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**LEGISLATION UNIFICATION ON REGISTRATION OF SCIENTIFIC DISCOVERIES  
AND INTELLECTUAL PROPERTIES AS A RESERVE FOR ECONOMIC GROWTH  
OF COUNTRIES PARTICIPANTS OF "NEW SILK ROAD OF INNOVATIONS"**

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**Abstract.** The economies of various countries around the world today are based on the continuous creation and commissioning of modern, new technologies based on the results of scientific and technological progress. High-tech potential has become a prerequisite for ensuring a high level of competitiveness of the economy of any state. In this regard, countries are actively funding research, as well as encouraging individuals to invest in R&D.

One can definitely say that one of the achievements of fundamental science in the XX century is the discovery that allows you to find new perspectives by identifying various patterns, and, most importantly, serve as the basis for the subsequent creation of various inventions, models or designs.

For modern Russia, one of the key barriers to the transition to a postindustrial, innovative economy is imperfect legislation in the field of registration of scientific discoveries and obtaining further patents for the results of intellectual activity. As an alternative to solving this problem, we propose the project "legislation unification on registration of scientific discoveries and intellectual properties as a reserve for economic growth

of countries participants of "New Silk Road of Innovations", which can be implemented in the format of the "New Silk Road of Innovation" developed by the PRC.

**Keywords.** International trade, state foreign trade policy, post-industrialization, innovation sphere, scientific and technological progress, New Silk Road of Innovation, scientific discovery, patent law, intellectual property

In the modern world, when the growth rate of trade operations is much faster than the growth rate of industrial production and the capacity of national economies, the issues of competent construction of the state foreign trade policy are becoming especially acute [9].

Back in XVI – XVII, mercantilist scientists proved that in order to increase the volume of national wealth, economic entities should export expensive finished products and import cheap raw materials. In the XVIII century, classics deepened this postulate, proving that one should always try to supply those products in the production of which the subject has an absolute (minimum production cost) or relative (high labor productivity) advantage. In both cases, it was exclusively about the finished product. Economic thought in the XIX – XX centuries, which arose in the wake of successive scientific and technological revolutions, introduced a new concept into the theory and practice of cross-country rivalry for the markets for domestic products - a competitive advantage based on the education of the nation. Today, in the context of actively developing post-industrialization of the world economy, the idea that the gain in benefits from participation in international trade is possible only by establishing control over the R&D, production and subsequent sale of innovative, high-tech products has been raised to the rank of axiom. In XXI, a country that offers raw materials and products with a low degree of redistribution on world markets cannot become a leading subject of geo-economic space. For Russia and other countries of the former Soviet Union, this means the final economic desertification of their territories, which carries significant threats to national security.

According to the authorities of the Russian Federation, as well as a number of other Central Asian countries, a way out of this crisis situation in the medium term may be participation in the New Silk Road project developed in 2013 by PRC experts. It is assumed that the improvement (and in some cases the creation "from scratch") of the necessary format of the NSP infrastructure can give the participating countries new reserves of growth for their national economies.

Of course, this idea has a right to exist, especially since there are quite a few examples of how quickly countries began to develop that were actively involved in international trade by creating the appropriate infrastructure in them. It is not in vain that modern economists classify infrastructure as one of the key factors of production that increase the level of its national competitiveness [3]. However, we consider it important to emphasize that the Chinese initiative completely sounds like NNP INNOVA-TSIY. Chinese President Xi Jinping has repeatedly emphasized during his official speeches that contemporary trends in the development of the world economy, in particular integration and informatization, are decisive in its framework. It is for this reason that the project received such names as: "The New Silk Road of Innovations" and "One Belt - One Way" [6]. This means that along the transport corridors through the territory of the countries of Central Asia and Russia, manufacturers from the Middle Kingdom are planning to actively supply innovative products of their own production to Europe, which they began to prepare in advance for - to improve the system of registration of intellectual property objects. As a result, at present, the market value of Chinese enterprises, together with patents, amounts to several times more than just tangible assets [8, 10].

We believe that the optimum situation for joining the project in question should be a situation where all of its entities will have the opportunity not only to participate in international trade operations (often exclusively by providing their territory for transit), but the opportunity to generate their own proposal innovative products, which, along with Chinese, will also go to world markets according to the NShPI. The respective countries are more than ever interested in co-

operation and the development of joint ideas. However, we are deeply convinced that the results of this cooperation are immensely dependent on the excellence of the Russian patent system (as a leader in research and development among other participants in the NLPI format). It should become the foundation on which to rely in joint development [7].

Having analyzed the main "bottlenecks" of the Russian innovation sphere, we came to the conclusion that imperfect legislation is a huge problem hindering the process of commercializing the results of intellectual activity obtained in Russia [1]. It encourages Russian authors to register and receive patents not with us, but abroad, either under the Protocol of the Eurasian Patent Organization, or under the PCT International Protocol (in the same China). In the second version, the fact that the international protocol "PCT" is expensive and therefore not always available for Russian manufacturers of innovative products becomes a significant barrier to expanding further cooperation with China on an equal footing, on the other hand, patents registered in accordance with Protocol of the Eurasian Patent Organization, are not ratified in China.

An option to increase the innovative component in the structure of GDP and the commodity structure of exports of countries participating in the NLPI is the idea of unifying the legislation in the field of registration of scientific discoveries and intellectual property among the countries participating in the "New Silk Way of Innovation", which is laid down in our project.

Globally, the project meets a number of UN development goals declared in 2017.:

- promoting sustained, inclusive and sustainable economic growth, full and productive employment and decent work for all;
- creating a solid infrastructure, promoting inclusive and sustainable industrialization and introducing innovations;
- ensuring rational patterns of consumption and production;
- strengthening the means of achieving sustainable development and revitalizing the mechanisms of global partnership for sustainable development.

The mission of the project is justified by the need to increase the level of intellectualization of economies and ensure the economic security of the countries participating in the New Silk Road of Innovation - "Creating a unified system for registering scientific discoveries and intellectual property among the countries of the New Silk Road of Innovation" until 2025, through the conclusion of intergovernmental agreements."

In accordance with the mission of the project, we formulated its main goals and objectives.

**Goal №1.** Conclude and ratify the agreement on the creation of a unified system of registration of scientific discoveries and intellectual property between the participating countries of the "New Silk Road of Innovation" until 2025:

- Establishment of a political dialogue with the leading role of the Russian Federation with the participating countries of the "New Silk Road of Innovation" until 2020;

- Creation of an interstate expert commission on the unification of patent laws of the countries participating in the "New Silk Road of Innovation", in the period until 2021;

- leveling of external threats in order to maintain political stability in the participating countries of the "New Silk Road of Innovation" throughout the project.

**Goal №2.** To achieve a competitive, in comparison with the PRC, level of production of goods with high added value of the participating countries of the "New Silk Road of Innovation" (except for the PRC) in the period until 2035:

- an increase in the share of R&D expenditures in the GDP structure of the countries participating in the "New Silk Road of Innovation" to 1.5% in the period up to 2025;

- increase in the share of high-tech production of the countries participating in the "New Silk Road of Innovation" to 60% in the structure of production in the period up to 2030;

- the transition of the countries participating in the "New Silk Road of Innovation" to the post-industrial type of development of the national economy.

Goal №3. To ensure stable sustainable economic growth of the economies of the countries participating in the “New Silk Road of Innovation” through the development of high-tech sectors of national economies and the active attraction of foreign investment in the period up to 2040:

- deepening of cooperation processes between the countries participating in the “New Silk Road of Innovation” in the field of creating innovative, high-tech products in the period up to 2030;

- An increase within the New Silk Road of Innovation of export flows of goods with high added value, production of countries participating in the New Silk Road of Innovation (except the PRC) up to 2040;

- achieving stable annual GDP growth at the level of 2.5-3% of the countries participating in the “New Silk Road of Innovation” until 2040

In order to identify strengths and weaknesses, as well as assess opportunities and threats, we carried out a SWOT analysis of the project under development (Table 1), based on which conclusions were drawn about possible scenarios for its implementation, which can be either optimistic or and pessimistic.

In the first version, it is expected to create a unified system of registration of scientific discoveries and intellectual property, demanded by all countries participating in the “New Silk Road of Innovation.” In the second, reaching an agreement with the PRC on its ratification of the current protocol for patenting the EAPO.

Among the main risks accompanying this project, we attributed:

1. Increasing the role of external factors during the implementation of the project (from the countries of modern leaders in high-tech products, as well as from the United States, based on their geopolitical interests);

2. Lack of financial resources in the NSP participating countries for basic research;

3. Changing priorities in the national strategies of the NSP participating countries;

4. Lack of necessary factors of sufficient production of innovative and high-tech products in the countries participating in the NSP;

5. Loss of dialogue between the countries participating in the New Silk Road;

6. Involvement in the dialogue of a limited number of countries of the Greater Eurasian Space.

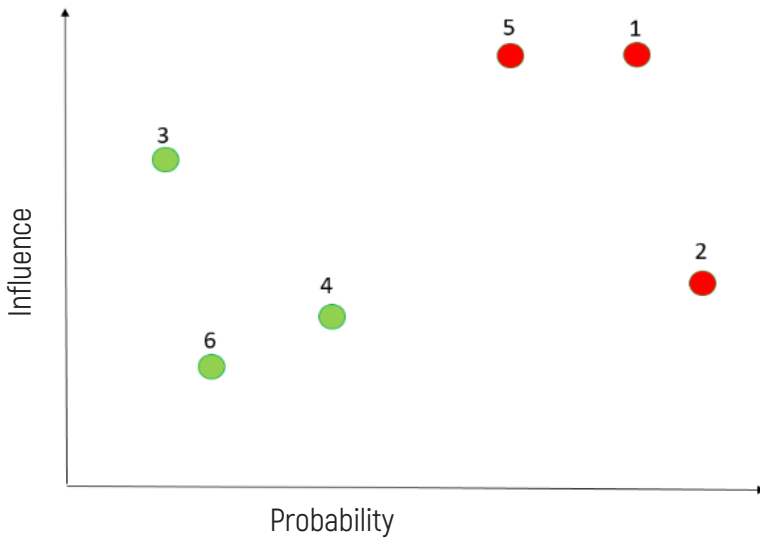
**Table 1.**  
**SWOT-analysis of the project "Legislation unification on registration of scientific discovers and intellectual properties as a reserve for economic growth of coun-tries participants of "New Silk Road of Innovations"**

| Strengths  | Weaknesses   |
|--|--|
| 1. Unified legislation in the field of registration of scientific discoveries and intellectual property among the countries participating in the "New Silk Road of Innovation";<br>2. Involvement in the dialogue of all countries of the Greater Eurasian space;<br>3. Stabilization of interstate relations and the general situation in the region; | 1. The complexity of the dialogue with the side of the People's Republic of China on the creation of a unified system of registration of scientific discoveries and intellectual property among the countries participating in the "New Silk Road of Innovation";<br>2. Involvement in the dialogue of a limited number of countries of the Greater Eurasian Space;<br>3. The need to restructure the budgets of the countries participating in the "New Silk Road of Innovation" in the direction of increasing the share of R&D;<br>4. Domestic economic and political problems in the participating countries of the "New Silk Road of Innovation"; |
| Opportunities  | Threats  |
| 1. The original idea of creating a "New Silk Road of Innovation";<br>2. The inevitability of the transition of the countries of the Great Eurasian Space to the post-industrial stage of economic development;   | 1. Loss of dialogue between the countries participating in the "New Silk Road of Innovation";<br>2. Pressure from modern leading countries of the innovation economy;  |

Source: compiled by the authors

The most probable and large-scale consequences were recognized risks of increasing the role of external factors, lack of financial resources, as well as loss of dialogue between the countries participating in the NLPI (Fig. 1).

As control events, we intend to sign intergovernmental agreements on the unification of legislation in the field of registration of scientific discoveries and intellectual property no later than 2025.



**Fig. 1. Risk matrix**

Data Source: Compiled by Authors.

We believe that this project has a right to exist. The importance of science, innovations, and the created high-quality infrastructure in advance has been identified and thoroughly studied by a huge number of both foreign and Russian specialists [2,4,5].



## References

1. Vinichenko Yu. V. On the civil circulation of exclusive rights to protected results of intellectual activity / Yu. V. Vinichenko // Problems of Civil Law: Coll. of sci. works - Irkutsk, 2008. - P. 50-59. - Bibliogr.: P. 58.
2. Kozyrskaya I. E. New Deglobalization Trends in the Modern International Economy: 2014 - 2016 / I.E. Kozyrskaya, Yu. V. Kuzmin, T.P. Dobrovolskaya, N.R. Epova // Eighth Oriental Readings of BSU: Coll. of sci. works - Irkutsk, 2017. - P. 65-72.
3. Porter M. International Competition. Competitive advantages of countries / M. Porter. - M.: Alpina Publisher, 2019. - 947 P.
4. Samarukha A.V. Development of the national innovation system / A.V. Samarukha, G.I. Krasnov // Bulletin of the Irkutsk State Economic Academy (BSUEP). - 2011. - № 1. - P. 49-53.
5. Samarukha V. I. On the paradigm of sustainable socio-economic development / V. I. Samarukha, T. G. Krasnova // Bulletin of the Irkutsk State Economic Academy (BSUEP). - 2010. - № 3. - P. 34-38.
6. Tavrovsky Yu.V. The New Silk Road of the XXI Century / Yu.V. Tavrovsky. - M.: Exmo, 2017. - 368 P.
7. Tyurina I.O. The influence of Russian patent law on the development of high technology: sociological analysis / I.O. Tyurina. A.V. Neverov, A.V. Chursina // Bulletin of the Peoples' Friendship University of Russia. Series: Sociology. - 2016. - № 14(16). - P.844-858.
8. Tsvigun I.V. Current status and development prospects of Russian-Chinese trade and economic cooperation / I.V. Tsvigun // Seventh Oriental Readings of BSUEP: Proceedings of the Intern. scientific Conf. 25th anniversary of the Department of World Economy and International business, Irkutsk, Nov 15. 2013 - Irkutsk, 2013. - P. 206-211.
9. Chepinoga O. A. Foreign trade of Russia in modern conditions / O. A. Chepinoga // Baikal Research Journal. - 2015. - V. 6, № 5.
10. Shalak A.V. Chinese dream through the concept of "soft power" / A.V. Shalak // Bulletin of the Irkutsk State Economic Academy (Baikal State University of Economics and Law). - 2015. - V. 25, № 3. - P. 564-568. - Rew. on the book: XVII All-China Congress of the CCP. The Chinese Dream and Peace / Ed. H. Huaguang, L. Jianzhang. - Beijing: Chinese Foreign Languages Publishing House, 2013. - 430 P.

## MARKETING RISKS OF THE DIGITAL ECONOMY

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**Abstract.** The article emphasizes the problem of managing marketing risks in the activities of the company, as well as methods of dealing with these risks. This struggle occurs by conducting market research and identifying such a thing as risk management, which is directly related to marketing and marketing risks. The article also presents the traditional methods of risk management in the field of marketing and presents such a specification as consumer or prohibited risks. A feature of this study is the introduction of a specific set of rules that contribute to the risk management process.

**Methods:** To conduct this study, we examined the work in the field of marketing, such authors as V.S. Stupakov "Risk Management", N.V. Murashkin "Marketing", article by OA Chagina "Risk management in marketing and others. The stages and techniques of identifying and managing marketing risks, which are described in detail in this work, were also studied. To fully understand the material, the concept of risk management was introduced.

**Keywords:** marketing, marketing risk, risk management, marketing research.

The study proposes a new methodology for managing marketing risks in the company. Earlier, similar techniques were highlighted in the works of T.V. Vorobeva, V.E. Shkurko, A.A. Kudryavtseva and A.V. Radionova [1,2,3]. This methodology differs from the methods previously proposed by the inclusion in it of a certain set of rules that contribute to the risk management process.

For the successful operation of the company, effective management is necessary in the conditions of a constantly changing market situation. The processes of integration and globalization in the global economy, the acceleration of the life cycle of services and goods, increased competition leads to instability of the marketing environment and, consequently, to uncertainty in the activities of the company. For this, corporate and marketing strategies are developed that allow the company to adapt to changes that occur in the market.

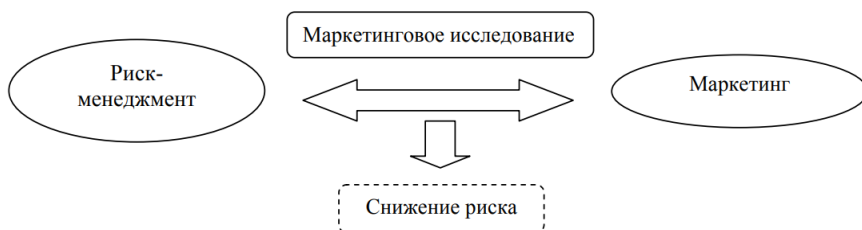
Marketing is one of the basic concepts related to managing a company regardless of its field of activity. First of all, it is aimed at identifying the needs of consumers, and secondly, at the effectiveness of the organization's goals. Success is achieved by an enterprise that is able to meet the needs of consumers in the most economical way and at the same time ensure effective interaction. Effective marketing activities allow the company to find a way to satisfy consumer values that competitors cannot provide.

Another important characteristic of marketing activity is the reduction of uncertainty in which any organization is located. The company may have budget planning, cost control, cash flow accounting, but all this will not be enough in the absence of understanding of profit.

Risk management and marketing are closely related to the functioning of the company. We can say that marketing is a risk management tool, since marketing activities make a significant contribution to reducing risk, the likelihood of its occurrence. This relationship can be easily traced by the example of marketing research.

For example, by correctly determining the level of demand for the company's products and consumer motivations, it is possible to increase the efficiency of managing financial resources of the company. If, as a result

of research, it turns out that the level of demand is lower than previously anticipated, management may decide to refuse to attract external funds in order to reduce the risk of an unbalanced capital structure. In the case of increased demand, it will be possible to revise the budget structure and refuse to raise additional funds, for example, a bank loan. The close relationship and interdependence of marketing and risk management can be schematically represented as follows (Fig. 1) [4].



**Figure 1 - The relationship of risk management and marketing**

Similarly, organizations and other marketing components are affected by the risk level. This applies to marketing strategies. So, for example, a competitive strategy will save you from wasting money in competition. If this is not avoided, unforeseen expenses may arise that will result in the takeover of this company or lead to complete bankruptcy. Other marketing strategies work similarly. All of them are primarily aimed at preventing or reducing financial risks and are used in conjunction with traditional risk management methods. For a complete understanding of the features of risk management in the marketing activities of the company, it is necessary to consider the concept of "risks".

Risk - is the possibility of the occurrence (danger of occurrence) of an adverse event, as a result of which the subject who made the decision aimed at achieving the goal loses all or part of his resources, loses the expected income or incurs additional material and financial expenses not stipulated by the plan [5].

This means that risk is a very complex phenomenon, inextricably linked with market conditions, socio-political conditions and even consumer psychology.

It is impossible to completely avoid risk, but each company has the option to choose a situation in which risk is minimized. In commerce there is a law: low risk - low profit, high risk - large profit. However, the risk is associated not only with the choice of a specific industry, the search for a suitable segment and the implementation of commercial operations. Marketing contributes to risk management, which is achieved through targeted actions to reduce risk to an acceptable value.

However, the risk may be associated with wrong or incorrect actions of the company, which is not able to assess and predict the risk, but it can also be caused by factors that are not subject to control of the company. Such factors are called objective risk factors, that is, factors independent of the company's activities. These include risk categories such as competition, inflation, and the economic and political situation in the country.

Factors that depend on the activities of the company are called subjective. These include: the production, economic and financial potential of the company, the qualifications of the marketing service, the state of the market infrastructure, etc.

In order to start taking risk management measures, it is necessary to identify the causes of risk. The main goal is to minimize risk. Risk management is a set of marketing activities for assessing potential risks and for conducting commercial, financial, credit, manufacturing, sales and organizational activities aimed at reducing risk or insuring it.

The objectives of risk management are as follows:

- a) conduct in-depth market research, assess the likelihood of risks;
- b) find a zone (market segment or market niche) with a lower level of risk (due to lack of or weak competition);
- c) to release and sell goods in high demand (sometimes unique in its properties);
- d) use reputable distributors;
- e) apply advanced methods of sale and trade services;
- f) ensure high financial and credit potential;
- g) secure risks.

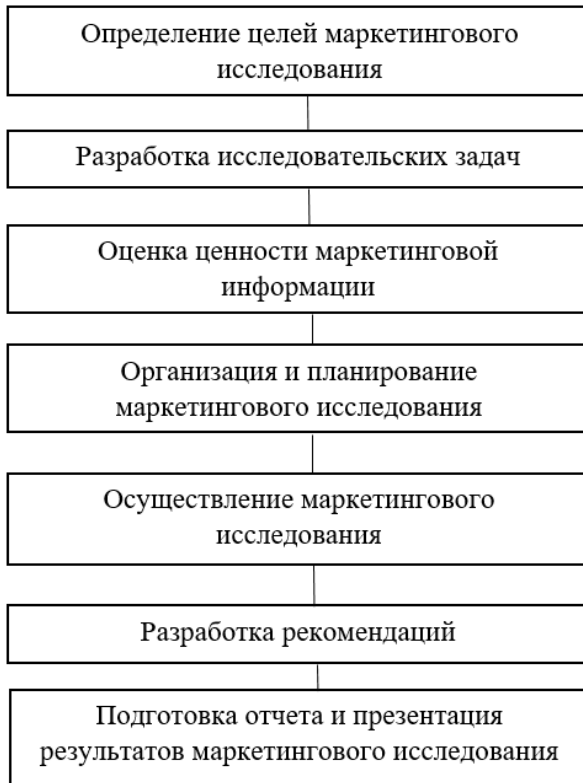
The risk management process provides for compliance with a specific set of risk management rules. These include the following:

1. You can't risk more than equity allows, i.e. the possible loss should be calculated, which must be compared with the capital;
2. The willingness to take risks forces us to allocate the appropriate capital, which we can risk in the expectation of a quick payback, the so-called venture capital;
3. We need to think about the consequences of risk;
4. One cannot risk much for the sake of small;
5. The decision to take a risk is taken only in the absence of doubts, and if there is any, it is prudent to avoid risky actions;
6. It is necessary to identify (predict) risk zones, to calculate various options for decisions that can be used as an alternative to the adopted one;
7. It is necessary to ensure caution, prudence when making decisions that entail the creation of risky situations;
8. Decisiveness and perseverance should be combined with flexibility in implementing decisions.

The article by O.A. Chagina [4] states that risk management of marketing research has its own characteristics and is closely connected with specific stages of the marketing research process. The stages that are shown in Figure 2 [5] are traditionally distinguished.

In order to identify risks, traditional methods for identifying risks associated with the economy are applied very often. Including, the preparation of a technological map of marketing research, which is a graphical interpretation of the technology of marketing research. Such a card can be useful in cases where it is necessary to identify the main elements of the marketing research process, on which its accuracy and reliability depend. Such elements are called nodal, since in the event of a violation of their main mode or failure at all, the entire process is suspended or leads to critical situations.

There are also other methods of risk management marketing research [6]. For example, such as: avoiding risks, that is, refusing to conduct such a study; taking risks upon oneself; elimination or prevention of losses; loss minimization; risk transfer to more specialized (qualified) performers from an external organization.



**Figure 2 - Stages of marketing research**

Another of the risk management specifications in marketing is consumer risks or, in other words, prohibited risks. A distinctive feature of this concept is its subjective side. That is, the specificity does not concern objective risk. Marketers, unlike actuaries and financiers who have the ability to use statistical and factual information to determine the probability parameters of the occurrence of certain events, are forced to take into account only the expectations and needs of average consumers. In turn, consumers have limited information, few attempts (i.e. product purchases), and an imperfect memory. In many cases, for the first time they are faced with a particular product/service. Thus, an accurate risk assessment is not possible. Even if it is possible to determine the value of risk, it will be the subjective perception of a particular consumer.

This concept allows you to look at the existing situation from the point of view consumer. This allows us to explain the behavior of consumers who most often seek to avoid mistakes, and do not seek to maximize utility. In addition, the concept of perceived risks allows the competent and cost-effective distribution of budget funds for various marketing events and, if necessary, adjust the development strategy of the company.

Thus, we found out that risk management in the field of marketing is another specificity of risk management, which is determined by the uncertainty of factors of the internal and external environment of the company when making decisions in the field of marketing, and which determines the procedure for detecting, evaluating and choosing a specific impact technique at risk. This marketing management function allows the company to minimize the costs of the company's marketing specialists and frees from the creation of new risk management methodologies. In order to identify and evaluate risks, traditional methods can be applied quite successfully, but the important factor for starting a successful marketing risk management activity is the detection of existing risks and the choice of methods to deal with them, depending on the characteristics of the external and internal environment of the company [7].



## References

1. Vorobyova, T.V. Risk management: training manual / T.V. Vorobyov. – Tomsk: Publishing House Tom. state arch.-build. un-ty. 2014. – 68 P.
2. Shkurko, V. Ye. Project risk management: textbook / V. E. Shkurko; [sci. ed. A. V. Grebenkin]; M-stry. education and science of Russ. Federation, Ural. Feder. un-ty. – Yekaterinburg: Publishing House of Ural. university, 2014. – 184 P.
3. Kudryavtsev A. A., Radionov A.V. Introduction to quantitative risk management: training manual / A.A. Kudryavtsev, A.V. Radionov. – SPb: Publishing house of SPb state university 2016. – 192 P.
4. Chagina O.A. Risk management in marketing // Scientific Bulletin of MSTU CA. – 2011. - № 167. – P. 91.
5. Stupakov V. S. Risk management: training manual / V.S. Stupakov, G.S. Tokarenko – M.: Finance and statistics, 2006. – 288 P.
6. Chernyakov M. K. Prediction of development trends of digital government (e-government) in post-Soviet countries / M. K. Chernyakov, M. M. Chernyakova // Journal of New Economy. - 2019. V. 20, № 4. P. 5–21 – 100 ex. - ISBN 2658-5081. - DOI: 10.29141/2073-1019-2019-20-4-1.
7. Chernyakov M. K. Dynamic model of social risks in the digital economy / M. K. Chernyakov, M. M. Chernyakova, K. C. Akberov // Advances in Economics, Business and Management Research. - 2019. - Vol. 81: Modern Management Trends and the Digital Economy: from Regional Development to Global Economic Growth : 1 intern. sci. conf. (MTDE 2019). - P. 373–378.

