-state movement), obtained by calculation and experimental methods.

The experimental installation is a laboratory overhead crane KMG-201 [6], the parameters of which are given in Table 1:

**Table 1.**  
*Parameters of the experimental setup*

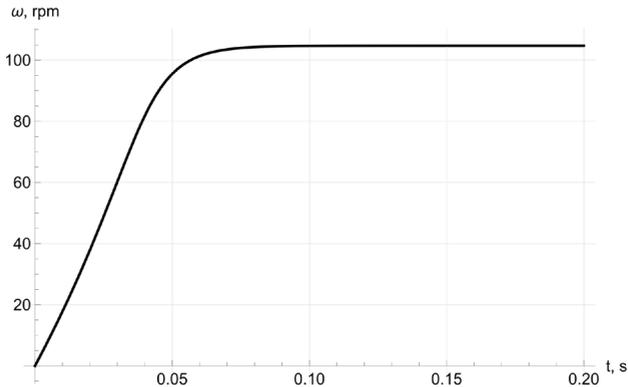
Tap	Load capacity	Lifting height	Engine mechanism rise	Lifting motor power	Rated speed	Cargo
KMG-201	2 t	8 m	MTKN -112-6	5 kW	915 rpm	10 x 0.2 t

The theoretical calculation of the speed in the operating cycle of the lifting mechanism was carried out by integrating the electric motor torque obtained on the basis of the Kloss formula [4], taking into account the moment of inertia of the drive. The simulation result is presented in Fig. 1.

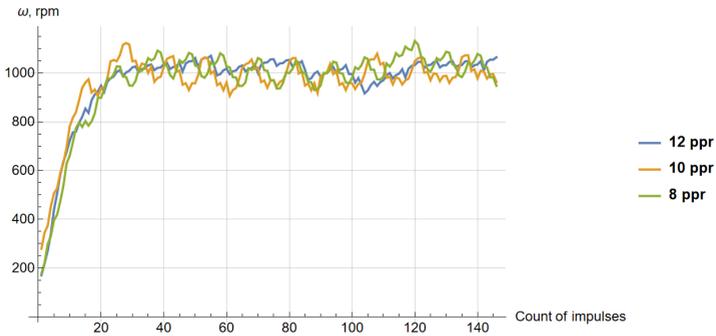
$$\omega = \frac{1}{J} \int \frac{2M_{cr}}{\frac{s}{s_c} + \frac{s_c}{s}} dt, \text{ where} \quad (1)$$

- J - the moment of inertia of the motor shaft;
- s - sliding of the electric motor;
- $s_c$  – critical sliding of the electric motor;
- $M_{cr}$  - the critical moment of the electric motor.

In the experimental part of the study, a pulsed optical speed sensor was used the FC-03 is paired with a set of discs that have different numbers of slots, allowing for simulation of different sensor resolutions (from 8 up to 12 pulses per shaft revolution).



**Figure 1.** The theoretically obtained section of the lifting mechanism operation cycle.



**Figure 2.** Type of experimental dependencies of the studied section of the cycle operation of the lifting mechanism.

Analyzing the section of the graph that describes the steady motion of the drive (see Fig. 2), you can notice that it contains a harmonic whose period is corresponds to the number of pulses per revolution, the amplitude of which is 10% of the average speed of the electric motor.

For each value of resolution, a series of experiments was carried out, but on the basis of which a tendency was revealed to reduce the spread of the calculated

time of the transient process with an increase in the number of pulses per encoder revolution (see Table 2).

**Table 2.**  
*Engine starting time, determined experimentally*

Number of pulses per revolution	Start section time, ms			$\bar{x} \pm \Delta x$
8	226	252	238	240±13
10	216	198	205	207±9
12	181	186	184	184±3

Analysis of experimental data shows that with an increase in the number of sensor pulses per revolution, both the error in determining the time of the transition process and its duration itself decreases. We see the reason for this in the impossibility of accurately fixing the moment of the beginning of the cycle. Instead, after some time from the start, when the engine speed has reached a non-zero value, the encoder reads the first pulse. Thus, the moment the engine starts is determined with an accuracy of one sensor pulse. Moreover, the greater the number of pulses per revolution, the less uncertainty.