## **QUALITY INDICATORS OF INNOVATIVE PRODUCTS IN THE LIGHT INDUSTRY**

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The reputation of a quality enterprise is an important indicator of the profitability and performance of the enterprise. The concept of quality coincides with the early stages of human development. Product quality refers to the useful consumer properties of the product that reimburse the requirements of relevant regulatory and technical documents, including the ability to meet public demand.

Improving the quality of products is one of the most important tools for the enterprise to have certain advantages over its competitors, increase production efficiency, and save all resources. The quality problem is very complex and multifaceted. From a legal point of view, quality refers to a set of properties that indicate whether or not the products meet certain regulatory requirements. This approach to defining quality does not provide a modern marketing concept and quality management. Because its main principle is to reimburse consumer demand. In the newest, third, version of ISO 9000, the definition of quality is compact, concise and specific: quality means the actualization of requirements and expectations. When products or services are produced, quality is learned from the perspectives of all stakeholders, in other words, the opinions of not only the consumer, but also the collective of the enterprise, suppliers, investors, owners, and finally society as a whole. Thus, quality also means a system of relationships between all stakeholders, such as the product's properties.

Accordingly, the quality can also be defined as follows. Quality is a collection of properties that ensure the coordination of products and interests. According to one objective economic law, both public and private needs are always on the rise. This is not only the increase in production, but also their quality requires upgrading. In this regard, it is necessary to differentiate between the two concepts. One of them is quality assurance and the other is its improvement.

Quality assurance in the light industry means that the released innovative products and services are in line with the standards currently in force. So, if there is an attempt to eliminate a defect in the product during production, it does not mean an improvement in quality, but an attempt to adjust the product to certain standards. Quality improvement means the transition to a new, higher level of demand, in line with increased demand and market demand. The quality of products and services is characterized by a whole system of indicators because they are a combination of different consumer properties. These properties have conditioned the quality management process for many years. Quality management is a system of methods, rules and methods that allow the release of new product, its sale, or the provision of quality and affordable service to the fullest extent possible to meet the needs of consumers. The quality of industrial products is a combination of properties that reflect the level of novelty, reliability, durability, technical and economic efficiency, ergonomic, aesthetic, environmental and other consumer properties that are able to meet the requirements of the system of public relations.

Due to the transition to the market economy, in recent years, the quality of the product has been given more attention to international ISO 9000 series standards. The standards in force throughout the Republic are based on the generalization of science and technology results and practices and are aimed at achieving the optimum effect for society. Successful solutions to the problems of improving the quality of products in the light industry will prevent the negative consequences that may arise in the environmental and sociological sectors, the basis for economic growth, and the society, of course, can only benefit. First of all, it is necessary to point out that poor quality industrial products negatively affect the ecology of

both its production and consumption processes, polluting the atmosphere and the biosphere, causing serious damage to the soil, and causing various disorders in their organisms. Environmental and ergonomic measures should be developed and implemented at light industry enterprises.

The light industry is one of the most important industries for consumer goods. At the same time, light industry plays a great role in the development of economic and social situation in the country. First of all, there is always a great demand for the goods produced by the industry, ie, this sector is characterized by the rapid turnover of funds. Secondly, the technological turnover of this area includes agriculture, chemical industry and other areas. The main objective of this area is to meet the growing demand of all sections of the population to bring. The light industry is engaged in the production and processing of various products for the population: cloth, clothing, footwear, knitwear, socks and fur products, head coverings, textile and leather goods. In addition, light industry enterprises use tire yarn, fabric processing, wing yarn used in the metallurgical industry, linen fittings for the food and electrical industries, and ribbon strips for agriculture, as well as the entire industry. production and supply of goods, which are necessary for use in the fields. Therefore, the light industry enterprises, in addition to the consumer goods, are engaged in the production of raw materials and by-products for a number of industries. Currently, light industry accounts for only 1% of total production in the country, which is an extremely low indicator for this sector. In order to understand the reasons for such an indicator, it is important to study the overall state of the light industry and identify problems in its development. Thus, it is important to explore and find ways to develop this industry to enhance the potential of the light industry. One of the key areas of development is the need to apply ISO 9000 series quality standards to light industry in order to improve the quality of new products released. Strategic planning and quality policy create conditions for setting quality goals. The senior management should work out these goals to improve the organization's performance. Effective planning, provision, management and improvement of quality are essential for achieving competitive production in the light industry.

Analysis and evaluation of the current economic situation, technical and technological level, innovation activity and export opportunities of light industry in Azerbaijan revealed numerous reserves in the non-oil industry. Increasing the population's demand for consumer goods, the prevailing quality factor necessitates the implementation of comprehensive economic, technical, technological, environmental, social and institutional measures for the near and far future reconstruction and innovative development of the light industry. These factors give us the opportunity to use the ample opportunities for the development of the light industry in Azerbaijan. These include:

- strong historical traditions in the light industry;
- a rich local raw material base (cotton, spinning, cattle breeding, chemical industry
  - production of artificial and synthetic fibers);
  - favorable economic and geographical position in terms of transportation;
  - direct access to Central Asia and the Caspian region;
  - country's proximity to potential export markets;
  - close participation in the use of international trade routes;
  - opportunity and location of a number of productions in small and medium cities of the republic;
  - state-owned textile and weaving Complete privatization of most sewing enterprises;
  - energy security and availability of energy carriers of the country;
  - the EU does not impose any quotas on textile and sewing products for Azerbaijan.

The "Non-oil Industry Development Program of the Republic of Azerbaijan", developed in connection with the perspective development of the light industry, is based on the need to implement the following measures. The following measures may contribute to the development of light industry and high quality products:

- to support the reconstruction and operation of existing local industrial enterprises in the country;

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- Creation of new enterprises and strengthening of local raw materials, taking into account the raw material base on the basis of modern technologies;

- to study and apply the experience of foreign countries in the establishment of processing and manufacturing enterprises representing small and medium-sized businesses;

- to provide the state with the necessary support to modernize enterprises;

- granting preferential loans to enterprises operating in this area, reducing their income tax;

- creation of favorable environment for attraction of investments and support of investment projects;

- development and implementation of modern technology-based investment projects in the light and textile industry of Azerbaijan with a long-standing tradition, particularly in the production of clothing and other consumer goods and improving product quality; - introduction of new technologies and know-how to produce high quality and environmentally friendly products, expanding production of competitive hand-carpets, supporting the activities of enterprises in this field, etc.

In a market economy, the center of gravity is focused on addressing the issues of quality and efficiency of new products in the light industry. Now we cannot be satisfied with the significant increase in product output. We need higher quality products, which we can achieve by living less lively and well-rounded labor. This is a key factor in improving efficiency. The quality of the product requires, the level of production technology, the level of mechanization and automation of technological processes, its continuity, the quality of the primary materials, the energy level of labor, the scientific organization of labor, the general cultural level of production, safety and labor protection. and so on. depends on the factors. Increasing efficiency in a market economy system depends on the quality of our products and all our work. This is because saving high quality labor and resources, increasing export opportunities and, ultimately, better and more fully meeting society's needs. It is known that high-quality products are much less likely to be used and repaired It contributes to the use of force and resources. Thus, its benefits are

numerous. That is why the management of the light industry must constantly work to fulfill its responsibilities to improve product quality, and continuously improve the quality of production organization and culture, and to enhance the scientific and technical creativity of its employees. As well as expanding inventive and productive work at the enterprise, organizing exchange of experience, conducting quality reviews, creating quality teams, applying advanced forms of creative participation in improving product quality, and providing technological, patent and licensing information. should be taken seriously. The nomenclature of quality indicators in the light industry depends on the purpose of the product. In a multi-purpose product, this nomenclature may be more numerous. These indicators are measured by different measurement units. They can also be dimensionless. Product quality indicators also depend on the specifics of the area in which the product is used.

Currently, there is an increase in the volume and quality of innovative products as a result of reorganization of the light industry. As in other areas, as a result of the deepening of industry reforms, innovative products have become vital factors in the volume of production, expansion of the raw material base, assortment of products. There should be a qualitatively up-to-date establishment of local raw materials-based industrial enterprises in the regions and a policy of establishing new businesses. Taking into account the important role of the enterprise in improving the quality of products and reducing the cost of supply, providing high-quality and fresh raw materials, it is important to provide scientific and feasibility studies for the state's involvement in land management. As a result of the reorganization of the light industry, there is an increase in the volume and quality of products. The situation has improved in the areas of raw materials processing, weaving and sewing, leather and leather products. There have been significant improvements in the production of leather, leather goods and footwear in the Republic, and these opportunities should be used more efficiently. Thus, the introduction of innovative technologies in industrial enterprises will be stimulated, specialized and specialized industrial campuses will be established. Creation of special economic zones and establishment of industrial camps will be an advantage, given the potential of economic regions in the country.

## **FORECASTING THE EFFECTIVENESS OF THE PENAL SYSTEM**

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**Abstract.** The author's approach to predicting the time characteristics of the performance of the penal correction system (predicting the likelihood of relapse and its time) is substantiated. A forecasting tool is proposed, tested on a representative sample of data. The directions of development of the proposed approach are determined..

The results obtained make it possible to optimize the targeting of the activities of bodies and institutions of the penal system for working with the contingent of convicts, and thereby increase their effectiveness.

**Keywords.** The limited use of forecasting methods, factors of recidivism, quantitative characteristics of the probability and time of recidivism.

Penitentiary system is a system of considerable size and role in the socio-economic development of a country. The social economic results of the labor activity of the contingent of persons sentenced to conviction (as of October 1, 2019, over 533 thousand prisoners were held in penal correctional institutions) are significantly (3-5 times) lower than when working without freedom restrictions. This means that every 100 thousand able-bodied persons sentenced to imprisonment are equivalent to a reduction in the country's labor potential by 60-80 thousand people. More than 50% of recidivists are convicted, and their share is constantly growing. Direct budget expenditures on the maintenance of prisoners and staff of insti-



tutions are also significant. In this regard, there is an acute problem of reducing the state's loss of human financial capital from the content of prisoners convicted in mass.

The main goals of the penal system approved by the Penal Code and other federal laws are to correct convicts and prevent the commission of new crimes, both by convicts and other persons. These goals are recognized by key politicians, scientists, and law enforcement officials. However, the lack of tools for their quantitative assessment leads to significant restrictions on the management of system-wide goals, in particular, to ignore the activity and severity of recidivism in the results of the activities of this subsystem of law enforcement agencies. Many second and subsequent crimes are more difficult to solve, more cruel and often are connected with the involvement of new persons in criminal activity.

It should be noted that the exclusion of recidivism results from Penitentiary system performance evaluations is also justified by the fact that recidivism depends not only and not so much on the activity of the penal system, but on the socio-economic situation in the country and the activities of other law enforcement agencies. Penitentiary system receives people whose criminal potential has developed under the influence of the situation in society. In the process of serving sentences in Penitentiary system institutions, the accumulated criminal culture of convicts and the negative influence of the criminal environment are battled with the punishment as a punishment for a crime and the educational activities of the institutions. The result of this struggle may be:

- development of criminal skills and abilities of convicts, their approval in the continuation of criminal activity. Subsequent recidivism tends to become more severe, difficult to solve, or latent;
- decrease in the level of criminal potential of the convicted person due to the action of punishment factors, correctional activities of Penitentiary system specialists With this potential, convicts are released from prison. Their further fate and the real socio-economic losses of society are practically independent of the activities of bodies and institutions of the penal system (employment, acceptable living conditions, criminal connections).

Thus, the penitentiary system makes a certain contribution to reducing the socio-economic losses of society (limiting crimes during imprisonment, reducing the criminal potential of some who have served their sentences, etc.), as well as their significant growth (distracting a significant number of convicts from effective labor, significant budget financing of the Penitentiary system, etc.). Since the socio-economic losses of society from the activities of the Penitentiary system are not quantitatively measured, the main goals (correction of convicted and limiting crime) are replaced by the execution of a sentence and a set of departmental standards that are only factors in achieving the main goals. But the methodological problems of quantifying the socio-economic impact of law enforcement agencies, should not be the basis for refusing to use them in management and reducing the effectiveness of management.

In this paper, we substantiate the method and tools for determining the quantitative characteristics of the system-wide goals of the Penitentiary system and the results of their achievement by methods of forecasting theory. Their content is an individual prediction of the likelihood of a crime being committed by specific individuals who have served their sentence for previously committed crimes.

The main provisions of criminological forecasting, relevant for the present time, were formulated in the works of A.G. Avanesov [1 and others]. In particular:

- the main task of criminological forecasting was substantiated, which "consists in identifying the most important and effective ways to combat offenses in the forecast period based on the identified trends and patterns of future crime changes" [2, p. 36-37].

- the principle of selecting the main factors initiating the crime is substantiated, by the force of their influence on the probability of the conviction of a subsequent crime;

- it was established that the greatest influence on the tendency of the offender to commit a subsequent crime was recognized as a connection with the family and relatives, the life conditions of the convicted person after release, goals and life aspirations, educational and cultural levels. This conclusion is confirmed in the work of K. Barthel [3], the results of a study of domestic criminologists [4, 5 and others] and our analysis;

- it has been proven that the vast majority of crimes have, in addition to common crimes for all crimes, many individual, characteristic only of a particular criminal and random characteristics that are impossible to foresee. It is possible to detect and justify the patterns of change only in the analysis of crime based on representative samples, limiting the influence of random factors if possible. The most acceptable way to eliminate random factors in statistical modeling is the classification of recidivism and criminals by essential characteristics.

Along with the presence of certain results of the theory and practice of criminal forecasting, we note that the conceptual issues of assessing the effectiveness and efficiency of Penitentiary system institutions as a separate subsystem of law enforcement agencies have not yet been investigated. There is no unambiguous understanding of the social danger of post-prison crimes, since a method for its quantitative determination has not been developed. The concept of the contribution of the Penitentiary system to the general results of law enforcement activity in the form of reducing recidivism does not have a specific content. The factors determining the temporal characteristics of relapses, etc. have not been studied.

The objectives of this work are to expand the application of forecasting theory as a tool to improve the efficiency of managing the system based on highlighting the most significant factors in reducing crime. Conceptually, the authors' suggestions are as follows. The criterion for the performance of the penitentiary system and its institutions is the contribution to reducing the socio-economic losses of society from crimes by persons who have served their sentences of imprisonment. The main results of the contribution of the penal system are a decrease in the likelihood of post-prison crimes and their severity. Contribution characteristics cannot be determined from actual results due to the influence of factors independent of the Penitentiary system's activity, but they can be determined as expected (predicted) results. Assessment of the contribution allows excluding from the results the influence of recidivism factors independent of the Penitentiary system's activity by forecasting of these characteristics of convicts for the period of serving the term of imprisonment.

The approach used by the authors to predict the likelihood of post-prison crimes is based on the identification and integrated assessment of criminogenic factors, based on expert and statistical estimates of the likelihood of relapse of convicts before conviction and after release. Master's program of the Academy of the Federal Penitentiary Service in 2012-2015 under the "management" program, only 56 experts, including a tori article.

The classification of factors (the allocation of 3 groups of factors) was performed by the authors in accordance with the objectives of the study according to the conditions and place of their formation. The first group is the factors that determined the likelihood of convicts committing a recidivist crime at the time of sentencing for the previous (basic) crime. We will call these factors the personality characteristics of the convict at the time of admission to the Penitentiary system. The second group is the factors that determined the change in the likelihood of a relapse for the period of execution of the sentence (stay of the convicted person in the institution) for the underlying crime. The third group - the factors of resocialization of the convict after release (characteristics of the conditions of stay in society). For each factor of the group, the experts established the level (severity) ranges ( $F1_{ikj}$ ,  $F2_{ikj}$ ,  $F3_{ikj}$ ,  $j=1...M$ ). It is assumed that the influence (expert assessment) of each factor of the group on the likelihood of a relapse by the  $i$ -th convict ( $S1_{ik}$ ,  $S2_{ik}$ ,  $S3_{ik}$ ) depends only on the strength of the factor.

The list of factors of the first and second groups, contained in the works of leading domestic and foreign criminologists [3,4,5, etc.], and the authors' studies [6,7], showed the appropriateness of distinguishing and accounting estimates ( $F1_{ikj}$ ,  $S1_{ik}$  and  $F2_{ikj}$ ,  $S2_{ik}$ ), given in table 1.

The most likely value of the forecast of relapse by the  $i$ -th convict at the time of admission to the Penitentiary system ( $\rho_i1$ ), is

$$\rho_i1 = \sum_k S1_{ik} \cdot \sum_j F1_{ikj} \tag{1}$$

The risk of recidivism after release (without taking into account the influence of living conditions after release) is determined by the accumulated criminal potential at the time the previous crime was committed, and the effectiveness of the sentence (punishment) and activities of Penitentiary system bodies and institutions

The probability of recidivism after release (without taking into account the influence of living conditions after release) is determined by the accumulated potential of the previous crime, and the behavior characteristics of the convicted person in an institution are

$$\rho_i^2 = \rho_i \cdot 1 + \sum_k S_{ik}^2 \cdot \sum_j F_{ikj}^2 \quad (2)$$

The correlation of the probabilities of post-prison relapse before and after serving a sentence - a criterion for the effectiveness of the Penitentiary system:

$$R1 = 1/N2 \cdot \sum_i \sum_k S_{ik}^2 \cdot \sum_j F_{ikj}^2 \quad (3)$$

$l=N2$  - the number of convicts released from the institution (s) during the assessment period.

Condition  $R1>0$  reflects the positive contribution of the Penitentiary system to law enforcement and vice versa.

A simplified example of assessing the likelihood of relapse before and after release (without taking into account the recommended level of significance of individual group factors) is given in table 1.

**Table 1.**  
**Assessment of the risk (probability) of relapse of the convict**

| Groups and risk factors  | Significance of group indicators, S | The factor level of the i-th convict F=+100 -100, points, | The influence of the factor on the probability of relapse, %, (example) |
|--|-------------------------------------|---|---|
| 1  | 2                                   | 3   | 4   |
| <b>1. Estimates at time of arrival at Penitentiary system institution</b>  |                                     |   |   |
| 1.1. Category of crime committed (robbery)   | 0,05                                | 40  | 2   |
| 1.2. Type of crime (single offense)  | 0,1                                 | 20  | 2   |
| 1.3. Attitude to work  | 0,15                                | 0   | 0   |
| 14. Characteristics of the personality that affect the likelihood of relapse (aggressiveness, unrealistic claims in relation to one's life arrangement)  | 0,1                                 | 50  | 5   |
| 1.5. Systematic consumption of alcohol and psychotropic substances   | 0,15                                | 50  | 7,5   |
| 1.6. social behavior before committing a crime   | 0,2                                 | 30  | 6   |
| 1.7. The age of the convict, years.  | 0,05                                | 30  | 1,5   |
| 1.8. Family characterization   | 0,2                                 | 50  | 10  |
| Total, the likelihood of post-prison convicts being admitted to the Penitentiary system<br><b>-34%</b>   |                                     |   |   |
| 2. The probability factors for post-prison relapse determined by the behavior in the institution (factors influencing sentences and educational activities), "-" - decrease in the probability of relapse, "+" - increase in probability |                                     |   |   |

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| Groups and risk factors   | Significance of group indicators, S | The factor level of the i-th convict F=+100 -100, points, | The influence of the factor on the probability of relapse, %, (example) |
|---|-------------------------------------|---|---|
| 1   | 2                                   | 3   | 4   |
| 2.1. The dynamics of attitude to work in the institution  | 0,2                                 | 0   | 0   |
| 2.2. Lifestyle in the institution. Attitude to the established order of serving a sentence  | 0,2                                 | +10   | +1  |
| 2.3. Attitude to the criminal subculture and the criminal leaders of the institution  | 0,1                                 | -30   | -3  |
| 2.4. The dynamics of socially useful relations with society   | 0,1                                 | -10   | -1  |
| 2.5. Participation in social events of the administration of the institution  | 0,1                                 | -20   | -2  |
| 2.6. Life plans and intentions after liberation   | 0,2                                 | -20   | -4  |
| The influence of the Penitentiary system on the likelihood of convicts committing post-prison relapse: a decrease in the probability of serving a sentence on <b>9%</b> |                                     |   |   |
| 3. The influence of post-prison relapse factors determined by the living conditions of the convict in society,%   |                                     |   |   |
| 3.1. Employment opportunities for work acceptable for the convicted (specialty, qualification, attitude to work, validity of claims).                                   | 0,2                                 | +50   | +10   |
| 3.2. Living conditions  | 0,15                                | +20   | +3  |
| 3.3 Marital status (family quality)   | 0,15                                | +20   | +3  |
| 3.4 financial problems  | 0,1                                 | +30   | +3  |
| 3.5 Social environment and social contacts  | 0,25                                | +50   | +12,5   |
| 3.6. Life monitoring by law enforcement services and assistance in social adaptation  | 0,15                                | -20   | -3  |
| The general influence of factors of the third group: a 28.5% increase in the probability of relapse   |                                     |   |   |

In total, according to the example of one of the convicts, the calculations showed that the probability of a relapse accumulated for the underlying crime was 34%. The serving of sentences (punishment and the activities of staff of correctional institutions) reduced the likelihood of relapse to 25%. Unfavorable living conditions after release increased the likelihood of relapse to 53.5%.

Of considerable interest in the fight against relapse is the assessment of the period of "maturing" of a convicted person who has been released to commit a new crime. This period is equal to the time interval between release of a previous crime and the commission of a subsequent one, or the time interval between commission of related crimes minus the term of imprisonment for the previous one. The authors fulfilled such a forecast [8] according to information from the police department of the Russian regions for 2014 and the first half of 2015, including data on 430 individuals, who have committed 1038 recidivism crimes during this period. The largest number of them (45.5%) were committed by persons aged 21-30 years. The period of "maturity" of relapse was used as an effective sign of correlation-regression models. The full set of factor attributes {X} was determined by experts, of which the included in the model (Table 2) have a low level of multicollinearity with an acceptable level of significance of influence on the resultant attribute.

**Table 2.**  
**Matrix of pair correlation coefficients**

|    | Y- relapse maturation period, years | X1- age of previous crime, years | X2- the number of crimes committed, units | X3 - served term of imprisonment for a previous crime, years | X4 - severity of the previous crime, grades (1-low, 2- medium, 3-severe, 4- especially severe) |
|----|-------------------------------------|----------------------------------|---|--|--|
| Y  | 1                                   |                                  |   |  |  |
| X1 | 0,18                                | 1                                |   |  |  |
| X2 | -0,3                                | 0,17                             | 1   |  |  |
| X3 | 0,71                                | -0,05                            | 0,05                                      | 1  |  |
| X4 | 0,24                                | 0,05                             | 0,01                                      | -0,05  | 1  |

Regression Equation:

$$Y_{est} = 2,05 + 0,01 \cdot X1 - 0,45 \cdot X2 + 0,75 \cdot X3 + 0,09 \cdot X4$$



The multiple correlation coefficient is 0.72, the average relative error of 1.3 years confirm the legitimacy of using the model for preliminary estimates of the timing of the relapse after release. In case of early release of a convict for a previous crime, factor X3 is adjusted for the terms of the early sentence.

The sequence of assessing the temporal characteristics of the relapse of convicts held in the Penitentiary system:

- persons stand out from the convicts; a preliminary assessment of the likelihood of relapse is quite high;
- information is generated that is necessary for a quantitative assessment of the probability of relapse (table 1). An expert assessment of the level of factors and their significance is carried out, the probability is calculated;
- information is generated on factors determining the period of relapse of previously identified individuals. The time of "ripening" of relapse is calculated;
- information is communicated to the penitentiary inspectorates and police.

### **Conclusions and directions of development of the method**

1. Assessment of the Penitentiary system as a subsystem of the law enforcement system, the criteria for the effectiveness and efficiency of which are not defined, can only be predictive.

2. A significant limitation of the validity of law enforcement research, including the Penitentiary system, is the inconsistency and reliability of statistical data on the conditions of the commission and the results of post-prison relapses.

3. The method for quantifying the temporal characteristics of relapses described in the article has certain limitations that can be eliminated with its further development. In particular:

- criteria estimates are represented by deterministic values. It is advisable to analyze and take into account the laws of their distribution;
- verification of the developed assessment tools was performed by the authors on a limited amount of statistical information. The expansion of the volume of empirical data, the quantity and quality of examinations will increase the objectivity of assessments of the strength and significance of factors of post-prison crimes;

- forecasting the time characteristics of relapses should be supplemented by a forecast of the expected socio-economic losses of society from crime. To this end, it is necessary to develop tools for assessing and measuring social and economic losses of post-prison relapse.

4. The need to take into account the forecasts of the activities of the law enforcement system, including the Penitentiary system, of the unpredictable consequences of relapses mentioned in the works of N.N. Taleba [9] "Black Swans" and the development of relevant recommendations should be acknowledged.

### References

1. Avanesov G.A. Theory and methodology of criminological forecasting. Ed. "Legal literature." – Moscow, 1972.

2. Barthel K. Psychology of criminal behavior. – St. Petersburg: Prime-EUROSNAK, 2004, P.32-57.

3. Antonyan Yu.M. Criminology: textbook for bachelors. -2nd ed., Revised. and add. – Moscow: Publishing house Yurayt, 2012. – 523 P.

4. Gorodnyanskaya V.V. Post-prison relapse: monograph. / Ed. V.A. Utkina.- Moscow: Yurlitform, 2012. -168 P.

5. Terekhin V.I. Penitentiary system effectiveness: essence and methods of quantification: monograph. – Academy of the Federal Penitentiary Service of Russia, 2014, 182 P.

6. Terekhin V.I., Chernyshov V.V. The effectiveness and efficiency of the penal system: assessment and planning: monograph. – Academy of the Federal Penitentiary Service of Russia, 2019, 2012 P.

7. Terekhin V.I., Chernyshov V.V. Statistical analysis and prediction of recidivism. // Man: crime and punishment. №2, 2016.

8. Taleb N.N. Black Swan. Under the sign of unpredictability – 2nd ed. ext. /

Nassim Nicholas Taleb; Trans. from English – Colibri, ABC – Atticus, 2015. – 736 P.

## APPOINTMENT OF JUDGES IN THE RUSSIAN FEDERATION

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**Abstract.** This article discusses the problems of appointing judges, draws attention to the principle of separation of the executive and judicial powers on the strategies used to build confidence in the judiciary

**Keywords:** judicial authority, increasing the stability of magistrates tenure

In any democratic society, it is imperative that judges are independent of other public authorities. The principle of separation of powers is of great importance in the selection and appointment of judges. The order in which they are appointed affects the public perception of judicial independence. The need to maintain public confidence is especially important for the judiciary, which, by virtue of its independence, is not directly responsible to any electorate. Building trust in the judiciary is almost an end in itself. The executive and legislative branches of government can be involved in this process, provided that thus appointed judges are free from any influence and pressure<sup>1</sup>. The Group of States of the Council of Europe against Corruption in its opinion "Prevention of Corruption against Members of Parliament, Judges and Prosecutors" of October 18, 2017. notes that the selection process requires further improvement. Greater attention should be paid to the ethical qualities and honesty of candidates for judges. The integrity test used in the selection, appointment and promotion of judges can be carried out on the basis of objective criteria and in such a way as to guar-

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<sup>1</sup>See: Judicial seminar of the European Court of Human Rights "Building confidence in the judiciary" // Bulletin of the European Court of Human Rights.2019. № 4. P. 127-148.

antee respect for the independence of the judiciary, including by reducing the influence of the executive branch in the process of appointing judges. Another aspect is that, in addition to being independent and impartial, they must be perceived as such by the public, which is paramount to the trust that the public must have in the justice system. This principle should also be reflected in the selection process of judges, and it is necessary that such a selection process be as transparent as possible.

The IX All-Russian Congress of Judges, speaking about the status of judges in the Russian Federation, noted that the selection of candidates for judges should be carried out in strict accordance with the norms of the Constitution of the Russian Federation, the Federal Constitutional Law "On the Judicial System of the Russian Federation" and the Law of the Russian Federation "On the Status of Judges in the Russian Federation". The use of other criteria for candidates for judges is contrary to law<sup>2</sup>. As part of the implementation of the institutional reform of justice, the mechanisms for the selection of candidates for judges and qualification requirements for them have been legislatively tightened. The legal foundations of the activities of the Higher Examination Commission, examination commissions of constituent entities of the Russian Federation and the Higher Qualification Collegium of Judges of the Russian Federation (hereinafter HQCJ), qualification collegiums of judges of constituent entities of the Russian Federation (hereinafter - QCJ), which are designed to ensure the most objective and transparent process for the selection and appointment of judges for society, have been radically transformed.

In order to ensure the objectivity, impartiality and independence of the members of the qualification collegium of judges, the federal legislator provided guarantees to exclude extraneous influence on the decisions made by it, including on bringing the judge to disciplinary liability. So, the QCJ of the constituent entities of the Russian Federation are composed of judges of the federal courts, judges of the constituent entities of the Russian Federation, members of the public, representatives of the President of the Russian Federation according to established standards of representation; at the same time, judges are elected by secret ballot at the con-

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<sup>2</sup>See: Resolution of the IX All-Russian Congress of Judges // Judge.2017. № 1. P. 52 - 63.

ference of judges of the constituent entities of the Russian Federation to the composition of the respective qualification collegiums of judges, court chairpersons and their deputies cannot be elected in them (Art.11 of the Federal Law "On Judicial Community Bodies in the Russian Federation"), and judges in the qualification collegium of judges occupy a dominant position, making up almost two thirds (two thirds minus one) of the total number of members. This norm ensures the independence of the qualification collegium of judges from external influences when deciding on the issue of bringing a judge to disciplinary liability, excluding any negative impact on its decision by persons not included in its composition.

In the Russian Federation, a rather complicated process for the selection of judges based on a competitive exam has been developed. In this system, several stakeholders are involved in the process leading to the appointment of judges. The overall responsibility for the selection of candidates rests with the qualification collegiums of judges, the organization of exams is controlled by examination commissions, it is necessary to have a representation of the chairman of the relevant court, submitted to the President of the Supreme Court of the Russian Federation on the appointment of the recommended person for the position of judge. Further, a representation of the President of the Supreme Court of the Russian Federation, introduced in the established manner to the President of the Russian Federation on the appointment of a recommended person to the post of judge, is required. This process also significantly depends on the Commission under the President of the Russian Federation for the preliminary consideration of candidates for the positions of judges of the federal courts even before the actual appointment will be made by the President of the Russian Federation. The key principles for selecting personnel for a judge's position are specific rules for the selection of candidates: passing a competition for a position, appointment. Personnel selection serves as an effective guarantee for the prevention of corruption. The selection procedure for judges consists of 5 stages.

1. Conducting a qualification exam and assessing the knowledge of the applicant.
2. The presence of a positive opinion of the relevant qualification collegium of judges.

After passing the qualification exam, the qualification collegium of judges decides whether to recommend the candidate to the chairman of the court, where there is a vacancy. The submitted materials (application, documents submitted by the candidate, exam results, etc.) must be reviewed by the HQCJ QCJ within three months and the QCJ entity within one month from the day they are submitted. In addition, a check on the honesty of candidates for judges must be carried out by a qualification collegium based on both information received from various government bodies and a psychological assessment. Firstly, in accordance with the Methodological Recommendations on the implementation by QCJ of the norms of the anti-corruption legislation of the Russian Federation approved by the HQCJ decision of January 26, 2017, QCJ requests information from: the Prosecutor General's Office; Ministry of the Interior; Federal Security Service (FSB); Federal Tax Service; Federal Bailiff Service; Federal Financial Monitoring Service; and other services, if necessary. Secondly, a psychological assessment of candidates is conducted to identify, *among other things, the risks of integrity violations*. It is carried out in accordance with the Order of the Judicial Department at the Supreme Court of March 17, 2009 № 44 and includes a psychological examination, a structured interview and "other methods if necessary"<sup>3</sup>. The main qualities that are attempted to be determined through such an assessment are a high level of legal awareness, consciousness, integrity, commitment to high standards, dedication, scrupulosity, discipline and honesty. If none of the candidates meets the requirements established by law, the QCJ takes a reasoned decision regarding each person to refuse a recommendation and publishes a new notice of the vacancy. QCJ's decision on a recommendation may be appealed if the selection of applicants is violated, and the decision to refuse a recommendation is due to a violation of the selection procedure and the merits of the decision. We believe that at the regulatory level questions should be developed to determine objective criteria that should be followed in assessing compliance with the requirements of

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<sup>3</sup>Order of the Judicial Department at the Supreme Court of the Russian Federation of March 17, 2009 N 44 "On approval of the Methodological recommendations on the organization of psychological support for the selection of candidates for the position of judge" // The document is not published, posted in legal reference system "Consultant Plus". Date of appeal 05.15.2019

honesty in the selection process, the appointment of judges, and the accessibility of these criteria to the public.

The decision of the qualification collegium of judges on the recommendation of the candidate for the post of judge is sent within 10 days after its adoption to the chairman of the relevant court, who, if he agrees with the specified decision, within 20 days after receiving the decision on the recommendation of the citizen to the post of judge, introduces, in the established manner, the appointment of the recommended persons to the position of a judge (Clause 9, Article 5 of the Federal Law "On the Status of Judges in the Russian Federation"). From the legal structure of the above norm, the following conditions follow under which the President of the Russian Federation can decide on the appointment of a judge.

3. As indicated above, an additional candidate verification process is carried out after the QCJ selection process. Such verification is carried out by the Commission under the President of the Russian Federation for the preliminary consideration of candidates for the positions of judges of federal courts. The Commission under the President of the Russian Federation for the preliminary consideration of candidates for the positions of judges of federal courts is an advisory body under the President of the Russian Federation to ensure the implementation of the constitutional powers of the President of the Russian Federation on the appointment of judges of federal courts. The Regulation on the Commission was approved by Decree of the President of the Russian Federation of October 4, 2001 № 1185 (with subsequent amendments and additions)<sup>4</sup>.

The main tasks of the Commission are:

preparation, taking into account the views of plenipotentiaries of the President of the Russian Federation in federal districts, of recommendations to the President of the Russian Federation on the submission of candidates for judges of the Constitutional Court of the Russian Federation, judges of the Supreme Court of the Russian Federation, including the Chairman of the Supreme Court, in accordance with Articles 83 and

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<sup>4</sup>Decree of the President of the Russian Federation of 04.10.2001 N 1185 (as amended on 10.29.2018) "Regulation on the Commission under the President of the Russian Federation for the preliminary consideration of candidates for the positions of judges of the federal courts" // The document is not published, is placed in the legal reference system "Consultant Plus". Date of appeal 05.15.2019

128 of the Constitution of the Russian Federation Court of the Russian Federation, First Deputy Chairman of the Supreme Court of the Russian Federation, Deputy Chairmen of the Supreme Court of the Russian Federation - chairmen of judicial boards of the Supreme Court of the Russian Federation;

preparation, taking into account the views of plenipotentiaries of the President of the Russian Federation in federal districts, of recommendations to the President of the Russian Federation on the appointment of judges, including chairmen and deputy chairmen, federal courts of general jurisdiction and federal arbitration courts.

The Commission under the President can interview candidates and collect additional information from relevant stakeholders (judicial authorities, law enforcement agencies, tax authorities, etc.). Kudrin's Civil Initiatives Committee notes that the existing procedure allows the executive branch to exert a significant influence on the judiciary "through the mechanism of reappointment of court chairpersons and appointment of existing judges to higher posts<sup>5</sup>. In our opinion, it is not worth completely abolishing the personnel commission, you can only change its composition - additionally introduce human rights defenders into it. The work of the personnel commission should be more transparent. For example, when forming in 2019. of the new courts of appeal and cassation, out of several dozen retired judges who claimed to be judges, almost no one overcame the barrier of the personnel commission or HQCJ. Since the judge has already been resigned for some time, he does not carry out activities for the administration of justice and this circumstance prevents him from becoming a judge. Previous professional qualities are not taken into account. You can't enter the same river twice, it will be completely "different water and another river of justice". How correct and appropriate this is, is a rhetorical question.

The role of the President in the appointment of judges cannot be simply ceremonial, but it is actually decisive, since the President can refuse to appoint judges recommended by the qualification collegium of judges. The Presidential Administration is connected with the selection process not

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<sup>5</sup><https://www.rbc.ru/politics/26/05/2016/5745c3779a794705c3a917b8>



only because it has an appointed representative in the qualification collegium (at the regional level), but also due to the presence of the executive branch in the Commission under the President, which carries out the final selection. The meaning of the work of the Personnel Commission under the President is that it ensures the implementation of the constitutional powers of the President of the Russian Federation on the appointment of judges of federal courts. The personnel commission is an additional filter in the selection of candidates for judges. The work of this commission is in an equilibrium system of balances and checks. In this case, the fullness of power is not concentrated in one hand, it is evenly distributed between state structures. This is the so-called principle of separation, when individual branches of government are independent from each other and none of them occupies a leading position. For example, only the president has the right to appoint a judge of the federal court, but he does not have the right to terminate his powers, this is the prerogative of the qualification collegium of judges, i.e. body of the judicial community.

Within the meaning of the provisions of the Law of the Russian Federation dated June 26, 1992 №3132-1 "On the Status of Judges in the Russian Federation" and the Code of Judicial Ethics, candidates for judicial positions are required to provide reliable information about themselves and their close relatives, as well as about property, income and property obligations character. They give written consent to verify the information provided. As expressly stated in paragraph 8 of Article 5 of the Law "On the Status of Judges in the Russian Federation", if as a result of verification of the documents and information specified in paragraph 6 of this Article, their inaccuracy is established, the citizen who submitted such documents and information cannot be recommended for the position of judge . At the same time, it does not matter for the law, for whatever reason, false information about close relatives, property, incomes and property obligations has been provided or has not been provided at all.

An effective guarantee to prevent corruption is a thorough examination of the integrity of candidates for the position of judge, which involves checking the personal, family and public life of the applicant. The grounds for refusing to be appointed to a higher position or reappointment in the

current position were: providing inaccurate information about income, expenses, property and property obligations of the candidate and his close relatives. The applicant is not accepted for the position of a judge because of the failure to provide information on income, expenses, property and property liabilities, income from the sale of motor vehicles, apartments, land and other property objects both by the judge and his spouse, other income. In declarations (certificates), the applicant did not indicate real estate (land, residential buildings, buildings, apartments) that belonged to him and close relatives on the basis of ownership, which serves as the basis for the refusal of appointment to judicial positions<sup>6</sup>.

According to paragraph 4 of the Regulation on the submission by citizens applying for positions of the federal public service and federal public servants of information on income, property and property obligations, approved by Decree of the President of the Russian Federation of May 18, 2009 N 559, with subsequent amendments, the citizen upon appointment to the position of public service, provides information about his, spouse's and minor children income received from all sources (including income the place of work or the place of filling an elective position, pensions, benefits, other payments) for the calendar year preceding the year of submission of documents for filling a civil service position, as well as information on property owned by him by right of ownership and on his property obligations as of the first day of the month preceding the month of submission of documents for filling a civil service position.

4. Presence of a presentation by the chairman of the relevant court submitted to the President of the Supreme Court of the Russian Federation on the appointment of the recommended person to the position of judge Court presidents play a significant role in the selection process. We draw attention to three major changes in this area, which were implemented on the legislative initiative of the President of the Russian Federation and have already entered into force. Firstly, court chairpersons are deprived of disciplinary responsibility. Now the chairman of the court has no right to initiate disciplinary proceedings. It can be started

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<sup>6</sup><http://lip.vkks.ru/publication/34071> // Information on the reasons for the refusal to appoint judges to vacant judicial positions, according to the data provided by the Office of the President of the Russian Federation on public service and personnel.

only upon the request of a citizen, organization, Council of Judges of the Russian Federation, its Presidium, as well as the Council of Judges of the subject of the Russian Federation. This eliminates the “disciplinary power” of court presidents in relation to judges, which could potentially be used as a mechanism of influence. Secondly, the chairmen of the courts are denied the right to verify complaints about a judge committing a disciplinary offense. Similar checks could also be a peculiar way of influencing judges. Now, the qualification collegiums of judges are obliged to independently verify incoming complaints and discuss the results of inspections at meetings. The third innovation: court chairpersons are deprived of the right to disagree with the decision of the qualification collegium of judges on the recommendation of a candidate for the post of judge. Earlier, court chairpersons actually had a veto over candidates recommended by the qualification collegium, and such a veto could only be overcome by two-thirds of the vote. Now, the full authority for the selection of candidates for judicial positions has been transferred to the qualification collegiums of judges. Thus, a very wide range of powers was transferred from the chairmen of the courts to the qualification collegiums of judges<sup>7</sup>.

5. Presence of the presentation of the President of the Supreme Court of the Russian Federation, introduced in the established manner to the President of the Russian Federation on the appointment of a recommended person to the position of judge. The discretionary nature of the powers of the President of the Russian Federation allows for the possibility of refusing to appoint a person to the position of a judge without giving reasons.

Justices of the peace are either appointed or elected to positions for a certain term by the legislative (representative) bodies of state power of the subjects or are elected by the citizens of the respective judicial district, depending on the procedure determined by each subject of the Russian Federation. In the Russian Federation, all justices of the peace are appointed. Not later than six months before the expiration of their term of office, and in the case of early termination of powers - no later than

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<sup>7</sup><https://rg.ru/2019/10/28/glavy-sudov-bolshe-ne-smogut-trebovat-nakazaniia-dlia-sudej.html>

days after the day the vacancy is opened, information about the vacancy opening should be published in the media. Justices of the peace are appointed for a period determined by the law of the respective constituent entity of the Russian Federation, which shall not exceed five years. After this period, the person holding the position of justice of the peace shall have the right to act as a candidate for reappointment for a period determined by the law of the relevant entity, which may not be less than five years. It is important to strengthen the independence of justices of the peace as judges of the first instance, who are involved in the bulk of trials, ensuring an adequate tenure as that of federal judges until they reach 70 years. The stability of tenure of magistrates will strengthen the principle of independence of judges, unifies the legal status of magistrates and federal judges. The proportion of refusals to appoint (reassign) a judge because of the identified so-called conflict of interest is high. It is necessary to develop systemic guarantees to prevent situations that exclude a conflict of interest in the activities of a judge. These actions will also be an important signal for the general public, increasing its confidence in the impartiality of the judiciary.

## LAWMAKING SPECIFICITY IN THE COMMON LAW SYSTEM

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**Abstract.** The article observes the specifics of the legislative mechanism in the legal systems of England and the USA. Attention is paid to the lawmaking role of the courts, their participation in the statutory law interpretation and the constitutional control realization.

**Keywords:** lawmaking, common law, precedent, statutory law, legal system of England, American legal system.

Lawmaking in its most general form can be defined as the activity of "creating" of the law norms. However, the essential content of this activity is much more complicated, since it depends on the understanding of law as such. In its most general form, we can talk about three main approaches to understanding law, corresponding to the three main areas of legal thought: law as an idea (natural legal jurisprudence); law as a norm (legal positivism); law as a relation (sociological jurisprudence). Each of these schools is based on certain legal values, which, obviously, should be the basis for lawmaking. So, for supporters of us-naturalism valuable ideas of justice, rationality and humanism, embodied in the norms of natural law; for positivists - the will of the state reflected in the norms of positive law; for adherents of the sociological approach - a actually valid "living law".

Adhering to a positivist approach to understanding law, we consider it more accurate to define law-making as the activity of creating formal legal sources of law carried out on behalf of the state by competent law-making entities and provided by a system of state guarantees and sanctions [1, p. 231], which completes the process of law formation. It also seems more ac-

curate to consider lawmaking as a specific mechanism that has static and dynamic aspects. In statics, the mechanism of lawmaking covers a set of elements that ensure the creation of law, which can include: 1) subjects of law-making (institutional element); 2) methods, techniques of law-making technology (instrumental element); 3) the rules of conduct themselves (content element); 4) forms (sources) of law (formal element). The essential characteristics of the elements of the law-making mechanism are determined by the specific type of law-making activity. So, people, state bodies, authorized persons and organizations, the state as a whole, etc. can act as subjects of law-making. The methods and techniques of lawmaking are predetermined by the specifics of the created source of law. For example, one can single out the law-making technique, the corporate law-making technique, the contract law-making technique, the judicial law-making technique, etc. As for the content element, in principle it is the same for all types of law-making - these are the rules of law themselves, however, the structural consistency of these norms can also be different. The formal element will include relevant forms of law, the most common of which are a normative legal act, normative contract, legal precedent and legal practice.

The mechanism of lawmaking in dynamics reflects the sequence of stages of lawmaking activity, which is determined by a specific type of lawmaking, but in its most general form includes: 1) development of the rule of conduct itself; 2) giving the rule a legal form in the appropriate source of law. After passing through the first stage, we get a norm - a rule of behavior of a general nature, but only after passing the second stage does this norm become legal, i.e. acquires universally binding force. In reality, these two stages can be carried out simultaneously, or can be separated in time.

The content of the law-making mechanism, as already noted, depends on the specific type of law-making activity, which in turn is determined by the legal traditions that have developed in the relevant legal systems and families. In general, such traditional forms of law as legal custom, normative legal act, normative contract and legal precedent, which are an element and a kind of outcome of the mechanism of lawmaking, are known to various legal systems, but the role of each of them can vary significantly.

So, the culture of judicial lawmaking as the main type of lawmaking activity has been established in common law, which is explained by many factors related to the history of the formation of this family, the peculiarities of legal culture, the way of legal thinking, and more. specific legal system, for example, England and the USA.

England, as you know, is considered the ancestor and classic representative of the common law family, since courts appeared in it earlier than parliament. According to V.I. Lafitsky, the most powerful influence on the development of English common law "had four forces: judicial practice, legal doctrines, folk spirit and law" [2, p. 518-519]. Moreover, it is not by accident that jurisprudence is put in the first place here, which has turned judicial precedent into the main source of English law.

In England, judicial practice initially developed not on the basis of application to concrete facts and circumstances of abstract statutes issued by the courts from above, but on the principle of similarity. According to this principle, cases based on similar facts should be decided by the courts in a similar way. All this led to the fact that the English courts began to practice the separate resolution of issues related to establishing the factual side of the case, and issues related to clarifying the content and requirements of the law. By virtue of this, the judges were entrusted with resolving issues of law, and the jury was asked to clarify issues of real facts of the case, its specific circumstances [3, p. 71]. This was the beginning of the formation of the precedent rule - the stare decisis rule ("stand on the decision"), which to this day underlies the mechanism of judicial law-making in England and the USA. Of course, as public relations developed and the role of parliament increased, legislation (statutory law) also began to play a significant role in the English legal system. However, since historically the statutory law of England developed against the background of already established case law, it was initially perceived by the judges as something secondary to it. By the beginning of the 20th century, legislative regulation, mainly through consolidated acts, covered most branches of English law. Such acts, as a rule, absorbed in an orderly form the norms of individual legal institutions contained in numerous legislative acts and formulated in judicial precedents. No less important source of English law was the delegated legisla-

tion, the advantage of which English lawyers saw in its mobility. However, the increasing role of legislation did not lead to the loss of its precedents by judicial precedents, but to the creation of a special sufficiently flexible set of rules in which these two sources coexist on equal terms and closely interact [2, p. 288-290]. This coexistence is ensured through the so-called precedents of interpretation, which actually "grow" in legislative norms. Thus, judicial precedent remains the main source of English law, and judicial law-making - the main type of law-making, predetermining the specifics of its mechanism. "For centuries, the method, practice and style of legal thinking that developed through English unwritten law," notes A. Castales, "created a special legal culture. It was a culture in which judges, like legislators, were recognized as mouthpieces of the law" [4, p. 116]. The colonial policy of England allowed this culture to spread to other countries and continents, but it inevitably underwent changes there due to the influence of local conditions and legal traditions. One of such successors of the judicial law-making mechanism is the US legal system, the specificity of which we also would like to draw attention to.

The US legal system, as the heir to the traditions of common law in England, adopted a casuistic way of legal thinking and, accordingly, the culture of judicial law-making. However, *de jure* legislators are the main creators of US law. The fact is that the US Constitution, which is the main law of the country, proceeds from the principle of separation of powers, according to which the authority to create rules of law is vested in lawmakers elected by the people themselves and not appointed judges. It is no accident that the term "precedent" is not used at all in the US Constitution. Nevertheless, most American lawyers have always recognized and now recognize case-law court decisions as independent sources of law and, accordingly, the legislative powers of the courts.

And here, in our opinion, the key role was played by such a factor as legal ideology. ***Sociological jurisprudence*** was established as the dominant type of legalization in American legal doctrine, which brought ideological foundations to the principle of precedent (*stare decisis*) inherited from English legal science and practice, which made it possible to turn judicial decisions into the most important source of law and flourishing



"casual" law on American soil. As O.A. Zhidkov notes, in the first decades of the XX century sociological jurisprudence began to draw more and more attention of American judges, which "flourished in lush color on American soil, manifesting itself in the form of a number of "schools" and trends" [5, p. 57]. Under the influence of the "sociological jurisprudence", judges were openly considered as active participants in the lawmaking process [See.: 6, p. 32]. When considering the law created by judges from the perspective of a purely functional analysis, American lawyers usually emphasize that it is an inevitable product of the two power capabilities and functions of the judiciary, namely the need for "proper resolution of cases" accepted by the court and the stare decisis rule. [Quote: 5, p. 10].

Moreover, sociological jurisprudence influenced not only the establishment of case law, but also to a certain extent the development of another main (and currently the most common) source of American law - legislation (legislative law), in particular, statute law. The fact is that American laws (constitutions, statutes) differ in form and content from acts characteristic of Romano-German law. So, many of them are too generalized, "foggy", often ambiguous, schematic in nature. Even the US Constitution, as American statesmen are forced to state, "is among our most controversial, vague and incomplete laws" [5, p. 111]. The basic law of the United States "is constantly being developed and improved through the adoption of constitutional judicial precedents that not only clarify, but also change, transform the meaning of certain provisions of the US Constitution" [7, p. 10].

Accordingly, in the United States, the interpretative activity of the courts, filling the general wording of laws with specific content, is of great importance. It is the courts that have the last word in deciding what means a particular provision of the law. The principle of the "supremacy of judicial interpretation" is universally recognized in the United States: "If the law is unclear, interpreting it to clarify its meaning is among the judiciary's central missions. It follows, almost as ineluctably, that judicial interpretations should be treated as conclusive by the other branches" [8, p. 8]. In fact, without a judicial interpretation, many laws lose their meaning as well. In general, the precedents created by courts (primarily the US Supreme

Court) for interpreting the Constitution and statutes form a special kind of US case law - caselaw interpreting enacted law [See: 9, p. 39] through which the interaction of statutory and common law occurs by bringing the norms of the statutes in their case-law closer to the norms of common law.