Based on the study, it was concluded that when mechanisms are equipped with frameless speed sensors, the positioning of the disk relative to the sensitive part depends on the quality of installation. In this case, the accuracy can be increased due to software adjustment, which follows from the analysis of the steady-state portion of the movement. When measuring the time of transient processes in a mechanism, it is necessary to take into account the resolution of the encoder, which determines the amount of delay when recording the moments of the beginning / end of a movement section. Moreover, the lower the speed or the lower the number of sensor pulses per revolution, the higher the measurement error.

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蜂產品中的擬除蟲菊酯殘留

**PYRETHROID RESIDUES IN BEE PRODUCTS**

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抽象的。蜂產品中殘留的農藥對蜂科個體和人類都構成潛在危險。農藥的毒性作用多種多樣：從降低免疫力到致癌作用。因此，在使用蜂蜜和蜂花粉時，每個人都希望確保它們不會對自己的健康造成危險。合成擬除蟲菊酯等毒物在外在環境穩定性低，降解期快。溫度對農藥的分解有顯著影響。結果表明，當蜂蜜和花粉的儲存溫度從+25°C降低到+5°C時，殺蟲劑損失期縮短近2倍，不再表現出任何毒性。

**關鍵字：**蜂花粉、蜂蜜、擬除蟲菊酯、儲存條件。

**Abstract.** *The residual content of pesticides in bee products poses a potential danger to both individuals of the bee family and humans. The toxic effect of pesticides is diverse: from a decrease in immunity to a carcinogenic effect. Therefore, when using honey and bee pollen, each person would like to be sure that they do not pose a danger to his health. Such toxicants as synthetic pyrethroids have low stability in the external environment and a rapid degradation period. Temperature has a significant effect on the decomposition of pesticides. It is shown that when the storage temperature of honey and pollen is reduced from +25 °C to + 5 °C, the period of insecticide loss decreases almost 2 times and no longer presents any toxicity.*

**Keywords:** *bee pollen, honey, pyrethroids, storage conditions.*

Bees perform an important function in pollinating crops, so beekeeping is of great intersectoral importance, providing the population of the state with valuable products. Naturalness is the main advantage of beekeeping products, distinguishing them from other food products. However, as a result of human activity, xenobiotics can enter honey and beekeeping products even before extraction from the combs. Various classes of pesticides are used in agriculture. The most common are organophosphorus compounds and synthetic pyrethroids, which are widely used in agriculture as active pesticides (insecticides, acaricides, defoliants)

in the fight against pests of grain, fruit and vegetable crops. The mechanism of action of pyrethroids is similar to organochlorine pesticides. The most common insecticides from the pyrethroid class approved for use in the Russian Federation are cypermethrin, deltamethrin, permethrin, beta-cyfluthrin, lambda-cyhalothrin, tau-fluvalinate, etc.

Bees visiting agricultural crops where insecticides were used can lead to contamination of commercial bee products. Pesticide residues in beekeeping products pose a potential danger to both humans and all individuals of the bee colony. Numerous literature data indicate that honey and other bee products are excellent food products [1-6]. Honey and pollen are widely used not only as food products, but also as medicines in folk and official medicine. Of course, the quality and environmental safety of bee products must meet the highest requirements. One of the main preventive measures to prevent the harmful effects of pesticides on human health is to control their residues in food products.