The second feature of the mechanism of lawmaking in the United States is associated with the technique of "negative" lawmaking, namely its form as the recognition of an unconstitutional act by courts. None of the US regulations, including the Constitution, explicitly refers to the powers of courts to exercise control over the constitutionality of laws. However, many consider that this function was implied by the creators of the Constitution as one of the elements of the system of "checks and balances", aimed, in particular, to deter legislative power, and also follows from the principle of "supremacy of the Constitution" enshrined in the Basic Law. At the same time, they often refer to the words of A. Hamilton, who argued that the "will of the people" expressed in the Constitution should always be placed by the courts above the "intentions of its representatives" expressed in laws, and entrusting the courts with the task of "declaring all acts contrary to the spirit of the constitution invalid" [10, p. 504]. The final establishment of the institution of judicial control is associated with the activities of the US Supreme Court itself, with its most important decisions made, in particular, under the chairmanship of J. Marshall in the first decades of the XIX century. The most significant of these is the decision taken in one of the most famous cases of the US Supreme Court - the case of *Marbury v. Madison* (1803). In it, the Supreme Court, chaired by J. Marshall, declared that the federal Constitution is the supreme law of the country and that any law of Congress that contradicts the Constitution can be declared unconstitutional by the court. The principle "a Law repugnant to the Constitution is void" was formulated, which formed the basis of the doctrine and practice of constitutional control. In modern American literature, the dominant, although not indisputable, view is that "the Supreme Court is indeed the principal guardian of the Constitution, the final arbiter of the true meaning of the fundamental law" [11, p. 58].

It should also be borne in mind that the function of constitutional review is exercised by the courts exclusively and directly in the process of reviewing court cases, that is, in the United States, constitutional review is fully integrated into the judiciary. However, in fact, constitutional review goes beyond the judiciary in its traditional sense. As noted in American literature, "practically every important federal and state law comes to the courts to have its validity determined - at least in part if not in whole" [12, p. 33]. As a general rule, the courts, recognizing the statute as unconstitutional, actually annul it. Thus, it is they who determine whether the newly adopted law will be integrated and in which part (or in full) into the US legal system. This allows us to talk about the implementation by the courts of the so-called "negative" lawmaking [13, p. 11-12]. Legally, a law declared by a court unconstitutional can regain its legal force only if the court itself expressly and unequivocally declares the revision of its decision later.

Thanks to the right of constitutional review, courts actually become direct participants in the *legislative* process, essentially determining whether the relevant statute will be part of the current statutory law. The leading role here undoubtedly belongs to the US Supreme Court and the state supreme courts. Even if the "constitutional" decisions of the courts are "neutralized" by amending the constitution or issuing a new statute, the legislature will follow the judicial authority because it is forced to take into account its "position" on a particular issue in order to avoid subsequent accusations of unconstitutionality of adopted act. Thus, the Supreme Court as it pushes the legislator to adopt new rules. And in this case, as the researchers emphasize, the activity of the US Supreme Court acquires the properties of *positive lawmaking*. The court de facto creates the norm, assuming that its content will be the opposite of the one that was repealed. But the process of creating a legislative norm is the prerogative of legislatures. In this connection, the US Supreme Court can only determine its meaning, explain the principles of the US Constitution, in accordance with which a new regulatory act must be adopted in whole or in part [7, p. 35].

Thus, in the common law tradition, the primacy of the courts predetermined their special role in creating the rule of law and made judicial precedent the main result of the law-making mechanism. But with the development of social reality, the complexity of regulated social relations, the influence of external factors, lawmakers also took their significant place among the subjects of the law-making mechanism. This was most clearly manifested in the systems that recovered English common law, in particular in the USA, where the traditions of common and continental law are currently combined.

Accordingly, the specifics of lawmaking in the common law system (family) is based on the mechanism for creating judicial precedents. The main subjects of lawmaking in this legal family are judicial, not legislative bodies. The mechanism for creating a case law covers certain rules and methods for its removal from a court decision. The structure of the case-law is significantly different from its continental counterpart due to, first of all, its casuism and its connection with a specific contentious legal situation. The precedents created as a result of judicial law-making also form a certain system, however, it is specific in view of the fact that only higher courts can make case-law decisions. The mechanism of judicial law-making in dynamics, in turn, covers the process of formulating a case-law and making it binding. However, starting from the XX century, this mechanism is supplemented by a significant role of laws (legislative process) in the regulation of new social relations.

## References

1. Theory of State and Law / Ed. by R.A. Romashov. SPb., 2005.
2. Comparative Law: National Legal Systems. T.2. Legal Systems of Western Europe / ed. By V. I. Lafitsky. Moscow, 2012.
3. Romanov A.K. The Legal System of England. Moscow, 2002.
4. Castales A. Australian Legal History. Sydney, 1981.
5. Zhidkov O.A. US Supreme Court: Law and Politics. Moscow, 1985.
6. Miller A. The Supreme Court: Myth and Reality. Westport, 1978.
7. Sergeeva S.L. The Development of Constitutional Judicial Law-making in the United States (late XIX - early XXI centuries): Rep. dis. ... cand. jur. sci. Kursk, 2012.
8. Kramer L.D. Foreword: We the Court // Harvard Law Review. 2001.Vol. 115.
9. Burnham W. Introduction to the Law and Legal System of the United States. St. Paul, 2011.
10. Federalist: Political essays by A. Hamilton, J. Madison and J. Jay / under the general. ed. N.N. Yakovleva. - Moscow, 2000.
11. Bessette J.M. Guarding the Constitution from Legislative Tyranny // Is the Supreme Court the Guardian of the Constitution? / Ed. by R.A. Licht. Washington, 1993.
12. Law in America: How and Why It Works / Subj. ed. D.J. Hutchinson. N. Y., 1979.
13. Teryukova E.Yu. Legal Acts in the Process of Constitutional Justice: dis. ... cand. jur sci. Moscow, 1999.

## THE INSTITUTIONALIZATION OF SOCIAL DEMANDS AS AN INSTRUMENT OF THE LAW STATE

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**Abstract.** The article explores social claims in the rule of law. Through institutionalization in the law of social claims of the subjects, legal progress is achieved. Legal progress is aimed at achieving human-recognized values, satisfying pressing and relevant interests, social claims of subjects, which is a prerequisite for the existence of a rule of law state. Thus, social claims are an instrument of legal progress and the rule of law, their guarantor.

**Keywords:** social claims, legal progress, constitutional state.

Social claims are the immediate social basis of law as a legal phenomenon. They, having a direct impact on the legal regulation of public relations, through the mechanism of legal awareness, are introduced into lawmaking and the application of law. In this regard, social claims are currently fulfilling a particularly significant mission. They form the layer of social life that underlies the system of social regulation, and, first of all, of objective law, which accumulates, reduces to some normative principles, moreover, in the form of initially "due", the overdue requirements of the environment, of all social life – natural, economic, political, legal and other. By securing the interests of citizens and other persons in objective law, their social claims are embodied in subjective law. This fact is the initial, key to the study of social claims in law.

The right appears and exists there and then, where and when a person feels himself capable of really applying for something. Social claims are the basis of law, which is then clothed with the law of the state in one form or another.

Social claims, having the nature of legal requirements, are embodied in the lawmaking process in the current legislation and, therefore, affect the measure of freedom of behavior.

Social claims are the immediate social basis of law. Depending on their content and specific social situation, in some cases they act as the basis for transforming and changing existing legal institutions, in others they "anticipate" legal norms established by law.

Social claims are recognized by the state and are accepted into law. Thus, social claims thereby acquire the status of legal rights of citizens. As a result, corresponding legal relations arise between the state and the holders of these rights (authorized and obligated), as well as the latter among themselves. Social claims are thus transformed into legal ones.

Social claims play a significant role in the formation of law, since they reflect and record the need for legal regulation of social relations, which, in turn, is due to socio-cultural changes in modern civilization.

In the concept of social claims, a rigid (and from this point of view completely natural, natural) dependence of law on external factors, on everything that forms human being, finds expression. In this regard, social claim is currently fulfilling a particularly significant mission. They act as a driving force of law, participate in the "birth of law", helping him overcome the path from concept to result. The evolution of law goes from social claims to the rule of law, then through the implementation of norms to social practice.

It is worth noting that the multifaceted and multifactorial nature of the formation of social claims in law, their conditionality by objective and subjective factors.

Among the factors that objectively determine social claims, the determining ones are: cultural-historical, political, economic, social and legal factors. The factors subjectively determining social claims include the human psyche and will.

A correct understanding of the objective and subjective nature of social claims, an understanding of the dialectical interaction of objective and subjective factors that determine social claims will allow us to give a more complete picture of legal reality.

Objective law is the result of institutionalization in the norms of law of social claims of subjects.

On the whole, the whole process of the formation of objective law is complex and dialectical; it cannot ignore the emerging social claims, but it cannot be reduced to simply stating them in the legislation. The connection between social claims and objective law is obvious, since social freedom "approaches" the objective law in the form of that specific phenomenon, which in this work is called social claims.

It should be noted that when the interest of the subject, expressed in the form of social claim, is fixed by objective law, the latter acquires relative independence in relation to the interest that generated it. Interest may disappear, change, but the right in this regard is not automatically canceled.

Objective law, with all the materiality and imperativeness underlying its factors (economics, politics, etc.), owes its appearance to the emergence and subsequent consolidation in the norms of the law of social claims of subjects.

It is in legal norms that the social claims of subjects, if they meet the relevant criteria, must find a clear and stable expression. Thanks to the fixation in legal norms (in objective law), any participant in the relationship becomes confident that this claim will be constantly supported by the state's jurisdiction as a subjective right and that all other entities will have to (legally obligated) reckon with this.

The degree of development of the system of institutionalization of social claims in the current legislation determines the degree of its effectiveness, efficiency, and this in turn determines the importance of correctly identifying the relevant criteria.

The author of this article, saying that subjects (individuals and social groups), through their active external actions, encourage law-enforcement bodies to institutionalize their own social claims in the rules of law, thereby pursues the idea of man-made law, i.e. about his conscious creation.

As the dictionaries explain, the word "institutionalization" (from Italian *Instituzionalizzare* legitimize, enshrined in law) means: 1) the establishment of any new public institutions (in the 3rd meaning); legal and organized consolidation of certain social relations [1].



Yatsenko N.E. in the Explanatory Dictionary of Social Science Terms, clarifies that by "institutionalization" are understood:

- 1) the development of legal norms in any area of public relations (institutions), of various forms of social organization;
- 2) the establishment of social institutions;
- 3) the process of turning any phenomenon or movement into an organized institution (institute) [2].

The shortest and most comprehensive definition is given by the Large Explanatory Dictionary of the Russian Language edited by S.A. Kuznetsova. The consonant of this dictionary, to "institutionalize" means to "officially recognize - recognize, legalize- legitimize" [3].

The problems of "institutionalization" in law are currently not sufficiently developed in domestic science, only a few scientific studies can be identified in this area [4].

The process of institutionalization of social claims in law is considered mainly from the point of view of the sociological approach. As shown by S. A. Muromtsev, the rule of law is preceded by a primary action; if it begins to be repeated many times, it turns into a norm, that is, it is institutionalized in a sociological sense [5].

In our concept of social claims, the term "institutionalization" is used in accordance with its content as a process of consolidating social claims in the rule of law.

Moreover, social claims enshrined in law must meet certain criteria.

Thus, if the requirements put forward by the claimants meet certain criteria, then they should be fixed in the rules of law and receive their further implementation in subjective rights or legitimate interests. The consolidation of social claims in the rule of law is not some kind of concessions and benefits that the legislator presents to the claimants, this is a very important process that serves as a means of achieving social satisfaction of subjects, is a method of increasing their universal activity and living standards. It is precisely the degree of development of the system of institutionalization of social claims in the current legislation that determines the degree of its effectiveness and efficiency, which in turn determines the importance of correctly identifying the relevant criteria.

It is important to note that the identification of social claims, psychological moments, people's interest in their affairs and aspirations, the study of the driving motives of their behavior, including in the field of legal regulation, the analysis of the complex interaction of these factors is one of the important tasks of modern legal science, sociology and psychology. There is a need for new, effective ways to identify social claims, including assessing the adequacy of the entire legal system to developing social needs. The innovative methods that form the mechanism for identifying social claims include legal monitoring.

Methods for identifying social claims include expert judgment and forecasting. One of the effective ways to identify social claims at the stage of development of the draft regulatory legal act is its public discussion. If social claims are not reflected in the draft normative legal act, or are reflected, but distorted, then there is a legal expertise mechanism that can eliminate these inconsistencies. One type of such examination is anti-corruption examination.

In order to ensure effective lawmaking, specially organized activities of special bodies are required to identify social claims, as well as possible options for the development of social relations, legislation, and determine the optimal means and methods of legal regulation of certain areas of social relations.

It is important to emphasize that it is not enough to identify social claims, it is much more important to adequately reflect them in the legislation.

In the course of the legislative process, one should objectively take into account the different legal positions of social strata and groups of society. However, as practice shows, often the struggle around bills is generated not so much by the desire to find and choose the best option for legal regulation, as by the interests of factions and narrow groups of deputies, which is covered by the lobbying institution.

The low level of legislative activity affects the quality of the adopted laws, and ultimately leads to inconsistency of the current legislation with public needs, interests, and claims.

Social claims and lobbying are two interrelated phenomena. Lobbyism is one of the tools to protect and defend social claims of subjects. Legislative regulation of lobbying activities at the federal level will contribute to more active activities of aspirants to translate their urgent needs and interests into legislation and will lead to an increase in the effectiveness of all existing legislation.

One of the tasks of legal science is to justify, correctly consolidate social claims in appropriate forms.

The forms of institutionalization of social claims are: regulatory legal act, legal positions of the Constitutional Court, legal provisions of judicial practice, individual contract, legal acts of municipal and other non-state entities, etc.

The main form of institutionalization of social claims is a normative legal act. However, in connection with the introduction into the legal system of Russia of universally recognized norms and principles of international law; revival of ideas of private law; the establishment of the institution of constitutional proceedings and the activities of the Constitutional Court on the formation of legal positions; Strengthening the autonomy and independence of the judiciary in the process of judicial reform, it can be argued about the existence of other forms of institutionalization of social claims in law. These include the legal positions of the Constitutional Court, the legal provisions of judicial practice, legal acts of municipal and other non-state entities, an individual contract, etc.

Social claims enshrined in objective law are embodied in life and are directly reflected in the composition of subjective law, its structural elements.

Subjective law reflects the social situation of a person and serves as a legal means of satisfying his interests, social claims. Being an important factor in legal regulation, subjective law serves as a potential for the formation of an individual's activity, which includes the active external activity of subjects in upholding their social claims, thereby creating the prerequisites for the expansion of human rights and freedoms.

Social claims are the driving force of people's activities, they contribute to the development and improvement of objective and subjective law. Without their dynamics, the legislation of the country would come off reality and turn into a dead scheme of logically related norms.

In fact, the subjective rights and freedoms of citizens are established in order to ensure, satisfy, protect their interests and needs by legal means. Of course, not every interest is mediated by subjective law, but any law inevitably mediates a certain interest.

Life is so varied and changeable that constantly arising needs, interests and claims in the most diverse fields of activity of people, organizations and institutions cannot be fully covered and fixed in the legislation, in subjective rights and legal duties. Only the most socially significant interests are legally secured. In cases where interests not enshrined in objective and subjective law are recognized as legitimate or legally protected interests, they are subject to protection to the same extent as subjective rights.

Another legal means of satisfying social interests and claims of entities are legitimate interests..

In the legitimate interests are mediated only those interests and social claims that cannot be secured materially, financially (to the same extent as subjective law). Legal interests are a kind of phenomena preceding subjective rights, they can be transformed into rights when the necessary conditions mature for this.

Subjective law and legitimate interest are various ways of satisfying citizens' requests and needs. Legal interest, in contrast to subjective law, is not the main, but sometimes no less important means of legal mediation of the social claims of the subjects.

In society, the social claims of the subjects find their expression in law only thanks to the stubborn external activity of their carriers. The requirements to establish an appropriate range of economic, political, cultural and personal rights are not automatically realized; their implementation occurs in the context of a tense struggle, a clash of the forces of progress with the forces of reaction, new ideas with old views and prejudices.

Through the clash and struggle of group, personal interests and claims, through the upheavals of national relations, the form of development of cultures, ideology, the objective need for providing such a range of rights and freedoms that would meet the needs of the normal functioning of society, contributes to the development of legal progress.

Legal progress indicates a focus on the development of legal life - a complex, diverse and multicomponent phenomenon.

The legal progress in the work is understood as an objective, regular, characterized by an ascending focus process of the legal development of society, its social groups and individuals.

Law develops and changes as a result of the institutionalization of universally valid social claims. Subjects through the consolidation of social claims in the law, realize their interests. Thus, it can be argued that the law is changing and developing following the emerging need for legal regulation of certain social relations. This need is determined by the ripening social claims of entities that necessarily require their legal mediation.

Thanks to the institutionalization of social claims in norms, legal progress can become from the desired result, an obligatory direction of legal life. This makes social claims an effective tool for legal progress.

The law not only consolidates the pressing social claims of the subjects, recognizing them as correct, proper, but also prepares people's lives for the future. Therefore, legislative activity should be anticipatory and give legal progress the traits of purposefulness and consistency.

It seems that all the reforms carried out in the country should receive legal support, be held within the legal framework. To date, many important social claims have not yet been consolidated in law, important legislative acts have not yet been adopted, although the need for them is felt very urgently. This means that existing social relations remain unresolved.

Through institutionalization in the law of social claims of the subjects, legal progress is achieved. Legal progress is aimed at achieving recognized human values, satisfying pressing and relevant interests, social claims of subjects, which is a necessary condition for the existence of a rule of law state. Thus, social claims, legal progress, and therefore the rule of law, are in deep organic connection. Social claims are an instrument of legal progress and the rule of law, their guarantor.

### References

1. Krysin L.P. Explanatory dictionary of foreign words. – Moscow, 2010. P. 306.
2. Yatsenko N.E. Explanatory dictionary of social science terms. - SPb., 1999. P. 155.
3. Large explanatory dictionary of the Russian language / comp. and the main editor S.A. Kuznetsov. - SPb., 1998. P. 394.
4. Kononov A.A. Institutionalization of legal regulation: Rep. dis. ... cand. jur. sci. SPb., 2004; Maltsev G.V. Social grounds of law. – Moscow, 2007. P. 385.
5. Muromtsev S. A. Definition and main division of law. - SPb., 2004. P. 151–152.

## COMPLIANCE WITH REASONABLE TIME LIMITS IN CRIMINAL PROCEEDINGS

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**Abstract.** The article investigates the compliance with reasonable time limits in criminal proceedings. The case law materials concerning the violation of procedural time limits and prompt consideration of criminal proceedings by local courts in Ukraine have been analyzed. It is stated that a reasonable time is considered to be objectively necessary for performing procedural actions, making procedural decisions and considering and resolving a case in order to ensure timely (without unjustified delay) judicial protection.

**Key words:** criminal proceedings, violation of procedural time limits, reasonable time during criminal proceedings, making procedural decisions, performing procedural actions.

It's no secret that sometimes the trial can last for months and even years.

After implementation of the Criminal Procedure Code of Ukraine (hereinafter CPC) in 2012, the provisions of Article 6, Paragraph 1 of the Convention for the Protection of Human Rights and Fundamental Freedoms (hereinafter referred to as the "Convention") concerning the resolution of criminal proceedings during the trial were reflected in Article 28 of the CPC.

In the administration of justice, the courts should take into account the fact that, under Article 6 § 1 of the Convention, everyone has the right to a fair hearing within a reasonable time. According to the above pro-

vision, the criteria for determining the reasonableness of time limits in criminal proceedings are the complexity of criminal proceedings; behavior of participants in criminal proceedings; the manner of exercising their powers by the investigator, the prosecutor and the court (Part 3 of Article 28 of the CPC) [2].

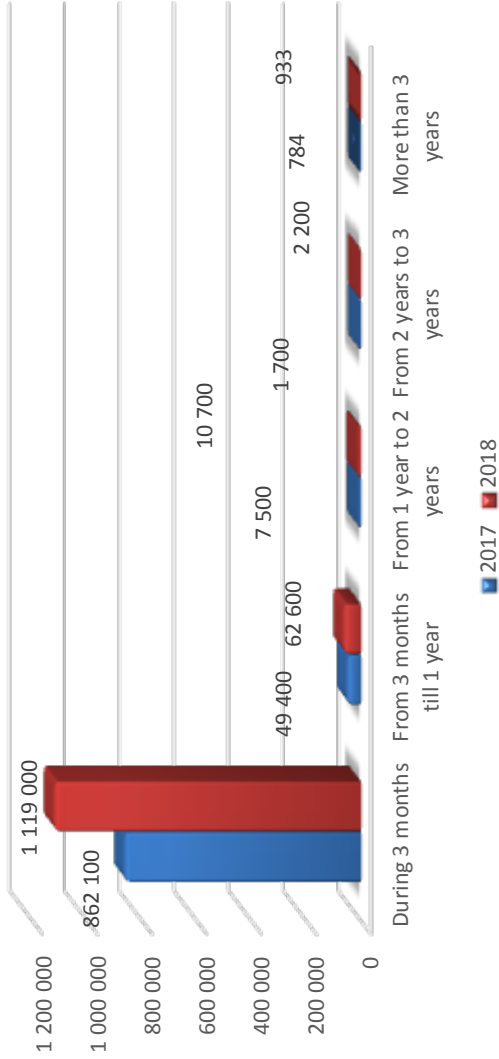
In the light of the case-law of the European Court of Human Rights, the complexity of criminal proceedings is determined by the number of suspected, accused and criminal offenses in respect of which the proceedings are being conducted; the number of participants in the proceedings (victims, witnesses, etc.); legal qualification of a criminal offense; the availability of information about a specific person who allegedly committed the criminal offense at the time of the pre-trial investigation; the nature of the circumstances to be proven in the criminal proceedings; the limits of proof; the volume of pre-trial investigative material combined in one proceeding; the need for the appointment of expertise, their complexity; the volume and specifics of the procedural actions necessary for a comprehensive and complete investigation of the circumstances in the criminal offense; the need for international assistance in criminal proceedings, etc. [3].

Case law evidence indicates that the main reasons for the violation of procedural time limits are the shortcomings in the activities of the courts, primarily related to the poor organization of the trial. There are cases where, contrary to the requirements of the procedural laws and without any grounds, criminal proceedings are assigned to a trial in violation of the time limits prescribed by law, including when the defendants are in custody, as well as the performance of duties of participants in the process.

To understand the substance of a reasonable time in criminal proceedings, we provide a quantitative indicator of the duration of the trial in 2017-2018.



## Efficiency of hearing criminal cases by local courts in Ukraine



In 2018, the number of criminal proceedings (cases) and materials completed in 3 months amounted to 1 million 119 thousand [862.1 thousand], which is 29.8% more or 84.9% [84.4%] of those before the local trial courts during the past year. In the period from 3 months to 1 year, 62.6 thousand [49.4 thousand] cases and materials were completed, or 4.7% [4.8%]; over 1 year to 2 years - 10.7 thousand [7.5 thousand] cases and materials, which is 43.4% more; more than 2 years to 3 years - 2.2 thousand [1.7 thousand] cases and materials, which is also by 29.6% more than in the previous year. In 2018, the number of cases and materials completed over 2018 was 933 [4].

During 2018, there were 454,000 [393,7 thousand] facts postponing criminal proceedings by local general courts, up 15.3% from 2017.

Analysis and examination of data received from local courts for 2017-2018 indicate that both the objective and the subjective reasons are affected by the expeditiousness of criminal proceedings.

These statistics give a reason to conclude that the number of being resolved for a long time has significantly decreased compared to the previous reporting period, while there are still cases of breach of reasonable time.

Consequently, a time-limit that is objectively necessary for performing procedural actions, making procedural decisions and considering and resolving a case in order to ensure timely (without unjustified delay) judicial protection is considered reasonable.

## References

1. Konvencija pro zahist prav ljudini i osnovopolozhnih svobod [Convention for the Protection of Human Rights and Fundamental Freedoms] // Holos Ukrainy. 2001. № 3. URL: [http://zakon3.rada.gov.ua/laws/show/995\\_0046](http://zakon3.rada.gov.ua/laws/show/995_0046).
2. Kriminal'nij procesual'nij kodeks vid 13 kvitnja 2012 r [Criminal Procedure Code of April 13, 2012]. No. 4651-VI (as of December 15, 2017) URL: <https://zakon.rada.gov.ua/laws/show/4651-173>.
3. Vishnij Specializovaniy sud Ukrayiny z rozgljadu civil'nyh i kriminal'nyh sprav «Pro dejaki pytannja dotrymannya rozumnyh strokiv rozgljadu sudamy civil'nyh, kriminal'nyh sprav i sprav pro administratyvni pravoporushennja» 17.10.2014 r [The Higher Specialized Court of Ukraine for Civil and Criminal Cases "On Certain Issues of Respecting the Reasonable Timing of Civil, Criminal and Administrative Offenses Courts" 17/10/2014]. No. 11 URL: <https://zakon.rada.gov.ua/laws/show/v0011740-14>
4. Verhovnyj sud Ukrayiny «Analiz stanu zdijsnennja pravosuddja u kriminal'nyh provadzhennjah ta spravah pro administratyvni pravoporushennja u 2018 roci» [The Supreme Court of Ukraine "Analysis of the state of justice in criminal proceedings and cases of administrative offenses in 2018"]. URL: [https://supreme.court.gov.ua/userfiles/media/Analiz\\_statistika\\_kriminal\\_2018.pdf](https://supreme.court.gov.ua/userfiles/media/Analiz_statistika_kriminal_2018.pdf)

## EXPERIENCE IN THE USE OF «FLIPPED CLASSROOM» TECHNOLOGY IN TEACHING PHYSICS AT A UNIVERSITY

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**Abstract.** The article is devoted to the promising educational technology of «Flipped classroom» and the experience of its application at a technical university at bachelors physics classes.

The technology of «Flipped classroom» is aimed at a more efficient distribution of study time due to the controlled independent work of students in extracurricular time. As a result of introducing this technology into the educational process at a university, the students study the material corresponding to the low and medium levels of cognitive activity during extracurricular hours on their own using a specially created program, and devote classroom time to analyzing practical tasks, in-depth study of the subject, analysis and systematization of knowledge in joint activities with the teacher and students in small groups. By this principle, all types of classes in physics are conducted (lectures, a workshop on solving problems, a laboratory workshop, design activity). The use of the technology under consideration is aimed at the complete exclusion in the study of the physics of educational situations in which students perform tasks of a low level of cognitive activity in the classroom.

The interaction of all participants in the educational process is carried out in the educational information environment (EIE) of the university, which is a pedagogical system that combines information educational resources, computer training tools, educational process controls, teaching methods, methods and technologies.

The results of the pedagogical experiment showed that the use of «Flipped classroom» technology in physics teaching significantly increased the level of training in physics for technical bachelors.

**Keywords:** technology of «Flipped classroom», information educational environment of a university, general cultural and professional competencies, classroom activities of students, extracurricular activities of students.

In the context of reforming the modern system of higher education, the educational community faces the task of finding educational resources that will allow, without compromising the quality of training of specialists, to organize the learning process at the university at a level that meets the needs of modern society. One of the promising technologies, according to many theorists and practitioners of education, is the technology «Flipped classroom». On the basis of FSBEI HE East-Siberian State University of Technology and Management, an experiment was conducted on the application of this technology in the process of teaching physics in technical bachelors.

The technology of “Flipped” training or “inverted class” is such an organization of the educational process in which classroom and extracurricular activities of students are interchanged. The main advantage of this technology is that most of the educational material is transferred to independent study in extracurricular time.

This approach to the organization of the educational process is not fundamentally new: the study of new material on their own, in their free time and further development of the knowledge gained during joint classes with the teacher at the university is an often used pedagogical technique. For example, in the early 90s of the last century, Harvard University lecturer E. Mazur gave students lecture material for study outside the classroom, and in classroom classes he organized solving problems in small groups and deepening the knowledge gained. The study conducted according to the results of the experiment proved its high efficiency: students studying in accordance with this technology showed significantly higher educational results than students studying the discipline according to traditional methods.

In modern conditions of informatization of education, the «Flipped classroom» technology is being updated, elements of innovation are introduced into it, which is due to the use of e-learning in the educational process of the university. Thus, specialists from the Open University (Great Britain) argue that the Flipped classroom technology, as a very promising educational area, can seriously affect the modern organization of the learning process at a university.

Researcher E.B. Ermishina believes that the main goals of the «Flipped classroom» technology are: optimization of the educational process, increasing the effectiveness of students' independent work and creating conditions for turning students into active participants in the educational process [1].

According to the theory of self-determination, «Flipped classroom» education meets the basic psychological needs of students in autonomy, competence, and relatedness with other participants in the educational process. Moreover, the need for autonomy and competence affects the emergence of motivation for educational activities. This is due to the fact that successful independent work in the extracurricular time increases the student's competence and helps to increase motivation to a much greater extent than when using traditional teaching technologies.

The essence of the «Flipped classroom» technology is that students study the material corresponding to the low and medium level of cognitive activity during extracurricular hours on their own using a specially created program, and devote classroom time to analysis of practical tasks, in-depth study of the subject, analysis and systematization of knowledge in collaboration with the teacher and students in small groups. As a result, it becomes possible to more efficiently distribute study time due to the controlled independent work of students in extracurricular time. According to this principle, all types of classes in physics are conducted (lectures, a workshop on solving problems, a laboratory workshop, design activity). The use of the technology under consideration is aimed at the complete exclusion in the study of the physics of educational situations in which students in the classroom perform tasks of a low level of cognitive activity. For example, they write a lecture notes, prepare for laboratory work or solve simple

problems directly in the classroom.

When organizing the «Flipped classroom» for physics in a technical university, the teacher is faced with the task of creating a unified educational process that combines students' classroom and extracurricular activities, in which those types of educational activities are separated in which they independently master the relevant competencies and those that require the help of teachers and other participants in the educational process. In the study, all types of educational activities of students in physics studies were carried out in conditions of level differentiation, in order to provide each student with an individual educational trajectory.

For teachers of the department, «flipping» the educational process is associated with serious preparatory work, since it is very important to structure the material according to degree of difficulty, create control and training materials for each module, multimedia content, and organize an effective rating control system.

According to researchers S. B. Veledinskaya and M.Yu. Dorofeeva (TPU) for the design of the educational process in the technology under consideration the reverse design model is used, which includes 3 stages: - designing the results of training in the discipline and sections; - development of methods for assessing learning outcomes; - development of an integration plan for the classroom and electronic components [2].

One of the important stages in the implementation of the «Flipped classroom» is related to the formation of the information environment. The educational information environment (EIE) of a university is a pedagogical system that combines information educational resources, computer-based learning tools, educational process management tools, teaching methods, methods and technologies aimed at creating an intellectually developed socially significant a creative person with the necessary level of professional knowledge and competencies. [3, p.17].

In our study, EIE allows to implement in the educational process a holistic set of educational stages that progressively replace each other and represent a system of psychological, pedagogical, didactic conditions and incentives that make the individual need to make an informed choice, adjust and implement a model of self-development of the professional and

personal sphere.

By didactic conditions, we mean a set of objective possibilities of content, innovative pedagogical technologies, organizational forms of training and a control system that contribute to the formation of an adequate level of general cultural, general professional and foundations of professional competencies of students.

Performing tasks outside the classroom, the student should be able to feedback with the teacher, as well as interact with other students [4]. This can be done using various learning management systems (for example, MOODLE), which allow you to place the resources necessary for students in the online course (syllabus, instructions for studying educational material, including pre-class materials, on the topic; interactive lectures for out-of-class work with automated checking of the correct understanding of the material being studied; simulators, tests and documents for independent study, etc.), as well as course elements designed for posting of answers to tasks and organizing extracurricular online activities of students (forums, Wiki-pages). [5]

The teacher's activities in the presented educational model «Flipped classroom» are divided into pre-audit, classroom and post-classroom. The teacher's functions in each of these types of activities range from the usual explanation and counseling of students to reflection and control.

For students, educational activities are also divided into three types. So, in the process of pre-audit work, students get acquainted with the teaching material by working with theoretical material, watching videos demonstrating various phenomena and processes, analyze examples of problem solving, theory and experimental methods, independently solve simple problems, and perform a verification test.

The classroom work of students is associated with the updating and deepening of knowledge acquired independently in the EIE. The teacher, on the basis of the available data on the results of the extracurricular activities of the students, builds the learning process in such a way as to dwell in more detail on complex material, to reveal the essence of physical phenomena and processes, in the experience of practical activities in solving problems, and performing the experiment. Post-student activities of students



are aimed at completing the studied and securing new material (solving home control work, performing reports on laboratory work, etc.).

To test the hypothesis of the study on the basis of the FSBEI of HE, the East Siberian State University of Technology and Management, an experiment was conducted on the application of the «Flipped classroom» technology in the preparation of technical bachelors in physics. In our study, 4 descriptors were used to assess competency (competency is not mastered; partially mastered; mostly mastered; fully mastered) on three scales of the categories "know", "be able", "own".

When studying physics, students work with theoretical material, solve problems, perform laboratory work, participate in project activities. Accordingly, to evaluate the category "know", we will take the average values of the assimilation coefficients according to the results of the input control of knowledge at a workshop to solve problems, perform laboratory work, and intermediate and final certification. To evaluate the category "be able to" - the average values of the coefficients of assimilation of the results of the output control of knowledge on independent work in a workshop to solve problems and the results of reports on laboratory work. The "own" categories correspond to the average values of the assimilation coefficients of the results of the experimental part of laboratory work and design activities, including leading-type integrative projects. The diagram (Fig. 1) shows the corresponding results of the pedagogical experiment.

The diagrams show that the average values of the coefficients of assimilation of general professional competencies are higher in the experimental groups than in the control ones. In our opinion, such results are due to the fact that the systematic educational activity of students in EIE, the use of a complex of innovative educational technologies of blended learning when teaching physics, allow students to rise to a higher level of competence.

In order to clarify the attitude of students to the use of the technology "Flipped classroom" in the process of teaching physics, anonymous questionnaire was conducted among students of experimental groups. The results are shown in the diagram (Fig. 2)

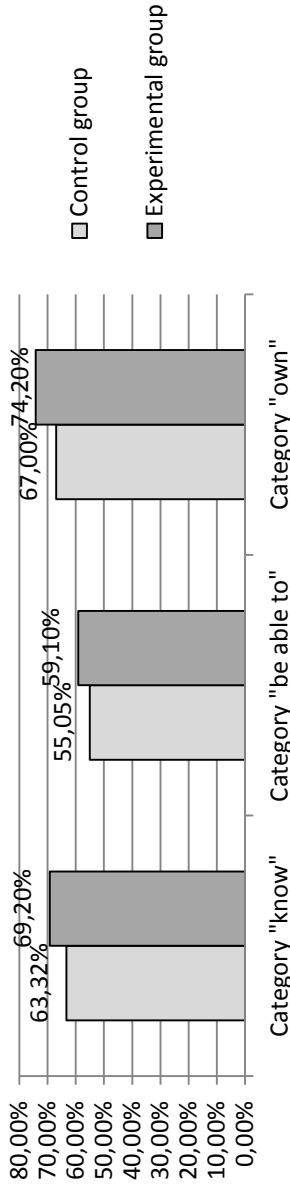


Fig. 1. The results of mastering the categories of "know", "be able", "own" general professional competencies

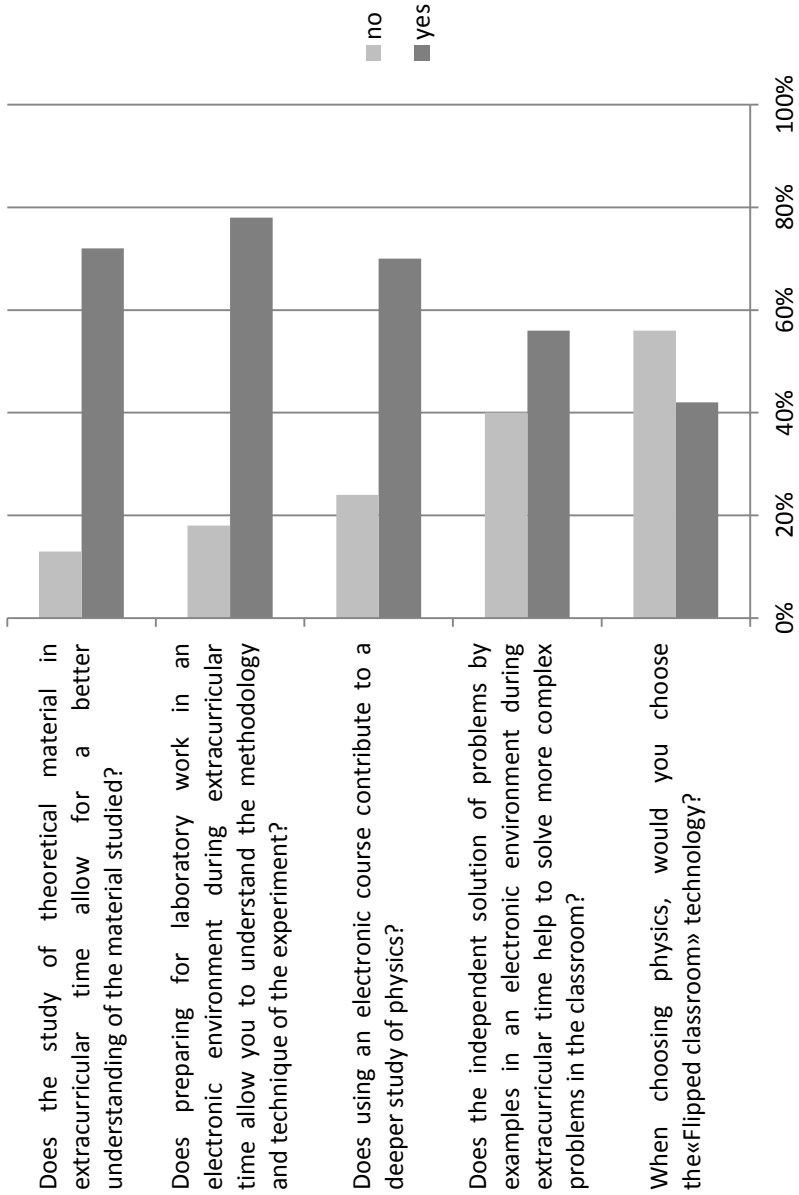


Fig. 2. Student Survey Results

Analyzing the results of the questionnaire, we revealed the ambiguity in the attitude of students of different specialties to the choice in teaching physics of blended learning in the educational information environment of the university, although approximately the same answers were received to the rest of the questionnaire (Fig. 3).

It can be seen from the diagram that slightly less than half (48%) of the students in the construction faculty would have agreed to take a physics course provided that educational technologies of blended learning are used.

At the same time, 74% of the students of the Faculty of Electrical Engineering surveyed answered yes to the question of choosing a blended learning model for further educational activities. After analyzing the results of the Unified State Examination in the physics of the students of these specialties, it turned out that the students of the electrotechnical specialties have higher Unified State Exam scores in physics and mathematics than those who study at the Faculty of Civil Engineering. A survey of teachers confirmed the fact that traditionally students with a higher level of school training, conscientious, responsible, are studying at the Faculty of Electrical Engineering.

It can be concluded that the high rate of educational activity within the framework of the methodological system impresses students with a good level of basic knowledge and positive personal qualities. Poorly prepared students with low motivation, who are not used to consciously approaching their education, the pace of blended learning, in which each type of activity is clearly regulated, oriented by the timing of completion, accompanied by control, the results of which count towards the overall rating, is liked to a much lesser extent. In an interview with students of the Faculty of Civil Engineering, it turned out that the traditional teaching method, in which the student receives ready-made knowledge in the classroom, is impressive only because it does not require the costs of an intellectual and temporary resource, it is more familiar from school.

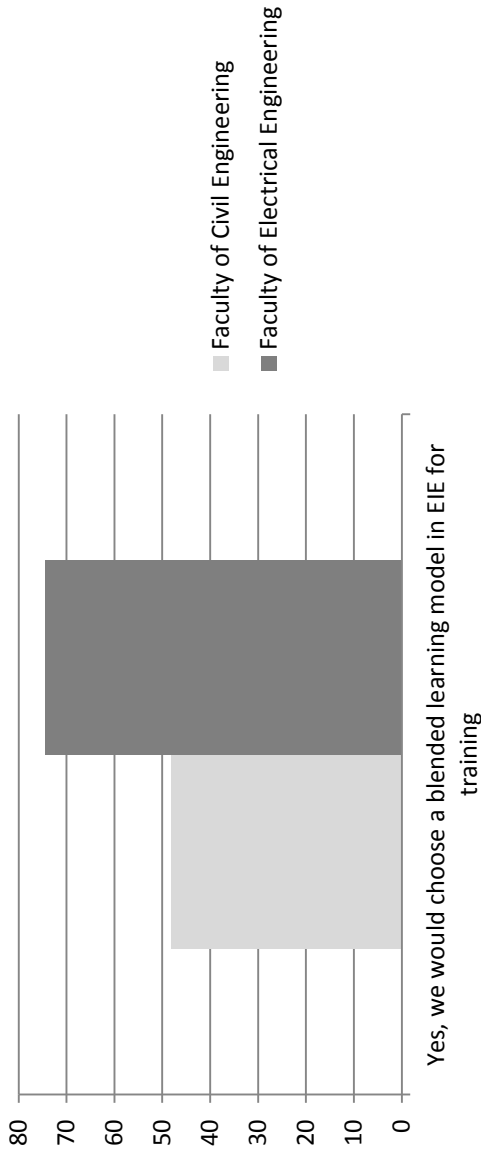


Fig. 3. The results of a survey of students of various specialties

We believe that this stereotype needs to be changed, since the most durable and valuable knowledge is acquired, as a rule, independently. It is necessary to pull up poorly trained students to the level of stronger ones. By teaching students to systematically fruitfully and consciously work in the field of acquiring new knowledge, we not only contribute to the development of their intellectual abilities, but also form a number of competencies that in the future will become the basis for the formation of a professional engineer who is able to independently think and find ways in his professional activity. way out of these situations, not waiting for ready-made solutions. For this purpose, it is advisable to partially or fully implement the methodological system that we have introduced into the educational process in other disciplines.

In turn, students who reacted positively to the use of the «Flipped classroom» technology in physics education in the educational information environment of the university noted that this technique allowed them to receive a powerful impetus when acquiring new knowledge and, in a short time, to break out far ahead in mastering the physics course compared to students in control groups. Also, students expressed a desire in the future, while studying other disciplines, to study at the same pace, using the technology of blended learning in the information educational environment.

## References

1. Ermishina E. B. The use of the "Flipped classroom" in the study of the discipline "History of Economics" // Electronic information and educational environment of the university as a factor in improving the quality of the educational process. Krasnodar: Publ. South. Un-ty of management, 2015. P. 22–27.
2. Veledinskaya S. B. Blended learning: design technology of the educational process / S. B. Veledinskaya, M. Yu. Dorofeeva // Open and distance education. 2015. № 2. P. 12-19.
3. Nazarov S.A. Pedagogical conditions for the design of a personality-developing informational-educational environment of a technical university: abstract. dis. ... cand. ped sci. – Rostov on Don, 2006. – 24 P.
4. Zavodchikova N. I., Plyasunova U. V. Using the model of training organization «Flipped Class» in the course of discipline "Methods of training and education in the field of computer science" // Bulletin of Tver State University. Ser. Pedagogy and psychology. 2016. № 1. P. 139–146.
5. Vorobyov A.E., Murzaeva A.K. Fundamentals of the «Flipped classroom» technology in universities // Bulletin of the Buryat State University. Issue 1. 2018. P. 18-30.

## THE ROLE OF THE TEACHER IN THE UPDATED CURRICULUM

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**Annotation.** Changes in the country and society present new requirements for a modern teacher. Every day you have to solve new problems in a changing situation every minute. Being a modern teacher is difficult, but possible. A modern teacher must make high demands on the process and work results, but at the same time, try to be attentive to each student and strive to contribute to personal development, and sometimes to correct the negative impact of the environment on him.

**Key words:** information society, new technology, teacher of new century, changes in process of education.

In modern Kazakhstan, the formation of a new education system oriented towards the world educational space is underway. This process is accompanied by significant changes in pedagogical theory and practice.

Qualitative changes in any area of our life, and even more so in education, are impossible without forming a new teacher's view of his place and role in the educational process.

The future of mankind depends on the role of teacher. The main goal of the school is to prepare a diversified personality with the necessary knowledge, skills and abilities necessary in life, to educate a highly moral person who loves his Motherland, who is able to approach any matter creatively. At present, due to the transformations taking place in society and in the education system, the requirements for the teaching profession have increased greatly, which entails serious changes from the teacher himself.



A teacher has to have deep knowledge in the field of psychology of education, upbringing and formation of personality of each student, he has to be able to organize communication in educational activities and has special knowledge and skills for the introduction of innovative techniques in school practice.

The 21st century is the century of information technology, a century that makes its own adjustments to the process of education of schoolchildren. Strategic guidelines for the development of education are determined by the First President of the Republic of Kazakhstan N.A. Nazarbayev in the Message to the people of Kazakhstan "Nurlyzhol - the path to the future" and are embodied in the update of the content of the secondary education of the Republic of Kazakhstan. Changes in technology, communications and science impose modern requirements for teachers, who must understand their role in the process of updating the content of education and ensure the introduction of new methods.

Nowadays we live in the environment where society imposes new requirements to the professional competence of the teacher. The democratization of society has created opportunities for innovative renewal of education as a source of new potentials for social renewal. Innovative processes have revealed the need to educate a flexible, dynamic person who wants to live in new, constantly changing conditions. One of the main ideas in the personality-oriented learning approach is the focus on the development of the student's personality as an active subject of educational activity and comprehensive preparation for the continuous process of education, self-development and self-improvement throughout life. Teachers should reveal the best qualities inherent in the soul of a student, encourage him to get joy from the acquired knowledge, create situations of success, and teach him to be a good person and a citizen of his country.

The ongoing process of informatization of society entails radical changes in the strategy of education: school also should be informational. New content of learning is possible on the basis of modern technologies: using of computer and various interactive equipment, development and introduction of non-traditional forms of a lesson (teachers can use presentations, videoconferences, messages, mobile phones, the Internet to

prepare for a lesson and during a lesson). Thus, informatization of education is a process of changing of content, methods and forms of education, which provides preparation of learners in the conditions of information society. The most important role of a teacher is to teach learners to live in the information world, to be able to find and use the necessary knowledge. In this case a teacher needs:

- to know educational processes;
- to update his professional knowledge constantly;
- to know and to use modern new technologies at the lesson;
- to improve his computer literacy;
- to learn his students to find out necessary information and use it to achieve the results;
- to collect, modify and use necessary information to improve the methodology of a lesson;
- to predict the results of his activities;
- to possess broad erudition;
- to reflect his professional achievements and the results at the end of each lesson.
- a teacher is not a source of information for his learners; he just helps students get information;
- to teach students how to identify similar features between subjects they learn at school and the reality;
- to help students learn to get information themselves, comprehend it, using additional resources.

The teacher is no longer a source of information, the teacher no longer has to stand and retell reproductive material and demand the same from the student. A student must constantly make little discoveries for himself. This is a creative approach to learning.

The main task of the teacher is to teach children to learn, to help the child become a harmoniously developed, competitive personality. Involving each child in the learning process, being able to listen to him, make him his assistant, look through the eyes of a student at the problem that concerns him - that's the task of the teacher. New time required from the teacher the possession of modern active technologies and their active use in the

classroom. Today's student has good computer skills and understands technology. And the task of the modern teacher is to direct their skills in the right direction, suggest how to get knowledge, interest, ensure that their eyes lit up with an interest in knowledge. The emphasis is not on the knowledge gained, but on the process of their application.

The modern school has always been and still is the mission - the upbringing and training of the "Future of the country" and "Future of the nation". The truth of these words can be judged by one basic fact: if we take into account that the child goes through the main stages of life in a school: childhood, adolescence, here he enters the threshold of adolescence. We can also say that he is in the "school of life." In the near future, the modern school will be a renewed and multilingual, multi-functional, competitive school.

A good school is a school of pedagogical excellence, which is famous for its teachers in "their business" and excellent graduates.

Today, society places high demands on the teacher. In the modern world there are changes that require changes from the teacher. Therefore, he must keep up with the times. And for this, the teacher must learn. A real teacher always has a lot of questions for which he is looking for answers and thus moves forward. A real teacher lives his work! It is impossible to teach someone to love, if you do not love; it is impossible to teach someone to learn if you don't learn, you don't improve your skills; it is impossible to teach someone to discover talents in oneself if one has never looked for them in oneself! Such a person knows for sure that in order to be a true teacher, you need to develop yourself, look for active forms and methods of teaching, and keep up with the times.

In the context of updating the content of school education, the forms and methods of organizing the teaching of the subject matter change. The learning process of the subject has the following features: the student is not given knowledge in finished form, and the knowledge is acquired by the students themselves, through the collaborative environment organized by the teacher, the search activity. The teacher should act not as the only source of knowledge, but as the organizer of the active learning and cognitive activity of the students themselves.

The educational process is organized in a spiral system, where the student each time has the opportunity to expand and deepen their knowledge. Modern lesson is the following:

1. The discovery of truth, the search for truth and its reflection.
2. Formation of behavioral habits, such as greeting, mutual attention, goodwill, etiquette.
3. A free lesson, to recognize a person as the highest value, to provide freedom for individual development
4. Creating a situation of success, the subjective experience of a person of personal achievements.
5. Organization of group activities.
6. The favorable psychological atmosphere of the lesson.

A lot of attention will be paid to changing the system of assessing the achievement of the expected results of students. Evaluation should comply with the following principles: validity, systematicity, consistency, objectivity, transparency, recommendation, and reliability.

It involves the parallel development of two lines of assessment: formative and summative assessment. Evaluation of educational achievements in a result-oriented education model implies ways of evaluating the results of training for a lesson and final work in a quarter.

But updating the content of education, broadcasting the best experience of introducing new approaches to learning and teaching methods, should take into account the positive experience of the traditional. Synthesis of traditional and innovative teaching methods will allow diversifying the forms of conducting classes that activate students' cognitive activity.

In general, the level of the Kazakhstani secondary general education should correspond to the development objectives of the state and ensure its competitiveness in the modern world.

A modern teacher should react to all changes in the process of education, and use in his practices all information and communication opportunities of a new century.