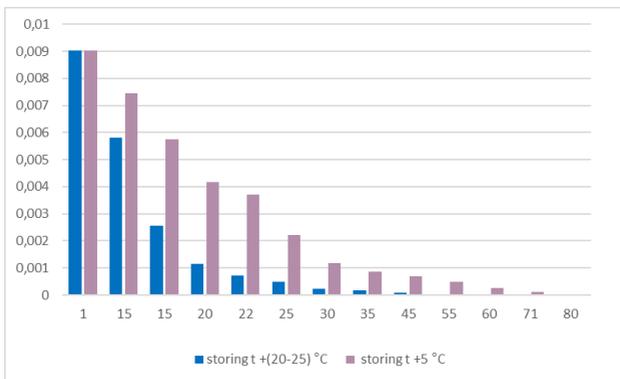
The state of the Russian regulatory framework regarding the control of pesticides in bee products, as well as the level of technical equipment of laboratory services, does not always guarantee the safety of domestic beekeeping products. In the USA, pyrethroid residues in honey are regulated by the US Environmental Protection Agency (EPA) and EU Regulation No. 396/2005, and maximum residue limits in honey have been set at no more than 0.05 mg/kg. [7, 8] In the regulatory documentation on food safety in force in Russia, in particular for beekeeping products, unfortunately, there are no maximum permissible concentrations for organophosphorus pesticides and pyrethroids, which are often found in honey and bee bread when studying the quality and safety of these products, since they pose a threat not only to bees but also to human health. Целью исследования было оценить наличие синтетических пиретроидов в продуктах пчел и проследить скорость их деградации.

Determination of pesticides in food requires sample preparation and analytical determination. All of these steps are necessary due to the varying chemical properties, complexity of matrices, and low concentrations of pesticides in food samples. Determination of residual amounts of synthetic pyrethroids (alpha-cypermethrin, tau-fluvalinate) in natural honey and pollen was carried out on a gas chromatograph "Kristallux-4000M" using a selective electron capture detector (ECD). Pesticides were identified by retention time determined using a calibration solution and quantified by absolute peak area calibration.

During the experiment, we set the task to monitor the rate of degradation of synthetic pyrethroids in honey and pollen during storage. A standard solution of a mixture of 15 pesticides was added to honey and pollen samples to obtain concentrations of 0.01 mg/kg. The samples were divided equally and stored at room temperature +25 °C and in the refrigerator +5 °C. The results show that when storing honey at room conditions +25 °C, after 15 days in its storage there was a

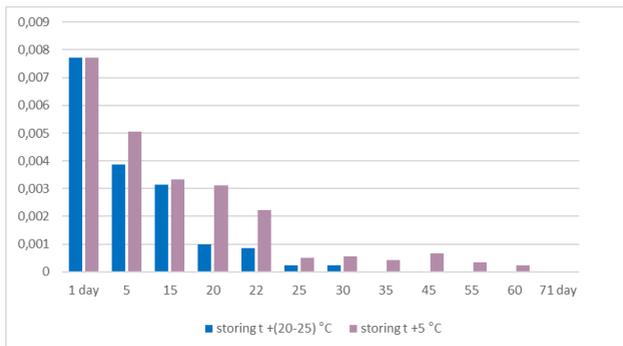
decrease in pyrethroids by 71.5%, when stored at room conditions and by 36.4% in honey that was in the refrigerator (Fig. 1).

After a month, the reduction was 97.6% when stored at room temperature and 86.8% when stored at +5°C. After 2 months, there were no pyrethroids in honey stored indoors. When honey was stored in the refrigerator after 2 months, the decrease was 97.1%, and on the 80th day they were not found there at all.



**Figure 1.** Decay rate of residual amounts of pesticides from the class of synthetic pyrethroids in honey during storage, mg/kg

In pollen, the amount of pesticides also decreases during storage, and their degradation depends on storage conditions. Thus, in pollen after 15 days, the decrease in the amount of synthetic pyrethroids was 59.2% when pollen was stored in room conditions, and when stored in a refrigerator, the decrease was 56.9% (Fig. 2).



**Figure 2.** Decay rate of residual amounts of synthetic pyrethroid pesticides in pollen during storage, mg/kg

After a month, no pyrethroids were found in pollen exposed to ambient air conditions. In pollen that was in the refrigerator on the 30th day, the decrease in pyrethroids was 92.8%. After 2 months, there were practically no pyrethroids in the pollen that was in the refrigerator, the decrease was 97.0%.

That is, the results of the study indicate that when the storage temperature is reduced from + 25°C to + 5°C, the half-life of insecticide loss is reduced by almost 2 times.

Thus, in honey, when stored at room conditions, the period of degradation and loss of synthetic pyrethroids is 35-55 days. When honey is kept at a temperature of +5 °C, the period of loss of synthetic pyrethroids is 60-80 days.

In pollen, toxicants also break down and their concentration decreases. In pollen, when stored under room conditions, the degradation period of synthetic pyrethroids is within 30-35 days. When pollen is kept in a refrigerator, the period of loss of synthetic pyrethroids is 55-70 days.

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蜂膠無人機育雛組合物的技術與感官指標

## TECHNOLOGICAL AND ORGANOLEPTIC INDICATORS OF THE COMPOSITION OF DRONE BROOD WITH PROPOLIS

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抽象的。雄蜂巢對環境因素的高度敏感度決定了其穩定性的需要。有幾種穩定雄蜂育雛勻漿的方法，這些方法是冷凍乾燥、吸附、引入蜂蜜組合物和酒精酞劑的組合物中。這些方法為特定應用提供了某些優點。對於直接攝入，吸附到乳糖-葡萄糖混合物是一種有前途的方法。濃縮蜂膠萃取物含有非常豐富的生物活性物質，將其引入組合物中既可以擴大產品的生物活性譜，又可以更好地保存雄蜂幼體的物質。本文描述了含有蜂膠萃取物的雄蜂育雛組合物的技術和感官特性。

關鍵字: 無人機育雛勻漿、蜂膠萃取、技術、穩定性、感官。

**Abstract.** *High sensitivity to environmental factors of drone brood dictates the need for its stabilization. There are several methods for stabilizing the drone brood homogenate, these are lyophilization, adsorption, introduction into the composition of honey compositions and alcohol tinctures. These methods provide certain advantages for a particular application. For direct ingestion, adsorption to a lactose-glucose mixture is a promising method. The concentrated propolis extract is very rich in biologically active substances, and can be introduced into the composition both to expand the spectrum of the biological activity of the product and to better preserve the substances of the drone brood. This paper describes the technological and organoleptic properties of the drone brood composition with propolis extract.*

**Keywords:** *drone brood homogenate, propolis extract, technology, stability, organoleptics.*

Drone brood homogenate (DBH) can be used for the production of innovative functional food products, dietary supplements and medicines. The complex chemical composition of GTR and the high amount of nutrients make it a perishable

product. Therefore, the issue of its stabilization is relevant. There are methods of stabilization by lyophilization (N.V. Iliesiu et al., 1983), honey, alcohol (N.V. Budnikova, 2011), adsorption on lactose-glucose adsorbents (L.A. Burmistrova, 1999). A number of dietary supplements and functional food products based on drone brood are produced. Apilarnilprop is currently marketed as a medicine in Romania by Sicomed. 1 tablet contains lyophilized apilarnil 10 mg and propolis 7 mg. In Russia, a bioadditive with a similar composition has been developed (E. E. Bogutskaya et al., 2020). Both honey compositions and adsorbed forms based on DBH are widely available on the market, but there is no information about the combination of adsorbed DBH and propolis extract (EP).

6% of the mass of DBH consists of lipids (N.V. Iliesiu, 1980), dicarboxylic acids, mono-, di-, trihydroxy acids, phosphoglycerides, glycerides, fatty acid esters, saturated and unsaturated fatty acids (N.V. Budnikova, 2011). The sulfhydryl groups, amino acids, vitamins, carbohydrates, hormonal components, and enzymes contained in DBH determine its high biological activity (L.A. Burmistrova, 1999). Unique decenoic acids are found in varying quantities in all beekeeping products (T.V. Vakhonina, 1992). In DBH, 9-oxodecenoic acid predominates, which has pronounced immunotropic properties, increasing the number of antibody-forming cells, and has an antimicrobial and wound-healing effect (G.Yu. Ishmuratov et al., 2003). Drone brood reduces the risk of death caused by disorders of the cardiovascular system, as it contains substances with antioxidant activity (Sawczuk R., 2018).