**References:**

1. Message of the President of the Republic of Kazakhstan N.A. Nazarbayeva to the people of Kazakhstan "Nurly Zhol - the path to the future" // [www.akorda.kz](http://www.akorda.kz)
2. Polat E.S. New pedagogical and information technologies in the education system. - Moscow: Academy Publishing Center, 2003.
3. Shchukin G.I. Activation of students' cognitive activity in the educational process. - Moscow: Publishing House in Pedagogy, 1979.
4. Borisova N.Ya. Support of innovative activities of teachers / N.Ya. Borissova. Supplement to magazines. Secondary vocational education. - 2010. - No. 8. - S. 16 -21.

## MYTHICAL-MYSTICAL NATURE OF «UKOK PRINCESS»

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**Abstract.** The article considers the princess tomb found as a result of archaeological site on the Ukok plateau of the Altai territory, and the ancient concepts of its connection with mysterious forces interrelated with mythological thinking. Special attention is paid to the tattoo on the body and clothes at the burial of the "Ukok princess", and the data that tell about the history and knowledge of the Huns, Saks, and Turkic eras has been analyzed. The distinctive signs in the tattoo and clothes of the princess are associated with mythical knowledge. The symbols like griffin as the guardian of the Altaic treasure, the larch stick and red belt are explained, and there are preliminary conclusions about the role of Ukok princess in the community, where she lived.

**Keywords:** Turk, Altai, Ukok plateau, princess, griffin, Sphinx, bori-ana, Ochy bala.

## INTRODUCTION

Altai Mountains as the birthplace of the entire Turkic khanate became the motive of many legends. Altai is also considered the place of mankind's beginning. The treasures of the Altai Mountains are owned by four large countries as Kazakhstan, Russia, China and Mongolia. Altai preserve all the treasures of past history. The ancient historian Herodotus spoke of Altai-Altintag in his notes as a settlement of Saks in the East. The Huns, known in the history, also lived in the Altai Mountains, and later this territory was glorified by the Turks that are the heirs of the Saks and Huns. Altai is rich in ore and became the basis of many poems, tales and legends.

The Ukok plateau of the mountainous Altai territory is known in history for its archaeological sites, inherent in the ancient Saki culture. This area was included in the territory of the Katon-karagai district, then the Russian Altai. If we pay attention to linguistic studies, the meaning of the word "ukok" means "chest", which means "mountain plateau", "hill" in the Kyrgyz language, and "uheg" means "pointed peak of a rock or a high mountain" in the Mongolian language. Its translation from the language of the Altaic people means "listen to heaven (heavenly power)". In the ancient Turkic language it denotes the name of a month.

## MATERIALS AND METHODS

Ukok plateau is the valuable artifact of the Bronze Age which shows us the culture and tradition of people who lived in the territory of Koshash area. This discovery is called 'Ukok princess' or 'Ochy bala', and belongs to approximately III-II centuries BC. «Ochy bala» is a famous Gornyi Altai people's epic about a brave woman. The objects of this article are artefact of «Ukok princess» and «Ochy bala» epic. Moreover, we used mythic motives and heroes in order to compare cultural heritages. In order to deep investigate the importance of Altai princess in mythology we used research methods such as collecting materials related to this issue, analyzing and comparative methods in this research. Ukok princess is considered to be one of the largest archeological finding of the previous century, and both archaeologists and historians paid attention to this discovery in 1991.

In 1993, Siberian archaeologists under the leadership of the Russian academician V. Molodin and the historian N. Polosmak discovered a female burial ground near one of the Saki barrows on the mountain plateau in the territory of the Koshagash area. The discovery of the archaeological site was considered the largest archeological finding of the late XX century. According to scientists, the valuable artifact belongs to the Pazyryk culture of the Bronze Age. It is about the III-II centuries BC. The girl of about twenty-five, height 1 meter 70 cm, white skin, clothes made of fine silk, with a headdress decorated with gilded patterns, a red belt, a larch stick in her hand, and there are six red horses buried nearby. Horse equipments and jewelry disappeared due to the looting of the mound. During the excavations of the Berel burial ground we saw that the traditions of burial with horses are characteristic to the Saks culture. The mummy of a young woman, called "Altai princess" or "Ukok princess", "Ochy bala", preserved without damage. Local people called the place as "Ak katyn" (white queen).

In ancient mythical narratives the griffin with the head of a woman is depicted as the protector of golden treasury of the Altai Mountains. All the attributes of the mummy in the mound are interesting. The red belt is a sign of fighting spirit, and usually people with high status wore it. According to mythical knowledge, larch sticks have unique properties characteristic to possessors of supernatural powers. The girl has a tattoo, depicting a sacred griffin on her left shoulder. Griffin is a winged mythological creature with the body of a lion and with the head of a golden eagle, sometimes a bird with the head of a man. It has sharp white claws, and sometimes golden wings. Griffin is a contradictory living creature that combines heaven and earth, good and evil at the same time. It also means domination over two elements: the earth and air. They serve as the guardian of treasure and storehouse of gold. Such griffins are the guardians of Altai gold. The peculiarity is in the fact that they are depicted as a bird with the head of a woman. Archaeologists determine that images of birds are often found in ornaments of Saks. We can say about the winged wolf as the Hun or Turkic type of winged griffin. The mythical motive about two wounded children and a wolf-mother in the Chinese written annals indicates the basis of the narrative about the Huns' considering themselves



descended from the wolf [1, 65-66]. According to A.Sarai, tengri wolf is a flying winged wolf. It is found in the epic "Oguz-name" as follows: "in one it is visible on the top of a glacial mountain, in the other among the colorful clouds" [2, 25]. The fact that anthropomorphic images are winged demonstrates the free imagination of nomads wandering in space. Kok bori (gray wolf), that is, the winged bori-ana (wolf mother) is considered the sacred mother of a tribe. The bori-ana totem can be reasonably associated with the era of matriarchy. According to legend given by T.Zhurtbai, in a deserted steppe a lonely, helpless and wounded child meets bori-ana (wolf-mother), which lost its cubs, and bori-ana feeds the child. Thus, the child gets used to bori-ana and subsequently kok bori (tengri wolf) will become the spirit of worship of the Turkic people [3, 34-35]. In another legend one of the descendants of Kok bori (the child rescued by bori-ana) turns into a white goose during the war [3, 35]. The story of the "winged wolf" is combined with the transformation of the descendant of Kokbori (nursed by bori-ana) into a white goose.

In the Mongolian part of Altai there is a drawing of a wolf feeding a baby on the balbal (stone sculpture) of Bogeti. Scientists suggest that this is a trace of the Turkic Kaganate era. Now we remember the myth about the foundation of Rome city. The name and construction of this city is associated with Romulus, who was considered its first king. Amulius threw the twins Romulus and Remus into the Tiber river, but they were saved and a she-wolf fed them. This mythical motive became the object of art. In Rome there is a monument to a wolf feeding two children. If you look at them the connection between the two exhibits is obvious. The manifestation of the bori-ana totem in Altai and Rome through a valuable heritage as monuments should be considered in contact with the nomads. The beginning of the symbolism of the winged wolf comes down to this bori-ana.

The image of the griffin reminds us the motives about such creatures in the world mythology. In the ancient Greek mythical story about Oedipus, taken as the basis of the tragedy of Sophocles "Oedipus the King", one of the characters, the Sphinx is described in this way: "he has the head of a woman, the body of a lion, with sharp claws and special large wings" [4]. This monster-shaped anthropomorphic creature, sitting on a rock at the

entrance to the city, puzzles people passing by and demands that they guess. The people who could not solve the riddle are thrown down from the cliff, and not a single passing by was left alive. Once, escaping from his fate, Oedipus reaches this city. The Sphinx posed the riddle to him. Oedipus decided to solve this riddle, thinking that it is better to die at the hands of this monster than wandering aimlessly. The riddle of the Sphinx: "a living being walking on fours (legs) in the morning, on twos at noon, on threes in the evening, the more legs, the less strength". Oedipus easily guesses this riddle. "Your riddle is very easy. This is a human being. In early life a person takes his first step and crawl, in his adult life he walks on two legs, in his old age he has a walking stick". Hearing the solution to the riddle, the Sphinx throws herself over a cliff. In the case the riddle is not solved, the person who could not solve, and if it is solved, then the Sphinx must die. The Sphinx with women's nature puts an end to her fate by this action. Thus, the destruction of female domination is implied in the narrative of the myth. Anyway, the Sphinx possessed supernatural power. Many people died at her hands. The sphinx-griffins that held special power and authority, became the patrons of sacred female healers or shamans in subsequent years. Another hinting significance in this analysis, along with philosophical scientific conclusions, that attracts attention is that the Sphinx has the head of a woman and is female. According to her appearance, she is valiant and energetic like a lion, quick and free like a bird, and a predator. This is an anthropomorphic creature, containing all the characteristic features of the most powerful creatures of heaven and earth. A female ruler with a pleasant character in the era of female domination (matriarchy) appears in the form of a frightening monster during the establishment of male domination (patriarchy). This is evidenced by the image of Zhalmauyz kempir (old witch) in the folklore of the world. The heroes of fairy tales that resisted countless troops could not withstand Zhalmauyz kempir. Only the bravest ones could defeat her. The folklorist S.Kaskabasov explains such features of "a representative of all evil in the world" (Zhalmauyz) as "the second-degree phenomena, the result of patriarchy" [5, 73]. He says that Zhalmauyz is the image of an old mother and "a leader of maternity peculiar to God" in the ancient rite, thus "the woman-leader is taken as Zher-

ana (Earth-mother)" [5, 73]. There are many examples of the motives about "Zher-ana" that begin with a mythical worldview and continue in artistic knowledge. As a formed traditional poetic image "Zher-ana" archetype hold a place in the consciousness of mankind. The female ruler was not an ordinary person, she had supernatural power. She was a particularly honorable person in the tribe, possessing the qualities of quackery, healing, clairvoyance and divination. The Sphinx who told the riddle to Oedipus also had such properties. Her portrait image reflects a deep symbolic meaning. The mythological prototype of the Sphinx and Zhalmauyz kempir in a monstrous form is a ruler and matriarchal personality. Such characters evolved from a positive hero to a negative one on the path of their evolutionary development. The reason is the legality of social development. In the period of female domination falling and establishment of male domination there was a tough and great battle. A woman who was once a patron and admirer of a tribe cannot voluntarily give up power. We remember Tiamat, a female monster floating freely in an endless ocean in the Sumerian mythology. Everyone is afraid to go and open a war against her. Only one hero Marduk goes into battle against Tiamat and destroys her. Tiamat's death and the creation of heaven and earth of her body mean the end of matriarchy and the beginning of patriarchy. They said that chaotic state was replaced by new order in the world and everything made sense. In the ancient Kazakh epic "Kula mergen" Zhalmauyz persecutes Kula mergen (the main character). In the fairy tale "Altyn saka" she makes bai (a wealthy man) give his son to her, intimidating him. In the epic "Er Tostik" she pursues the Tostik (hero of the epic). Zhalmauyz (later Mystan kempir) acting as a negative character in the folklore is a kind of matriarch leader mentioned above that undergo transformation. The person who had been the ruler subsequently turned from a protagonist hero into an antagonist hero as Zhalmauyz or Mystan kempir. We are talking about female gods in the ancient world myths as a mythical prototype of the matriarch's images. Female living beings played a special role in the stories about the beginning of the world creation. The Earth is known for its female nature. Gaia in the Greek, Ki in the Sumerian, Umai in the Turkic, and Yin in the Chinese myths are the humanized images of the Earth. Many

scientists suggest that the era of chthonic mythology began with time immemorial and ends in the II century BC. Since this was the era of female domination, worship of the Great Mother God prevailed. So the cults as the Egyptian Tefnut, Greek Gaia, and Roman Tellur appeared. These characters of earthly nature were recognized to have the ability to fly in the sky. The mythologization of the whole creation is directly related to the worldview. The active participation of women in power, thanks to their strength, skills and intelligence, agility and vigilance, as one of the sources of life, is manifested in the image of ancient rulers. The cult of a female leader was associated with her different activities and functions. She is not only the protector of her people, but also has amazing qualities, and therefore, it can grapple with invisible creatures that harm human. Folklorists explain the appearance of female shamans in this way. Shaman women did not “disappear” with the era of matriarchy. There are many motives that in the era of the patriarchy they were engaged in influential actions helping the men and khans’s wives due to their supernatural powers and tricks. S. Ualikhanov wrote: “women with the spirit called elti. They are also shamans” [6, 183]. There is some evidence that the princess, who lived in her eternal settlement on the Ukok Plateau of the Altai Mountains, worshiped the matriarchs of ancient eras and considered herself their legal heir. The main feature of this evidence is the tattoo in the image of mythical griffin on the body of the princess. The griffin, keeper of treasures, is the protector of the hearth, which is the most precious thing for mankind. The meaning of the golden treasury symbol points to that. It means that if Altai is the golden center of the ancient Turks, the griffin with the head of a woman and the body of a bird is its protector. The connection between the woman-mother, defending her hearth and the griffin defending the treasury in her settlement can be explained in terms of artistic symbolism. We consider that the appearance of symbols is associated with ancient traditions, faith in the magic words, and signs or superstitions connected with them. As you know, a system of various symbols was formed in order to speak using subtext, hint, and signs. The larch stick in the hand of Ukok princess is also an important attribute. It is a part of the tree of life, growing in the center of the Earth. Permanent attribute of motives about the saints, druids, shamans is their sticks in their hands. A person that holds a small

part of a giant tree, belonging to three worlds – the past, present and future, are connecting the worlds of the living and the dead, that is, a human being of two worlds. The larch is an evergreen tree and symbol of stability, eternity, and strength. The red belt of the young princess is also a sign of her high status and exalted spirit. Another name of Ukok princess is “Ochy bala”. Ochy bala is a brave woman, the protagonist of the Altai epic “Ochy bala”. The epic was first published in 1951 according to Alexei Kalkin, the narrator of the Gorny Altai peoples [7]. The Altaians believe that the mummy on the Ukok plateau is the hero of this epic. Ochy bala is the image of the queen that appears in the poem as a courageous hero, fighting the enemy to defend her country. Once, the Altai people were subjected to violence by the enemy. Ochy bala fought against the army of Kan-tagdy-Bi and killed Ak-dala, Kan-tagdy-Bi’s son. But Kan-tagdy-Bi resurrected his son and went to battle again. Ochy bala went to the enemy’s place to uncover the mystery of Kan-tagdy-Bi’s power. On this way she met various mythical creatures. She had to fight the blue bull, a messenger of Yerlik, the king of the Netherworld. On advice of her horse Ochy-Deren, she turned into a golden eagle and defeated the blue bull. Due to her agility and cleverness, she revealed the secret of Kan-tagdy-Bi. The secret of his strength was a nonahedral blue stone, hidden in a golden chest. Ochy bala found this blue stone and defeated the enemy. She protected her people and land. In one of the legends Ochy bala turns into the moon and her horse Ochy-Deren into the star Urker (Pleiades), and they rise to the sky. The main character of the epic “Ochy bala” explains her origin in the framework of mythological knowledge. “Father is a mountain forest of dense pine. Mother is a sheer cliff”. It is stated in the language of the epic as follows:

*Kara taika (ny) atam tegen/ Қара орманды әкем деген / Calls dense forest as her father, Katu jardy anem tegen/ Қара жарды анам деген / Calls sheer cliff as her mother, Pazhyn piler kaany jok/ Басын иер қағаны жоқ / No kagan (khan) to bow her head, Pashkaratyn pashsyzy jok/ Басқаратын басшысы жоқ / No chief to lead, Eki le tungei emdi poiilu/ Бірдей екі ерекше қыз / Two similar unusual girls Emdi mynda jurtai pargan/ Бағзы күнде тірлік кешкен/ Lived since very early times [8, 86].*

It says that the eldest of two sisters Ochyra Mandi had the gift of clairvoyance. Ochyra Mandi led the household and people, and Ochy bala was engaged in hunting, not interfering in her sister's business. She was especially courageous, proud and freedom-loving... That's how Ochy bala is described in the epic...

In the myths of the Altai peoples Ochy bala – White queen – Ice maiden is on guard at the gates of the underworld in the center of the Earth. She does not let evil forces that frighten people and violate vital harmony out of the underworld. The White queen is the soul that keeps the mystery of the universe creation and eternal life. In her twenty-five years she left this world in order to protect peace and harmony, and not to release evil forces from the underworld. That is, she is the hero standing at the gates of two worlds “not alive and not dead” in mythical motives. One of such heroes is Korkyt ata of the Turkic people. After excavating the grave, local people said that disturbing phenomena had increased and therefore they sent a letter to higher organizations, asking for returning the princess to her burial place. The basis of the legend about the princess, standing on the border of the dead and the living, having own prophecy of conquering supernatural powers, and that her sister with the same unusual skill is also on one of these Altai plateaus, lead to ancient mythological knowledge. In conclusion, all the things of Ukok princess and the tattoo on her body indicate that despite her youth, this woman had an important role in society. Historical records and legends by local people show that the woman occupied a special place in the spiritual culture and social relations beginning with the ancient Huns and Saks, and continuing in the Turkic era. The unique relics found in the archaeological sites are also important artifacts. Particular respect for women, riding horses freely, fighting on the front lines along the men and defending their homeland is expressed in the solemn burial of Ukok princess. We don't know exactly who is this noble girl with a larch stick, dressed in a silk dress embroidered with gold, riding the red horse and fighting against her enemies. We know that she was not an ordinary person. Perhaps she was respected girl of the tribe, who fascinated everyone by her miraculous nature and deep knowledge of

secrets of nature. Maybe she protected them from enemies, various diseases, and evil forces. She may be virtue against to evil. Therefore, she became a hero of poems, legends, and deserved respect. Ochy bala queen ... Altaic charming lady ... Ukok princess... A wonderful girl with these names awakens the descendants' spirit and is wandering around the place of her ancestors in legends. We strive to uncover the truth from the legend, relying on artifacts.

### **CONCLUSION**

When one of the fragments of endless struggle between good and evil in the living space from mythical knowledge is described artistically and becomes folklore heritage, the artifacts indicating that folklore does not come out of imagination are valuable treasures found in the vaults. Now we can't say that the events of legends appeared only from imagination and are far from the truth. The tomb of the princess on the Ukok plateau and the Altaic epic "Ochy bala" about this princess is a case in point. The brave princess who was the main hero of «Ochy bala» epic was buried in the Ukok plateau. As the main hero of this epic, her name occupied a special place in the spiritual culture and in our people's memory.

## References

1. Kazakstan tarihy turaly kytai derektemeleri. Almaty: Daik-press, 2006. – 480p.
2. Sarai A. Kok turikteri. Almaty: “Merekenin baspalar uyi” LP, Mereke baspasy, 2014. – 688 p.
3. Zhurtbaev T. Dulyga. V. 2. Almaty: Zhalyn, 1994. – 384 p.
4. HYPERLINK “[http://licey.net/free/3-mify\\_narodov\\_mira/8-mify\\_narodov\\_evropy\\_i\\_ameri\\_ki/stages/94-30\\_car\\_edip.html](http://licey.net/free/3-mify_narodov_mira/8-mify_narodov_evropy_i_ameri_ki/stages/94-30_car_edip.html)” [http://licey.net/free/3-mify\\_narodov\\_mira/8-mify\\_narodov\\_evropy\\_i\\_ameri\\_ki/stages/94-30\\_car\\_edip.html](http://licey.net/free/3-mify_narodov_mira/8-mify_narodov_evropy_i_ameri_ki/stages/94-30_car_edip.html)
5. Kaskabasov S. Tandamaly. V4. Folklor iirimderi. Astana: Folyant, 2015. – 328 p.
6. Ualikhanov Sh. Multivolume collected works. V. 1 / 2-edition. Almaty: “Tolagai grup”, 2010. – 376p.
7. Kalkin A.G. Ochy bala (Tales): altai chorchoktor. – Gorno-Altaysk: Gorno-Alt. obl. national. publ. house, 1951. – 36 p.
8. Altaiskie geroicheskie skazanya “Ochi-Bala”. “Kan-Altyn”. Novosibirsk, 1997. – 668 p; Ermolenko L. N. Ob ognennoi prirode epicheskoi yarosti// Arheologiya Yzhnoi Sibiri. Novosibirsk. 2003. P. 67-71; Yamaeva E.E. Altaiskaya duhovnaya kultura. Mif.-Epos. Ritual. GAIGI - Gorno-Altaysk, 1998. – 168 p.



## FEATURES OF ADAPTIVE RESPONSES OF STUDENTS TO PHYSICAL ACTIVITY

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**Abstract.** The article deals with the peculiarities of psychophysiological adaptation of students in Junior courses, classified for medical reasons to special medical groups. The study was conducted on the basis of the Omsk state University of f .M Dostoevsky, faculty of physical culture, rehabilitation and sports, at the Department of adaptive physical culture, with students with disabilities, referred to as a health special medical group, 1-2 course, 34 students with disabilities, referred to health status to a special medical group. Analysis of the results showed the dynamics of the level of functionality of psychophysiological adaptation and stress mechanisms of psychophysiological adaptation of students referred for medical reasons to the special medical group in physical education. Different levels of adaptive capacity and stress mechanisms of psychophysiological adaptation of students assigned for medical reasons to a special medical group in physical education classes allowed to determine the nature of the functional capabilities of the individual.

**Key words:** psychophysiological adaptation, compensatory mechanisms, students, medical groups

One of the main problems of adaptive physical culture is the study of the regularity of adaptive processes in students to exercise. Of particular importance are the studies of compensatory-adaptive mechanisms

in students with disabilities classified as medically indicated by a special medical group. At the present time, this issue must be considered from the position of psychophysiological adaptation, since tension and overstrain of the emotional background of persons with disabilities are the main issue in the study of changes in the functional state of the human body [8],[9].[10].

The purpose of the study: to study the features of psycho-physiological adaptation in persons with limited health abilities, classified by medical indications to a special medical group before and after physical exertion.

### **1. Methods of research**

The choice of methodical techniques was determined by the purpose and objectives of the study. To implement them, a methodological approach based on a comprehensive study of the adaptive reactions of the students of the study groups with the allocation of psycho-physiological potential is used, which makes it possible to obtain information about the psychophysiological state of a student with disabilities. Indices of individual and typological characteristics of the emotional sphere of the individual, subjective indicators of the functional state and state of health were determined using the standard techniques of Spielberger-Khanin, SAN, a stress test.

Based on the Spielberger technique, a procedure was developed for determining the level of functional capabilities of psychophysiological adaptation and the level of tension of the mechanisms of psychophysiological adaptation [1].

The research was carried out on the basis of Omsk State University, the faculty of physical culture, rehabilitation and sports, at the chair of adaptive physical training, with students, classified for health reasons to a special medical group, 1-2 courses. Studies were conducted in the morning classes in physical training, students were subjected to psychological testing before and after exercise (physical exertion). The experimental study involved, with their voluntary consent, 34 students with disabilities classified as health by a special medical group. The research was carried out at the beginning and in the period of the end of semester studies during the educational process.

The statistical processing of the obtained results of the investigated features was evaluated according to traditional statistical methods: mean values, variance. In the solution of the problem of equality of mean values and variances, the Student's test was used.

### **2. Results of the study and their discussion**

The problem of psycho-physiological adaptation in persons classified as medical indications to a special medical group is key in predicting the success of mental and physical working capacity in conditions of study at a higher educational institution.

In the control group, assessment of psycho-physiological components. (70% [54,2 ± 6,3], 30% [37 ± 0,63], p≤0,05) of students before the beginning of classes and at 60% [51 ± 2.5], 20% [37 ± 0.63], 20% [26 ± 0.12], p≤0.05 of 10 examined after graduation, personal - in 70% [56 ± 1.6] p≤0.05, 30% [33 ± 1.6] and 80% [46.6 ± 2.63], 10% [36 ± 1.6] and 10% [24 ± 1, 6], p≤0.05, respectively).

Subjective assessment of emotional stress in the experimental group allowed to note the presence of high, medium and low values of situational anxiety (CT) before the beginning of physical education 16.6% [52.7 ± 1.22], 66.8% [37.5 ± 0, 72], and in 16,6% [24,7 ± 1,22], p≤0,05, after the lessons it was 41,6% [54,5 ± 0,22], 58,4% [ 35.9 ± 0.72], p≤0.05. Absence of significant emotional loads, determines less pronounced situational anxiety.

The values of personal anxiety (LT) having a genotypic nature, state the presence of high, medium and low values of the index from 24 surveyed before the beginning of the classes: in 37.5% [54.3 ± 2.79], 58.4% [38 ± 1, 7], 4.1% [20 ± 0.65] p≤0.05, after graduation from 54.1% [57.6 ± 2.7], 45.9% [40.2 ± 1.7 ] p≤0.05.

At the end of the semester, the examination of students after physical training showed the following changes in indicators: the values of situational and personal anxiety changes in values in 37.5% [51.5 ± 2.7], 62.5% [37.3 ± 1.7] p ≤0.05 and 32.5% [59 ± 2.9], 67.5% [38.5 ± 0.75] p≤0.05, respectively.

Mean values of the level of functional capabilities of psycho-physiological adaptation in the control group before the beginning of the classes - 93.5 ± 4.7, p≤0.05 and after the classes ended - 82.2 ± 4.5, p≤0.05. In the experimental group at the beginning of the semester - before the beginning of the classes - 80,2,3 ± 4,1 and after graduation -92,1 ± 5,5 and at the end of the semester - 85,8 ± 4,8, p≤0,05 . As studies have shown, the level

of functionality increases by the end of physical training. The tension of the mechanisms of psycho-physiological adaptation is also characterized by a decrease in the level by the end of physical education

An analysis of the level of anxiety in the group of subjects showed that the reactive (situational) anxiety in the students showed up insignificantly compared with personal anxiety, which determines the individual sensitivity of students to stress. A high level of anxiety indicates the possibility of a conflict situation, nervous breakdowns and psychoemotional instability. A high level of personal anxiety indicates the presence of a neurotic conflict, with emotional and neurotic breakdowns, psychosomatic disorders.

The obtained results made it possible to determine the level of functional capabilities of psychophysiological adaptation, as well as the emergence of stress mechanisms of psychological adaptation in students, classified by medical indications to a special medical group in physical education. The indicators of personal and situational anxiety were used in accordance with the methodology for determining the level of functional capabilities of psychophysiological adaptation in students. This technique allowed us to determine the level of tension of the mechanisms of psychophysiological adaptation, which can be estimated on the difference between the situational and personal anxiety of the subjects. The results of the study make it possible to determine the various levels of adaptive capabilities and the stresses of the mechanisms of psychophysiological adaptation of students who are classified by medical indications to a special medical group in physical education.

Assessment of stress resistance in the control group showed the presence of high, medium and low values of stress resistance: in 30% (10) there was a high degree of stress resistance before the beginning of the classes, the average - in 70% (10). After classes, the following values were found: a high degree of stress-resistance - in 20% (10), middle - in 70% (10), low in 10% (10). The presence of high and low values was also noted in the experimental group: before classes - 29.1%, 66.1% and 4.1% (24), respectively. After classes, the average values to 70% (24) increase slightly and there are no values of a low degree of stress resistance. At the end of the semester after physical training, the values of the quantitative indicators were noted: a high degree of stress resistance was noted in 37% (24) of the examined, 12.5% (24) of low stress resistance and 50% (24) - moderate stress resistance.

The problem of adaptation to physical exercise is not only biological, but also social significance due to the close dependence of adaptation mechanisms and human health. уровне [7], [8].

The normal state of life is characterized by the presence of the body's equilibrium with the environment and the maintenance of homeostasis within the system. Any change in the level of functioning leads to a reorganization of the systemic activity of the organism with the aim of achieving the necessary final result by moving to a new level of regulation, by using reserve capabilities, involving new ones and eliminating unnecessary links in the systems. Long-term tension of the regulation system can lead to its overexertion, and in the future - to depletion of protective mechanisms, decrease of the body's functional capabilities [2].

A high level of anxiety indicates the possibility of a conflict, nervous breakdowns and psycho-emotional instability. Personal anxiety is activated when certain stimuli are perceived by a person as dangerous, associated with specific situations, threats of well-being, self-esteem, prestige and others. Situational or reactive anxiety as a condition is characterized by subjectively experienced emotions: stress, anxiety, nervousness and the consequence of very high reactive anxiety can be violations of attention (concentration, stability, switchability, etc.) and fine coordination of movements [3], [4]

The obtained results make it possible to characterize the different levels of adaptive capabilities and the stresses of the mechanisms of psychophysiological adaptation of students who are classified by medical indications to a special medical group in physical education [9], [10].

Evaluation of the level of functional capabilities, the tension of the mechanisms of psychophysiological adaptation, studies of subjective characteristics of health, working capacity and emotional background before and after physical education classes makes it possible to build a prognostic model for identifying students with low and high functional and adaptive capabilities, to improve the organization of physical performance, which should facilitate realization of the goals of increasing the adaptive capacity of the organism, and quality of life and health [5], [6].

## **Bibliography**

[1]. Кокун О.М. Системний підхід як методологічна основа психофізіологічного забезпечення діяльності людини // Актуальні проблеми психології. – Т. V: Психофізіологія. Медична психологія. Генетична психологія / За ред. С.Д. Максименка. – К.: Нора-Друк, 2002. – Ч. 1. – С. 55 – 68.

[2]. Kelsey R.M., Soderlund K., Arthur C.M. cardiovascular reactivity and adaptation to resurrent psychological stress: replication and extension // *Psychophysiology*. – 2004. – Vol. 41, No 6. – P. 924.

[3]. Vorobyova TG, Dementieva EV, Turmanidze VG, Turmanidze AV, Psychophysiological adaptation of students in the period of training; *Bulletin of the Nizhnevartovsk State University*. – 2016.-No 2.-С. 59-65.

[4]. Kolobkov PA, Evseev SP, Tomilova MV, Malits VN, Creation of conditions for physical training and sports for people with disabilities and disabled people; *Adaptive physical culture*. No. 4 (60). -FROM. 2-8.

[5]. Neretin V.F. Forming a healthy lifestyle among young people through physical culture, In the collection: Actual problems of modern general and vocational education, Collection of articles on the materials of the All-Russian Correspondence Scientific and Practical Conference. 2015. pp. 138-141.

[6]. A.S. Fetisov, S.S. Mikhailov, D.A. Beshenets Physical culture as a means of impellent culture of a student's personality. *Bulletin of the Voronezh State Technical University*. 2014.-Т. 10.- No. 5-2 .- P. 257-262.

[7]. Dragic O. A. Analysis of morphofunctionalchangability of adolsent students in the environment of Ural Federal District / O. A. Dragic, C. A. Sidorova, E. A. Ivakina, S. V. Zobnina // *Life Science Journal*. 2014. No 11(11s). P. 595-598.

[8]. Nikulina, A.V. The physiological basis for improving the adaptogenesis of undergraduate students. / A.V.Nikulina: dis.doktorbiol.nauk. - Cheboksary, 2014. - 439s.

[9]. Vinogradova AA Adaptation of students of junior courses to study in high school / AA Vinogradova // *Education and science. Izvestiya Ural Branch of the Russian Academy of Education*. – 2008. – No. 32.- P. 37-48.

[10]. Shakirova O. V., Stepanova I. S., Kiseleva E. V., Formation of the motivation and value component of the physical culture of the personality of students of a special medical group in the conditions of the physical culture and recreation environment; *Adaptive physical culture* .- 2015.-v. 4 (64) .- P. 6-10.

**OBJECTIFICATION OF ASSESSMENT OF MENTAL STATES  
OF PRIMARY SCHOOL STUDENTS**

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Intensification of the educational process, in-depth study of subjects, the introduction of new educational technologies, etc. unfortunately, in addition to positive results, they also bring a negative effect - a deterioration in the psychosomatic health of children. The fact that mental states are an indicator of the psychosomatic well-being of a student determines the need to explore the possibility of obtaining their objective assessment. The solution to this problem will allow, in our opinion, not only to correctly assess the state of the student, but also to choose appropriate forms and methods of pedagogical influence, to correctly organize the conditions of activity and, thus, prevent the emergence of negative mental states that provoke psychosomatic disorders.

In our opinion, at the present stage, the researchers' priority should be the search for methods that make it possible to objectify the assessment of mental states in educational activity, which will make it possible not only to comprehensively assess the impact of the academic load on the psychosomatic health of the student, but also to develop adequate measures for its correction.

The choice of methods for studying mental states should be based on the *principle of systemicity*, which involves the study of mental states in accordance with their level organization, the *principle of unity* of the external and internal manifestations of the mental state, and the *principle of necessity and sufficiency*, limiting the set of methods to selected indicators corresponding to the levels of response, and suggesting the possibility of combining the obtained indicators into a common integrated assessment.

It is proposed to use a set of methods as diagnostic tools. The questionnaire "Typical mental states of students in educational activities" (Menzul E.V., Ryazantseva N.M.) aims to study the mental and social level of manifestation of the mental state of the student. The *mental* component is revealed by studying the student's self-esteem of his experience. *Social* - through the assessment of the student's mental state by the teacher based on external observation of the student's behavior. This technique allows you to: a) to identify mental states that students, in terms of their self-perception, experience most often in the learning process; b) to investigate the nature of the change in the mental states of students when the educational situation changes (outside the assessment situation and during the survey), c) to assess the quality of the assessment of the mental states of schoolchildren by the teacher based on a comparison of the estimates given by the student and teacher.

The methodology "*Assessment of the physiological component of the mental state in the situation of the impact of the training load*" is aimed at studying the nature of changes in physiological parameters under the influence of the training load. As a base, we use the method of monitoring indicators of the cardiovascular system (control of heart rate parameters), which is widely used in medicine in the study of functional conditions. This method allows you to identify the tension in the functioning of the cardiovascular system, due to emotional response or intense processing of information.

Since it is difficult to diagnose the physiological level of a mental state using a hardware technique in natural conditions of educational activity in real time, a model experiment is used to reproduce a situation that provokes a state of psychophysiological tension in laboratory conditions as close as possible to natural ones.



The formed complex of psychodiagnostic tools allows you to determine the qualitative uniqueness of the mental state at all levels of its manifestation (physiological, mental, behavioral), compare the indicators obtained as a result of using different methods, and based on them form typical psychophysiological groups of students.

Our study was carried out in three stages: 1) diagnosis of the mental level of the mental state (the nature of the change in the mental state of students when changing the educational situation was studied: outside the assessment situation (hereinafter "at school") and in the assessment situation ("during the survey"); 2) diagnosis of the social level of the mental state (the nature of the change in the quality of the teacher's assessment of the mental state of students when the educational situation changed) was studied; 3) the diagnosis of the physiological level of the mental state (the nature of changes in physiological parameters was studied under the influence of the training load and without it).

The study involved 429 people: 410 students in grades 2–5, as well as 19 teachers working with them.

The study of the mental level of manifestation of the mental state made it possible to determine the conditions that children experience in the process of educational activity ("at school" and "during the survey"). The data obtained indicate that typical mental conditions in both situations of the impact of the workload are *doubt* (30% - "at school" / 50% - "during the survey"), *concentration* (38/43%), *fatigue* (62/38%), *fear* (28/43%), *anxiety* (38/44%), *joy* (51/23%). Atypical - *surprise* (15/10%), *sadness* (12/8%), *shame* (7/8%), *admiration* (11/8%), *inspiration* (17/11%). An increase in the teaching load in the "during the survey" situation leads to a change in the spectrum of mental states experienced by students. So, there is a significant increase in the number of children experiencing states of *doubt* ((30 → 50%)  $\varphi^* \text{ exp.} = 3.5$  at  $p \leq 0.01$ ), *helplessness* ((10 → 29%)  $\varphi^* \text{ exp.} = 2.7$  at  $p \leq 0.01$ ), *fear* ((28 → 43%)  $\varphi^* \text{ exp.} = 2.6$  at  $p \leq 0.01$ ), *insight* ((18 → 33%)  $\varphi^* \text{ exp.} = 2.4$  at  $p \leq 0.01$ ). The decrease in values is expressed by such states as *boredom* ((28 → 6%)  $\varphi^* \text{ exp.} = 2.7$  at  $p \leq 0.01$ ), *fatigue* ((62 → 38%)  $\varphi^* \text{ exp.} = 4.9$  at  $p \leq 0.01$ ), *anger* ((23 → 7%)  $\varphi^* \text{ exp.} = 2.1$  at  $p \leq 0.05$ ), *resentment* ((34 → 8%)  $\varphi^* \text{ exp.} = 3.4$  at  $p \leq 0, 01$ ), *joy* ((51 →

23%)  $\varphi^* \text{ exp.} = 4.8$  at  $p \leq 0.01$ ), *happiness* ([34 → 14%)  $\varphi^* \text{ exp.} = 3$  at  $p \leq 0.01$ ). (The significance of the differences was determined by the Fisher angular transformation method:  $\varphi^* \text{ exp.} = 7.2$  ( $\varphi^* \text{ crit.} = 2.31$  for  $p \leq 0.01$ ;  $\varphi^* \text{ crit.} = 1.64$  for  $p \leq 0.05$ ).

Mental states, most often experienced by children in both situations of the educational load exposure, represent all groups of mental states: *active positive, active negative, passive negative and neutral* states. Therefore, it is impossible to draw a conclusion about the most typical or atypical groups of mental states. It should be noted that tense negative states during the transition from the situation "at school" to the situation "during the survey" show an increase in indicators. These are states of *doubt, concentration, helplessness, anxiety, fear*. Neutral mental states of *pleasure, calmness* and active positive ones - *joy* and *happiness* that determine the psychological well-being of schoolchildren, on the contrary, occur when moving to a survey situation, they are characterized by a decrease in values.

In a survey situation, all classes are characterized by a common spectrum of the most frequently experienced mental states. The number of mental states for which there are no significant differences between classes increases upon transition to a survey situation (compare: *calm, helplessness, boredom, tiredness, fear* - "at school" and *surprise, calmness, boredom, tiredness, sadness, helplessness, anger, shame, resentment, anxiety, admiration* - "during the survey").

The study of differences in the spectrum of experienced mental states in males and females revealed the only significant difference in *fear* (mp - 27% / fp - 62%:  $\varphi^* \text{ exp.} = 7.2$  [ $p \leq 0, 01$ ]) and only in the "at school" situation. In our opinion, this fact is due to the fact that school fears, characteristic of boys, are caused primarily by the control of knowledge, while in girls they are caused more by the educational activity itself, by relations with teachers, peers, i.e. events of school life in general.

Analysis of teachers' answers (social level of mental state) revealed the structure of their assessment: the *correct recognition* of the student's mental state (the indicated mental state is presented in the student's answer), *"ignoring"* the student's mental state (the student notes

this mental state, but the teacher does not recognize it), *attributing* to the student the experience of a mental state (this mental state is absent in the student's answer), which formed the basis for further calculations allowing poor quality teacher assessment of mental state of students.

Taking for 100% affirmative answers of students on a specific mental state, we determined the percentage of recognition by teachers of this mental state. We can say that teachers are more likely to not recognize the status of their students than recognize - the recognition rate does not exceed 37%. To determine the statistical relationship between the assessment of the mental state given by the student and the assessment of the student's mental state by a teacher, the contingency coefficient Q and the association coefficient F were used. The calculation of the statistical relationship showed that between the student's assessment and the teacher's assessment, the statistical relationship of the variables is either absent or very weak (Q ranging from 0.5 to -0.3; F ranging from 0.2 to -0.04).

Given the generally low quality of recognition of students' mental states, teachers recognize neutral mental states relatively better, in both situations. Worst of all they recognize *passive negative mental states*.

Comparison of the list of mental states indicated in the children's answers as the most typical with the list of relatively recognized mental states by teachers revealed a coincidence in only four states - *concentration, anxiety, joy* in the situation "at school" and *doubt* "during the survey". Thus, teachers do not recognize mental states of *fatigue, resentment, happiness*, typical of students in "at school" situation, and in a survey situation - *concentration, fatigue, fear, anxiety, and insight*. Thus, the organization of the learning environment, the student's activities during the lesson is planned and carried out without taking into account his subjective experiences of the situation. Of particular concern is the poor quality of recognition of conditions such as *fatigue, anxiety, fear, helplessness, resentment, anger* - negative mental states that are more likely to provoke the development of psychosomatic disorders.

When analyzing the quality of assessment by teachers of the students' mental states, the responses of children and teachers were compared

taking into account the structure of pedagogical assessment (attribution, recognition, ignoring). It was found that the indicators of recognition and attribution of mental states in both situations, the effects of the training load are approximately equal, and the differences between them are not characterized as significant ( $\varphi^* \text{ exp.} < 1.64$  at  $p \leq 0.05$ ).

The study of the influence of the gender factor on the quality of the teacher's assessment of the mental state of students made it possible to determine that in a situation "at school", teachers better recognize girls' state of **fear** (w.p. - 10%, m.p. - 2%:  $\varphi^* \text{ exp.} = 1.91$  ( $p \leq 0.05$ )) and **concentration** (w.p. - 23%, m.p. - 11%:  $\varphi^* \text{ exp.} = 2.56$  ( $p \leq 0.01$ )), and in boys - **fatigue** (m.p. - 23%, w.p. - 12%  $\varphi^* \text{ exp.} = 2.31$  ( $p \leq 0.01$ )). At the same time, teachers are more likely to attribute the state of **concentration** to girls than to boys. In the "during the survey" situation, teachers more easily recognize the state of **surprise** (m.p - 14%, pp - 0%:  $\varphi^* \text{ exp.} = 2.52$  ( $p \leq 0.01$ )) and **insight** (m.p .17%, w.p. - 0%:  $\varphi^* \text{ exp.} = 2.08$  ( $p \leq 0.05$ )) in males. The results obtained allow us to speak about the absence of a fundamental influence of the child's sex on the quality of recognition by the teacher of his mental state.

The influence of the personality factor on the quality of recognition of mental states takes place: for individual teachers, explicit preferences are determined in attributing certain mental states to children. However, it should be noted that indicators of the significance of differences in the quality of assessment of mental states between teachers within parallels both in the survey situation and in the "school" situation do not allow us to consider the influence factor of personal characteristics as fundamental.

Based on the results of comparing the assessments of students and teachers (the mental and social components of the mental state), it was concluded that there are discrepancies between the assessment of mental conditions given by schoolchildren and teachers.

In a model experiment aimed at studying the impact of the educational load on the mental state of students (physiological level), 96 people took part. A sample of participants in the first stage was compiled in such a way as to ensure the representation of all categories of students by gender and age. The results of the survey showed that within the physi-

ological norm, in the context of the training load (“during the survey”), 54 students (56%) remain - 21 girls (39%) and 33 boys (61%); In the risk group, where the norm for heart rate is exceeded, there are 41 people (44%) - 21 boys (51%) and 20 girls (49%). An analysis of the distribution of students in the formed groups allowed us to conclude that there is no definite dependence – the distribution is not due to the age or sex of the child being examined, but to the individual characteristics of his ANS.

Comparison of the data obtained during the study using the methods “Typical mental states of students in educational activities” and “Assessment of the physiological component of the mental state under the influence of the academic load” revealed significant differences, which allowed us to identify 8 possible combinations of assessments of the mental state (student, teacher, physiological control) and distinguish typological groups of students (Table 1).

**Table 1.**  
**Variants of the ratio of assessments of mental states**

| Option № | Assessment of the mental state by the child | Assessment of the mental state by the teacher | Physiological Control Data | The number of children in the group (%) |
|----------|---|---|----------------------------|---|
| 1        | +   | +   | +                          | 6                                       |
| 2        | +   | +   | -                          | 7                                       |
| 3        | +   | -   | +                          | 21                                      |
| 4        | +   | -   | -                          | 30                                      |
| 5        | -   | -   | -                          | 11                                      |
| 6        | -   | +   | +                          | 4                                       |
| 7        | -   | +   | -                          | 6                                       |
| 8        | -   | -   | +                          | 11                                      |

*Note: "+" - the presence of a state of tension;*

*"-" - absence of a state of tension;*

1 – group of psychophysiological comfort (option 5, 7);

2 – group of psychophysiological discomfort (option 1, 3);

3 – group of false psychophysiological comfort (option 6, 8);

4 – group of false psychophysiological discomfort (option 2, 4).

We characterize the selected typological groups of students. Psychophysiological comfort group (5, 7 variants of correlation of ratings). In both cases, the subjective experiences of the students with their state coincide with the data of objective state control. In this case, the 5th option seems to be the most successful, since, firstly, the objective control data indicate the absence of physiological tension, and secondly, the physiological control data are confirmed by the teacher's assessment and the child's assessment. In option 7, the teacher ascribes to the child a nonexistent state of tension, although neither the child nor the physiological control data confirm this fact. In this case, only a correction of the teacher's perception of the student's mental state is required.

Group of psychophysiological discomfort (1, 3 options). In the first version, a statement of tension is present in all assessments, which makes it necessary to carry out activities aimed at correcting the student's psychological well-being, and at organizing his educational activities, dosing the workload. In the 3rd option, the child's assessment is confirmed by the functional diagnostics data (there is a state of tension), however, the teacher does not recognize this child's condition, and therefore, the construction of interpersonal interaction and the organization of the student's learning activity (dosing of the study load) is inadequate, which provokes further occurrence psychosomatic disorders. In this case, it is necessary to carry out work with the teacher (in terms of correcting his perception of the mental state of students) and with the child (increasing his psychophysiological resistance to the impact of the teaching load), as well as making changes to the organization of the student's educational activity, dosing the teaching load taking into account his psychophysiological opportunities.

Group of false psychophysiological comfort (6, 8 options). The 6th option is also dysfunctional, because although the teacher sees the dysfunction of the child, which is confirmed by the physiological control data, the child himself does not notice the growing physiological discomfort. In this case, there is a decrease in the threshold of psychological sensitivity to a physiological state. In this case, the organization of educational activity adequate to the physiological capabilities of the student is necessary.

The 8th option seems to be even more dangerous from the point of view of the physiological well-being of the student, when neither the child nor the teacher ascertain the presence of a state of tension, but according to objective monitoring, physiological tension exists. With option 8, it is necessary to provide psychological assistance to the student, to make changes to the organization of his educational activity (dosing the teaching load), as well as to teach the teacher to recognize the mental state of the child.

Group of false psychophysiological discomfort (2, 4 options). The second variant of the combination of assessments also seems to be unsuccessful, since despite the fact that, according to objective monitoring of the child's state, there is no physiological tension, he feels psychological discomfort, and this fact is confirmed by the teacher's observations. In this case, corrective work is carried out both with the student and with the teacher. In the 4th embodiment, the child also experiences psychological discomfort and needs psychological support, but his self-awareness is not confirmed by objective data. The teacher also does not record a state of anxiety or a state of fear. Therefore, both the psychological support of the child, and work with the teacher to teach him to recognize the mental states of students on the lesson becomes necessary.

The proposed set of methods for studying the mental state of students in educational activities in practice involves the participation in its implementation of not only a psychologist, but also a medical professional. It should be incumbent upon him to investigate the physiological level of the mental state. The generalization of the results, their interpretation and conclusion are assigned to the psychologist. He also carries out psychocorrectional work.

## **TALIBAN: ON THE WAY TO CENTRAL ASIA**

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**Annotation.** The article is devoted to the study of a possible strategy for the Taliban movement in the Central Asian region. Particular attention is paid to studying the contacts of this group with Islamic international extremist organizations. The author predicts the intensification of manifestations of international extremism in Central Asia, as a new springboard for the implementation of state projects of Islamic radicals.

**Keywords:** political extremism; terrorism; Islamic radicalism; aggression; National security.

The Taliban movement (activity is prohibited on the territory of the Russian Federation) has always shown particular interest in the Ferghana Valley - the nodal point of the region currently called Central Asia (Uzbekistan, Kyrgyzstan, Tajikistan, Kazakhstan, Turkmenistan). The Ferghana Valley is considered by the Taliban as a union territory in their desire to advance to the north of the Central Asian region.

At the same time, not having sufficient resources for direct expansion into the regions of Central Asia, the Taliban are looking for allies who, firstly, would have deep roots in this region and, secondly, would have religious authority among wide sections of Muslims Central Asian region. And how, at first glance, this would not look strange, the Taliban found such an ally in the person of Sufis - members of the organization "Army of Men of Naqshbandi Tariqah" or "Army of Naqshbandi".



Traditionally, there was a view of Sufis as tough opponents of radical Islamists, but, as M. Podkopaeva believes: "There are many examples of close relations between Sufis and Islamic radicals. To begin with, Ibn Taymiyah, an early forerunner of the Wahhabi teachings and the highest authority for many generations of Islamic radicals, was himself a follower of the "faithful Sufi sheikhs", whose names he named. A very strong relationship with the Sufis was maintained by the purification radicals from the senusiya movement. The Senusia movement itself in Algeria in the middle of the 19th century took shape as a Sufi brotherhood, but carried a significant charge of Wahhabi ideas adopted by its founder in Arabia" [5]. Therefore, unlike ISIS (activity is prohibited on the territory of the Russian Federation), the Taliban are not alien to the Sufi tradition. Moreover, the Naqshbandi tariqat has deep historical roots in Central Asia and acts persistently in promoting its influence in this region. Moreover, the religious views of the Taliban are not exclusively Wahhabi.

Yes, the Naqshbandi tariqah is busy not only with the preaching of traditional Islam. So, according to V. Prokhvatilov: "Sufis Naqshbandi began to prepare for guerrilla warfare back in 2002. In 2004, the Naqshbandi Army, created by the Sufis, participated in the battles of Fallujah and Samara. The army does not have a single command - the network structure makes it less vulnerable to foreign intelligence services" [6].

In addition, the Taliban associates with the Naqshbandi tariqah, firstly, the traditional prevalence of this Sufi brotherhood among the Pashtuns and, secondly, the powerful influence of the Deobandi school, i.e. modernized Islamic radicalism.

Deobandism arose in British India at the end of the 19th century. as a movement for reform and the unification of the Muslim ummah under conditions of colonial rule and government by non-Muslims. The founders of this movement were Mohammad Kazim Nanotavi and Ahmad Gangohi, who founded the first madrassah in Deoband, in the Delhi region. The founders considered the opening of the madrasah an important step for the upbringing and education of young Muslims, who would revive the former glory of Islam, based on Sharia law, spiritual experience, Sufi practices. The deobandists, trying to protect the Islamic faith from any

innovations, rather rigidly interpreted the provisions of traditional Islam - rejected other directions, accusing their adherents of unbelief, seriously limited the position of women, demanded strict observance of Islamic rites, prayer practices, etc.

At the same time, adherence to the Hanafi madhhab contributed to the growing popularity of the views of the Deobandists and the spread of their teachings, especially in South Asia. Many Deobandi madrasahs arose in Pakistan, after its creation in 1947. Graduates of the madrasah were engaged in the propaganda of their views in various provinces of Pakistan, including in Afghan refugee camps. The Tal-Taliban leadership had a significant impact on the Dar-ul-Ulum Hakkania madrasah, which was completed by many leaders and some Taliban field commanders.

In our opinion, "in such madrassas, the future Taliban got acquainted with the Deobandi tradition associated with the non-recognition of the tribal, communal, feudal hierarchy and the desire to create a single Muslim state. Hence the Taliban's hostility towards the leaders of Afghan tribes and clans. Experiencing deep hostility to Shiites and Iran, the Taliban, at the same time, borrowed the idea of the Iranian Islamic revolution, and found the justification for it in the theories of such an ambiguous organization as the Jamaat Tablig movement (translated as "Outreach Society"), which became the connecting link between the teachings of Deobandi and the Taliban" [1; p. 17].