Propolis includes a whole range of flavonoid compounds and other polyphenols, the content of which reaches 88.5% (E.A. Vakhonina et al., 2015, E. Vakhonina et al., 2015a). Using the photolorimetric method, the total amount of flavonoid and other phenolic compounds is determined, which should be at least 25%, but sometimes this figure exceeds 70% (E.A. Vakhonina, N.V. Budnikova, L.A. Repeyeva, 2019). The use of concentrated propolis extract (EP) in the adsorbed composition is due to the fact that it does not contain significant amounts of alcohol, which leads to protein denaturation.

The goal of the work is to develop a composition based on DBH and EP using a lactose-glucose adsorbent.

To achieve the goal, the following tasks were set:

1. Preparation and incoming quality control of DBH and propolis extract,
2. Preparation of compositions containing 1, 2, and 3% concentrated propolis extract,
3. Determination of the most promising compositions based on a set of indicators.

The research material was drone brood adsorbed on a mixture of lactose: glucose (96:4), as well as a similar product with the addition of 1, 2, 3% propolis extract.

Organoleptic evaluation was carried out by blind tasting by five respondents. The appearance, color, smell and taste of the products were assessed.

To obtain raw adsorbed drone brood, the drone brood homogenate was mixed in a mortar with a pre-weighed amount of lactose-glucose mixture (96:4) and ground until a homogeneous mass was obtained. Propolis extract compositions were prepared by adding a weighed amount of propolis extract followed by grinding until smooth. The resulting intermediate product has favorable technological properties and is easily formed into briquettes, forming a plastic mass that is well suited to wet granulation. After this, the semi-product was first subjected to preliminary drying at a temperature of  $t = +4\pm 2$  °C for 24-48 hours, and then to vacuum drying. The uniform granulometric composition of the mass ensures high-quality uniform drying and preservation of volatile components.

EP gives the compositions a balsamic aroma characteristic of propolis with notes of honey, aromatic herbs, pine needles, and poplar. The aroma and taste increase in proportion to the content of propolis extract in the product, and at 3% EP the taste becomes excessively bitter and unpleasant, according to some respondents. Compositions containing 1 and 2% EP have a pleasant taste with a bitterness, more pronounced in the product with 2% EP, and the aroma of brood and propolis. With a propolis extract content of 3%, the product has a pronounced bitter taste, which is why a product containing 2% propolis extract was determined to be optimal.

**Table 1.**  
*Indicators of adsorbed DBH and its compositions with EP*

<b>product</b>	<b>96:4</b>	<b>1 % EP</b>	<b>2 % EP</b>	<b>3 % EP</b>
Appearance	elongated granules without extraneous inclusions	elongated granules without extraneous inclusions		
Color	white with a yellowish tint	light, yellowish	yellowish	bright yellow
Smell	brood-specific	characteristic of brood and propolis	characteristic of propolis and brood	characteristic of propolis, the smell of brood is insignificant
Taste	sweetish	sweetish, with barely noticeable bitterness	sweetish, with noticeable bitterness	sweetish, with pronounced bitterness, slightly spicy



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蜂蜜中某些水溶性维生素的含量  
CONTENT OF SOME WATER SOLUBLE VITAMINS IN HONEY

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抽象的。蜂蜜生物活性化合物的含量很大程度上取决于其植物来源，即由蜂蜜植物花蜜和花粉的化学成分决定。蜂蜜中维生素的来源是花蜜，很大程度上是植物花粉。蜂蜜的维生素含量因其植物来源而异，并且取决于其中所含花粉的维生素丰富程度。蜂蜜中的维生素含量较低，但与果糖、葡萄糖、矿物质、有机酸和生物活性物质结合，维生素的作用增强。以毛细管电泳法测定栗、向日葵、金合欢、酸橙和蕎麥蜂蜜中维生素核黄素和叶酸的含量。蕎麥蜂蜜比其他植物来源的蜂蜜含有更多的维生素 B<sub>2</sub>。与其他蜂蜜不同，栗子蜂蜜是叶酸的佼佼者。

关键字：蜂蜜，维生素，毛细管电泳。

**Abstract.** *The content of biologically active honey compounds largely depends on its botanical origin, i.e. it is determined by the chemical composition of nectar and pollen of honey plants. The source of vitamins in honey is nectar and, to a greater extent, plant pollen. The vitamin content of honey varies according to its botanical origin, and depends on how vitamin-rich the pollen contained in it is. The vitamin content in honey is low, but in combination with fructose, glucose, mineral salts, organic acids and biologically active substances, the effect of vitamins is enhanced. The determination of vitamins riboflavin and folic acid was carried out in chestnut, sunflower, acacia, lime and buckwheat honey by capillary electrophoresis. Buckwheat honey contains more vitamin B<sub>2</sub> than honey of other botanical origin. Chestnut honey is the leader of folic acid, unlike other honeys.*

**Keywords:** *honey, vitamins, capillary electrophoresis.*

Beekeeping is an important part of agriculture. One of the most valuable sources of nutrition in the modern world is beekeeping products due to their high biological activity, due to the rich content of nutrients necessary for humans. One of these unique products is honey. The nutritional value of honey, its rich composition, benefits, taste, have made it popular among supporters of a healthy diet. The chemical composition is influenced by such factors as the geography of collection,

climate, botanical origin, time of year, weather conditions, and the maturity of the product. The main sources for the production of honey by bees are, of course, nectar and pollen of honey plants, which contain a whole range of biologically active compounds: flavonoids, vitamins, amino acids, enzymes, etc. Therefore, honey is considered important a food product for the human body due to the presence of biologically active compounds contained in it in a balanced state. The content of biologically active compounds in honey largely depends on its botanical origin (i.e., they are determined by the chemical composition of the nectar and pollen of honey plants visited by bees, since the pollen falls off when the bee moves, and enters the nectar of plant flowers).

As is known, vitamins have high biological activity even in small doses [ 1 ] , thanks to them metabolism occurs, and the body acquires the ability to withstand the influence of unfavorable external factors. Honey contains small amounts of B vitamins and their content varies according to its botanical origin, and depends on how rich in vitamins the pollen contained in the honey is. Each of these vitamins affects the body of both the bees themselves and humans.

Riboflavin (vitamin B<sub>2</sub>) is one of the most important vitamins that is necessary for the normal functioning of cells in the human body. Vitamin B<sub>2</sub> is part of enzymes with the participation of which respiration processes occur and takes part in biosynthesis processes [ 2 ]. Thiamine (vitamin B<sub>1</sub>) is necessary in the implementation of biosynthesis processes, both in the synthesis of proteins, and in the synthesis of nucleic acids, and even fats. Pantothenic acid (vitamin B<sub>5</sub>), like others, is involved in the oxidation process. This is enzymatic oxidation. However, it also takes part in biological synthesis. Nicotinic acid, like other vitamins, is also of enormous importance in the body. It participates in biological oxidation processes. Nicotinic acid can also be synthesized in the human body, but with poor nutrition, its deficiency occurs, which negatively affects the condition of the body as a whole. Folic acid is one of the most widely discussed topics in modern nutrition research. The human body is not able to synthesize folic acid, so the daily need for folic acid is met by consuming foods rich in this vitamin [3]. Folic acid (vitamin B<sub>9</sub>) takes part in the synthesis of nucleic acids.

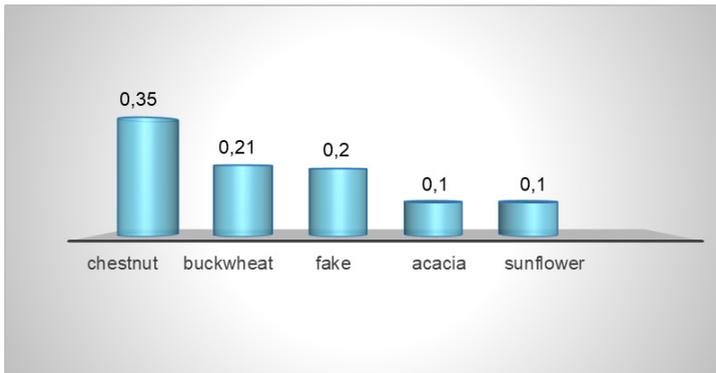
Folic acid is used for the synthesis, repair and methylation of deoxyribonucleic acid (DNA) [2], so it is especially important during pregnancy and childhood for continued cell division and growth [4]. A study conducted by Chinese scientists showed [5] that multivitamin supplements containing folic acid lead to a reduction in mortality from strokes.

The purpose of the research was to determine riboflavin and vitamin B<sub>9</sub> in honeys of various botanical origins. The research method used was capillary electrophoresis. The CE capillary electrophoresis method is based on the separation of charged components of a complex mixture in a quartz capillary under the action of

an applied electric field [6]. The essence of the method is the migration and separation of charged analyzed components under the action of an applied electric field. The honey sample was homogenized to achieve uniformity of the sample, then dissolved in an extraction solution for the extraction of a complex of B vitamins consisting of a solution of sodium tetraborate and a solution of sodium sulfite, the contents were thoroughly mixed until the crystals completely dissolved, after which the resulting solution was filtered and centrifuged. The resulting extract was used to determine vitamins.

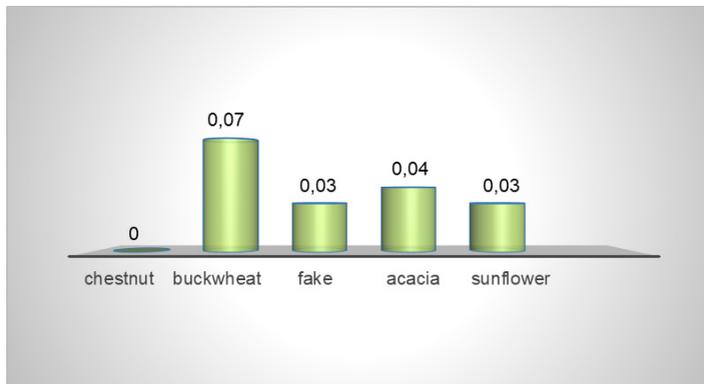
Were used for the study: buckwheat, linden, acacia, sunflower, chestnut. Palynological analysis is the most objective for assessing the botanical origin of honey, therefore the botanical origin of honey was determined by the number of pollen grains of a certain nectar plant species.

According to the results of the study, sunflower and acacia honey have the lowest levels of folic acid. But honey collected from edible chestnut flowers is among the leaders in terms of folic acid content (Figure 1).



**Figure 1.** Folic acid content, mg/100 g

But riboflavin was not found in chestnut honey, but there is a lot of it in honey collected from buckwheat flowers (Figure 2). And in other honeys the content of vitamin B<sub>2</sub> is almost the same.



**Figure 2.** Riboflavin content in honeys, mg/100 g

Thus, honeys of different botanical types contain different levels of vitamin B<sub>2</sub> and B<sub>9</sub>. The content of vitamins in honey is small, but in combination with fructose, glucose, mineral salts, organic acids and other compounds, the effect of vitamins is enhanced. Vitamins enter the body mainly from food. Some of them are synthesized in the intestine under the influence of the vital activity of microorganisms, but the resulting amounts of vitamins do not always fully satisfy the needs of the body. Therefore, natural honey has the right to occupy an honorable place in the diet of every person.

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