In addition, according to J. Bensi: "It were the representatives of Deobandi who ensured that the Afghans were trained in Deobandi madrassas by the work of the most authoritative for Pakistan, Abu I-Al Al Maududi, who is considered a reformer of Central Asian Islam based on the combination of Deobandi and Wahhabism. And it is precisely the concept of "theocracy" of Maududi that was the basis of the Taliban movement "[2].

In general, the Deobandi school has Naqshbandi roots and has a certain influence on the religious and political processes in Pakistan and Afghanistan.

This analysis would be incomplete if we did not consider a certain link between the Taliban and the Deobandi school, namely the religious organization Jamaat Tablig.

The Jamaat Tablig movement was founded in 1926 in colonial India by Muhammad Ilyas al-Kandahlyavi [7]. Muhammad al-Kandahlyavi believed that many Muslims are hypocrites because they do not read the Qur'an and do not pray. Therefore, al-Kandahlawi saw his main goal in instructing Muslims on the path of "true Islam."

By 1980, the Tablighi Jamaat movement had spread most widely to India, Pakistan, and Bangladesh. One of the reasons for the emergence of this movement was the financial problem with the organization of Deobandi madrassas. Therefore, Muhammad Ilyas al-Kandahlyavi, himself an active supporter of deobandism, decided to conduct missionary activity by the Jamaat Tablig preachers, combining them into groups of ten people and committing them to preaching, mainly among ordinary Muslims. This practice soon bore fruit - the organization began to grow numerically and became widespread in various regions of Asia. So, at present, representatives of Tablighi Jamaat operate in 150 countries.

The ideological attitudes of the Tablagovites are in many respects similar to the ideas of the Taliban movement, namely, the "attitude towards the defense of the "true" values and norms of early Islam; upholding the principle of monotheism (tawhid); overthrow of secular regimes in Muslim countries; creation of a world Islamic state (caliphate); the use of violent methods to achieve their goals [4; p. 104]. There are, of course, differences that impede the merger of these structures, so unlike the Taliban movement, the Tabulites consider the issue of Muslim unification as a natural process of the gradual Islamization of the world and therefore refrain from proclaiming the caliphate in the near future.

At the same time, despite the prevalence of the ideas of deobandism, the Jamaat Tablig movement did not become monolithic, dividing into moderate and radical parts. The watershed was the idea of jihad and its interpretation by members of the movement. Representatives of the moderate part believed that jihad was a personal struggle against their own passions and vices, while the radicals advocated armed jihad as a struggle against infidels.

As R. Bilalov notes: "The radical followers of the Jamaat Tablig subsequently formed their own paramilitary organizations. Some of them fought in Chechnya in the 1990s. It is, in particular, about the grouping "Kharakat ul-Mujahidiin" [3].

Radical Tabligh preachers actively conducted their activities in Pakistan, especially visiting Afghan refugee camps. Thus, participants in foreign missionary groups undergo short-term training sessions, where they are assigned specific tasks for organizing preaching activities. It was under the influence of the missionaries of the Jamaat Tablig and the Deobandi madrassas that the ideological principles of the Taliban were formed.

According to experts, a significant part of Islamic extremists are members of the Jamaat Tablig in the past. Many immigrants from Central Asia, before leaving for Syria to participate in hostilities in the ranks of jihadists, were engaged in missionary activities in the Jamaat Tablig.

Thus, the Taliban movement, the Jamaat Tablig organization, and the Deobandi madrassas are connected, inter alia, through the Sufis of the Naqshbandi tariqah.

To date, the Naqshbandiya tariqah along with the Kadiriya tariqah are the two most influential Sufi orders in the Middle East, with Naqshbandiya the most influential among the Sunnis of Iraq and Syria. According to V. Prokhvatilov: "Naqshbandi is a Sufi brotherhood (tariq), which received this name at the end of the 14th century by the name of Muhammad Bahauddin Naqshbandi al-Bukhari. The worldview of the tariqa is a combination and adaptation of "moderate" urban mysticism, reflected in the doctrines of Abdul-Khalik al-Gidzhduvani, and the nomadic "Turkic" - Ahmad al-Yasawi. In relation to the authorities, the Naqshbandi Tariqi remains the only fraternity that considers it obligatory to come into contact with the authorities in order to influence their policies regarding the masses [6].

Members of the Nakshbandi tariqah became more active in 2003, when the Nakshbandi Army they created began to be replenished by people from various governance structures of Saddam's Iraq and the Ba'ath Party. In fact, it was a military structure of the High Command for Liberation and

Jihad led by Isaat Ibrahim al-Duri, one of the deputies of Saddam Hussein. Therefore, it can be argued that the Army Naqshbandi group was created by decision of Saddam Hussein and with the participation of his closest advisers and senior functionaries of the Baath Party.

At the same time, some of the former officers and party officials of Saddam Hussein participated in the creation of the "Islamic State of Iraq" (at that time - ISI). Hence the absence of hostile relations between the Sufis of the Naqshbandi Tariqah and ISIS jihadists (banned on the territory of the Russian Federation). By the way, during the capture of Mosul by the Ishilovites, the Army of Naqshbandi assisted them and then formed the city administration. In addition to Iraq, the Naqshbandi Army took part in the fight against the Bashar al-Assad regime in Syria, but as an independent formation, rejecting the proposal for close cooperation both from ISIS and the more moderate FSA (Free Syrian Army).

Given the presence of various religious extremist structures interested in destabilizing the situation in Central Asia, the Taliban movement should be considered the main beneficiary of the upcoming events, as it has more numerous trained militant structures, some heavy weapons, well-established funding channels, and of course, assistance from Pakistan's special services directly interested in aggravating the situation in this region.

Thus, today, it can be assumed that the Taliban, despite certain failures in Afghanistan, still did not abandon its project to unite the Central Asian region under the banner of radical Islam and began to accumulate resources and search for allies before a decisive throw to Central Asia. Accordingly, if this plan is successful, the Central Asian region will for a long time become a zone of instability, the spread of religious and political extremism, terrorism, which directly threatens the border regions of the Russian Federation.

### References

1. Archakov M.K. The nature and roots of the ideological principles of the Taliban movement // Society: politics, economics, law. – 2018.– № 5. – P. 15– 19.
2. Bensy J. Where did the Taliban come from? // NG religion.19.06.2002.
3. Bilalov R. From preaching to jihad. URL: [http://islam-today.ru/islam\\_v\\_mire/ot-propovedi-do-dzhada/](http://islam-today.ru/islam_v_mire/ot-propovedi-do-dzhada/) (Appeal date: 11.02.2018).
4. Krasinsky V.V. Who is who in international terrorism: reference book / V.V. Krasinsky, V.V. Mashko. – Moscow: INFRA-M, 2019. – 128 P.
5. Podkopaeva M. Neobaburism. Historical speculation underlying Taliban claims for Central Asia URL:[http://www.nnre.ru/politika/radikalnyi\\_islam\\_vzgljad\\_iz\\_indii\\_i\\_rossii/p16.php](http://www.nnre.ru/politika/radikalnyi_islam_vzgljad_iz_indii_i_rossii/p16.php) (Appeal date 12.09.2019).
6. Prokhvatilov V. In Mosul, a revolt of the Naqshbandi Army broke out URL:<https://argumentiru.com/world/2016/10/441765>. (Appeal date 15.09.2019).
7. Marc Gaboriau. Transnational Islamic Movements: Tablighi Jamaat in Politics URL: <http://www.isim.nl/newsletter/3/regional/6.html> (Appeal date: 17.01.2018).

## ACUTE HEART FAILURE AT PREHOSPITAL STAGE IN PATIENTS OF OLDER AGE GROUPS

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**Abstract.** The article analyzed 92 patients with coronary pulmonary edema, revealed the main feature of the clinical course - the development of acute heart failure occurred against a background of chronic heart failure, and therefore, it was not possible to achieve the target values of saturation and respiratory rate at the prehospital stage. The effectiveness of emergency treatment at the prehospital stage was to reduce symptoms or relieve pulmonary edema.

**Keywords:** coronarogenic pulmonary edema, ambulance, gerontology.

### **Introduction**

Unfortunately, the epidemiological aspects of acute heart failure (AHF), in contrast to chronic heart failure (CHF), in the Russian Federation are not well understood [2,3]. Among the total number of patients with pulmonary edema in 40-56% of cases, it occurs in patients with progressive heart failure on the background of atherosclerotic and post-infarction cardiosclerosis, in 23-39% of cases complicates the course of hypertensive crisis [4]. The greatest incidence of pulmonary edema, as well as the greatest difficulties in its

treatment, are encountered at the prehospital stage of emergency medical care [1,2]. According to the literature, up to 7% of all calls of ambulance crews are made to patients with acute left ventricular failure [2,3]. Hospital mortality with AHF is 4%, 30-day mortality is 5-10%, annual mortality is 20-40%. [1,4] AHF de novo occurs in 34-37% of cases, in the rest the reason for admission to the hospital was acute decompensation of chronic heart failure [3]. Thus, pulmonary edema in the Russian Federation remains one of the most difficult urgent therapeutic conditions requiring immediate hospitalization of the patient in the hospital and emergency medical measures.

**Purpose of the study** – to identify the features of the course of acute heart failure at the prehospital stage in patients of older age groups.

### **Materials and research methods**

A retrospective study was conducted on the basis of the MBU of the ambulance station in Yekaterinburg. Object of study - 92 emergency medical services call cards (EMS) of patients with AHF for 2019.

The following criteria were evaluated: gender, age, time of onset of an attack, a history of cardiovascular disease, symptoms, electrocardiography (ECG) data, hemodynamic parameters, call result, assistance provided and its effectiveness.

Criteria for inclusion of patients in the study:

1. AHF Diagnosis at EMS Stage:

- Sudden onset with inspiratory dyspnea;
- Signs of acute left ventricular failure (orthopnea, paroxysmal dyspnea, moist rales to the subscapular line or above all pulmonary fields on both sides, peripheral bilateral edema);
- Signs of hypoperfusion (cold, wet limbs, oliguria, dizziness, possibly confusion);

2. Cardiogenic cause of pulmonary edema (acute coronary syndrome, hypertensive crisis, paroxysm of atrial fibrillation, decompensation of CHF).

3. Patients of senile age (according to WHO) from 75 years.

Study exclusion criteria:

1. Death at the prehospital stage (before the arrival of the brigade, in the ambulance and in the presence of the EMS brigade).
2. Age of patients less than 75 years.



The average age of patients was  $82.2 \pm 11.4$  years. By gender, the distribution of patients is as follows: 28 men (30%) and 64 women (70%). Statistical analysis of the material was performed using the program Statistica 9.0. When describing indicators in the form of alternative variables, the number of patients and the percentage (in percent) are given. The character distribution of signs was evaluated using the Kolmogorov-Smirnov test. Quantitative traits are presented in the form of  $M \pm SD$ , the significance of differences was estimated using the Mann-Whitney test. Differences were considered significant at  $p < 0.05$ .

### Research results

The condition of all patients by the EMS team is regarded as serious. The duration of the attack from the moment of deterioration of the condition of the patients to the call of the EMS team was  $11.26 \pm 4.46$  hours. Perhaps the insufficient urgent treatment of patients for EMS is due to the fact that all AHF developed against the background of CHF and patients did not timely focus on shortness of breath and peripheral edema. All 92 people had a history of hypertension (100%), 26 people had myocardial infarction. (28.2%), a history of acute cerebrovascular accident (stroke) - 12 people. (13%), in every third patient revealed a violation of the rhythm and conduction of the heart. The first symptoms appeared in the morning in 18 people. (20%), in the afternoon - at 36 people. (39%), in the evening - in 13 people. (14%), at night - in 25 people. (27%). All patients presented the following complaints: on sudden intensified shortness of breath, feeling of lack of air, asphyxiation. Dyspnea was inspiratory in 42 cases (46%), mixed in 42 cases (46%), expiratory in 8 cases (8%). Also, some patients complained of coughing. Wet cough was observed in half of the patients - 48 people. (52%), in two of them the nature of sputum was foamy. It is important to note that shortness of breath was the reason for calling the EMS brigade.

During assistance, the EMS team evaluated hemodynamic parameters, performed lung and heart auscultation, recorded and interpreted ECG, and performed pulse oximetry. At the external examination of patients, cyanosis attracted attention - 60 people. (65%) and swelling and pulsation of the cervical veins - 64 people. (69.5%).

The indicators of vital functions before treatment were identified as follows: consciousness on the Glasgow scale - in 88 patients - 15 points (96%), in 4 patients - 13-14 points - stunning (4%). Systolic blood pressure (SBP) -  $180.7 \pm 4.32$  mmHg, diastolic blood pressure (DBP) -  $101.3 \pm 2.08$ , heart rate (HR) -  $98.9 \pm 2.83$  beats per minute., respiratory rate (RR) -  $28.7 \pm 4.27$  mov. per minute Saturation  $88.9 \pm 3.34\%$ . After treatment, the following indicators were recorded: SBP -  $138.5 \pm 3.02$  ( $p < 0.0001$ ), DBP -  $84.3 \pm 2.3$  ( $p < 0.001$ ), heart rate -  $86.4 \pm 3.5$  ( $p < 0.05$ ). However, the RR is  $24.7 \pm 3.02$  mov. per minute ( $p = 0.645$ ) and saturation -  $93.4 \pm 1.27\%$  ( $p = 0.779$ ) did not normalize in any patient.

An ECG recorded a sinus rhythm in 72 cases (78%), paroxysm of atrial fibrillation in 12 cases (13%), the rhythm of ECS in 6 cases, 6.5%). Left ventricular hypertrophy was present in 48 cases (52%), left ventricular hypertrophy in 24 cases (26%), complete blockade of the left bundle branch block in 18 cases (19.5%), ischemic changes in the myocardium were recorded in 18 people. (19.5%).

All patients underwent treatment - oxygen therapy, intravenous access and infusion, according to indications: diuretics, antianginal and analgesic, antihypertensive drugs. All patients were hospitalized in specialized hospitals at the place of treatment, transportation was carried out on a stretcher with a raised head end.

### Conclusions

1. In patients older than 75 years, AHF developed on the background of CHF. Perhaps this is not always associated with the urgent treatment of patients for EMS and the inability to achieve normal RR and saturation after treatment.

2. The criteria for stopping pulmonary edema at the prehospital stage were: reduction of shortness of breath, disappearance of foamy sputum and suffocation, reduction or disappearance of wet rales during auscultation of the lungs, stabilization of hemodynamics.

3. Significant improvement after treatment was revealed by the following parameters: systolic blood pressure decreased by 20% ( $p < 0.0001$ ), DBP by 23% ( $p < 0.001$ ), heart rate by 24% ( $p < 0.05$ ), and saturation increased by 11% ( $p < 0.001$ ).

4. Criteria for stopping pulmonary edema at the prehospital stage have been achieved in the form of reducing shortness of breath, disappearance of foamy sputum and suffocation, reduction or disappearance of wet rales during auscultation of the lungs, hemodynamic stabilization in 80 people. (86%).

## References

1. Diagnosis and treatment of chronic and acute heart failure // *Cardiol. Bull.*– 2016. – № 2. – P. 3-33.

2. Emergency medical care. Clinical recommendations / ed. S.F. Bagnenko. – M.: GEOTAR-Media, 2018.-P46-48.

3. Tereshchenko, S. N. European recommendations for the treatment and diagnosis of acute and chronic heart failure in 2016. What's new? / S.N. Tereshchenko, O. Yu. Narusov, I.V. Zhiron // *Heart failure magazine*– 2016. – № 6. – P. 413-417.

4. Ponikowski Piotr ESC recommendations for the diagnosis and treatment of acute and chronic heart failure /Piotr Ponikowski, Adriaan A. Voors, Stefan D. Anker, Héctor Bueno, John G. F. Cleland, Andrew J. S. Coats, Volkmar Falk, José Ramón González-Juanatey, Veli-Pekka Harjola, Ewa A. Jankowska, Mariell Jessup, Cecilia Linde, Petros Nihoyannopoulos, John T. Parissis, Burkert Pieske, Jillian P. Riley, Giuseppe M. C. Rosano, Luis M. Ruilope, Frank Ruschitzka, Frans H. Rutten, Peter van der Meer // *Russian Journal of Cardiology.* – 2017.- №1. – P.5-14. <https://doi.org/10.15829/1560-4071-2017-1-7-81>

## **4-YEARS OF EXPERIENCE WITH LAPAROSCOPIC APPENDECTOMY IN A DISTRICT HOSPITAL**

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**Abstract.** The article analyzes the four-year experience of development and application of endoscopic surgical methods in the treatment of acute appendicitis in the conditions of inter-district multi-speciality hospital. The comparative analysis of treatment including 464 patients of the surgical department of inter-district multi-speciality hospital in the city of Nartkala in the Urvansky District of the Kabardino-Balkar Republic for 2014-2018 was carried out. All patients were divided into groups depending on the method of appendectomy. The main group consisted of 102 (22%) patients who underwent laparoscopic appendectomy, the control group included 362 (78%) patients who underwent traditional appendectomy. Outcomes and prospects for the development of endoscopic surgery in emergency surgery in the conditions of inter-district hospital are estimated.

**Key words:** acute appendicitis, endoscopic surgery, laparoscopic appendectomy.

The problem in the treatment of acute appendicitis, despite all the achievements of surgery for more than a century of experience, remains relevant today. This pathology is one of the most common surgical diseases in emergency surgery and is 1-4 cases per 1000 people worldwide [5, P. 4]. Erroneous diagnosis in acute appendicitis is 12-31%. The mortality rate over the past years has not changed and is 0.2-0.4%. The reason for such outcomes is not only late treatment of patients, but also a high percentage of diagnostic errors at all stages of hospitalization [3, P. 35].

However, even when used in the treatment of acute appendicitis such techniques as minimally invasive surgery, ligature treatment of the base of the process, etc., mortality in this pathology is directly proportional to the destruction of the Appendix wall, and ranges from 0.1% in nonperforative appendicitis to 3% in its perforation [6, P. 18]. In case of hospitalization later than 24 hours.

Since the mid-80s, the tactics of treatment of acute appendicitis has undergone significant changes. In our country, laparoscopic appendectomy has been used for several decades in the work of leading clinics, but even now the introduction and application of this method of surgical treatment is not seen in all hospitals [7, P. 15]. In our opinion this is due to the following reasons:

- a) there are still no well-established indications and contraindications for laparoscopic appendectomy;
- b) the positive and negative sides of endovideosurgical appendectomy are not clearly formulated.

**Objective:** to evaluate the effectiveness of surgical treatment of patients with acute appendicitis using laparoscopy in a district hospital.

**Material and methods.** The comparative analysis of treatment of 464 patients of surgical Department of inter-district multi-speciality hospital in the city of Nartkala in the Urvansky District of the Kabardino-Balkar Republic for 2014-2018 was carried out. Since the end of 2015 in the conditions of hospital laparoscopic appendectomy began to be carried out.

During the analysis of medical histories diseases we evaluated such parameters as:

- during the early postoperative period,
- duration of pain syndrome,
- period of activation of the patient,
- number and nature of complications,
- have there been repeated interventions for complications,
- duration of stay of the patient in the hospital,
- the period of rehabilitation.

Conversions and deaths were not observed in our studies.

All patients were divided into groups depending on the method of appendectomy. The main group consisted of 102 (22%) patients who underwent laparoscopic appendectomy, the control group consisted of 362 (78%) patients who underwent traditional appendectomy.

The ratio of patients by age and sex is presented in table 1.

**Table 1-Age and sex composition of patients**

| Age<br>sex<br><br>groups | 18 - 20 years |     | 21-30 years |     | 31-40 years |     | 41-50 years |     | 51-60 years |     | 61-70 years |     | older 71 year |     |
|--------------------------|---------------|-----|-------------|-----|-------------|-----|-------------|-----|-------------|-----|-------------|-----|---------------|-----|
|                          | women         | men | women       | men | women       | men | women       | men | women       | men | women       | men | women         | men |
| Main group               | 4             | 4   | 16          | 12  | 6           | 12  | 10          | 8   | 6           | 8   | 4           | 6   | 4             | 2   |
| Control group            | 32            | 40  | 60          | 52  | 24          | 30  | 20          | 30  | 16          | 20  | 14          | 8   | 12            | 4   |

Table 1 shows that both groups had virtually no differences in age and sex composition ( $p=0.85$  and  $p=0.75$ , respectively). The compared groups were comparable in the frequency of detection, the nature of concomitant pathology and the degree of destruction of the vermiform process.

The average age of operated patients ( $33,14\pm 7,93$  years) clearly proves the great social importance of the studied problem. The slight prevalence of the number of men in the study groups coincides with the data of the world literature [1, P. 52], [10, P. 99].

The majority of patients were taken to the hospital within 24 hours of the onset of pain, but about 15% of patients were admitted later than 24 hours.

The frequency of various morphological forms of acute appendicitis is presented in table 2.

**Table 2-Morphological forms of acute appendicitis**

|               | Catarrhal   | Phlegmonous | Gangrenous |
|---------------|-------------|-------------|------------|
| Main group    | 24 (23,5 %) | 50 (49%)    | 28 (27,5%) |
| Control group | 56 (15,5%)  | 270 (74,6%) | 36 (9,9%)  |
| All           | 80 (17,2%)  | 320 (69%)   | 64 (13,8%) |

Table 2 shows that the bulk of the clinical and morphological study of acute appendicitis were destructive forms (82.8%).

All operations were performed under anesthesia and with intraoperative prophylaxis of purulent complications by single administration of cephalosporin antibiotics. Standard endovideosurgical equipment was used to perform the operations.

Appendectomy was performed antegradically, treatment of the mesentery of the Appendix was performed by monopolar coagulation dissector with coagulation of a. appendicularis throughout, which allowed to reliably achieve hemostasis [8, P. 50].

The treatment of the stump was performed by us in the traditional "ligature" way: 2 Roeder loops were superimposed on the remaining part, and the node was formed outside the abdominal cavity, followed by its relegation with the help of a pusher [4, P. 68]. The main principle of prevention of infection of trocar accesses was the exclusion of contact of the process with the wound of the anterior abdominal wall. Extraction of the process directly through the postoperative wound has never been performed. Then the abdominal cavity was washed with an antiseptic solution followed by aspiration. The operation was completed by drainage of the abdominal cavity with subsequent removal of the drainage tube on the next day [2, P. 52].

Surgical interventions lasted an average of  $40.1 \pm 6.4$  minutes, and hopefully will tend to decrease with the accumulation of experience.

According to the results of our studies, in the main group, the pain syndrome in 46% of patients decreased and completely stopped after 11-13 hours after surgery, and in 85% - by the end of the first day. In the control group of patients, 76% of patients complained of pain within 30-32 hours after surgery, and only by the end of the second day the pain ceased to disturb the majority of patients. 23% of patients stopped complaining of pain in the postoperative wound only by the end of the third day. Ketorol (1-2 intramuscular injections) was used as an analgesic in the main group, while in the control group, in addition to ketorol (3-4 injections), narcotic analgesics (1-2 injections) were additionally administered.

When analyzing the activation of patients, it was noted that after laparoscopic appendectomy, 83% of patients showed activity 13-14 hours after surgery, whereas after a conventional appendectomy, this time was almost doubled.

In the main group, the average length of stay of the patient in the hospital was  $4.5 \pm 0.4$  bed-days, in the comparison group -  $8.6 \pm 1.2$  bed-days. At the same time, there was no desire for early discharge of patients, given the fact that complications can occur later than 2-3 days.

In our observations, intraoperative and postoperative complications were not observed in any of the groups.

The average recovery time after laparoscopic appendectomy was  $9.4 \pm 2.1$  days, after traditional appendectomy -  $16.2 \pm 1.8$  days.

Conclusions: Based on the foregoing, it can be stated that a number of such positive effects as the lack of need to use narcotic analgesics, recovery of activity of patients in a shorter time, economic efficiency, reduction in the duration of hospital stay and achievement expressed cosmetic effect was the advantages of laparoscopic appendectomy over the traditional open method.



## References

1. Ermolov A.S. Profilaktika rannikh posleoperatsionnykh oslozheniy laparoskopicheskoy appendektomii [Prevention of early postoperative complications of laparoscopic appendectomy] / A.S. Ermolov, V.D. Levitskij, A.A. Gulyaev i soavt. // Neotlozhnaya meditsinskaya pomoshh' [Emergency care]. - 2012. - №3. - p. 51-55. [in Russian]
2. Gallinger Yu.I. Laparoskopicheskaya appendektomiya [Laparoscopic appendectomy] / Yu.I. Gallinger, A.D. Timoshin // M.: 1993. – p. 65. [in Russian]
3. Grinberg A.A. Diagnostika trudnykh sluchaev ostrogo appenditsita [Diagnosis of difficult cases of acute appendicitis] / A.A. Grinberg, S.V. Mikhajlusov, R.Yu. Tronin, G.E. Drozdov // M. Triada-X: 1998. - 128 p. [in Russian]
4. Ivakhov G.B. K voprosu o tselesoobraznosti kisetnogo shva pri laparoskopicheskoy appendektomii [To the question of whether key local seam for laparoscopic appendectomy] / G.B. Ivakhov, A.V. Ustimenko // Al'manakh Instituta khirurgii im. A.V. Vishnevskogo [Almanac of the Institute of surgery named. A. V. Vishnevsky]. - 2010. - T. 5. - № 1. - p. 67-68. [in Russian]
5. Prudkov M.I. Ostryj appenditsit. Klinika. Traditsionnoe i minimal'no invazivnoe khirurgicheskoe lechenie [Acute appendicitis. Clinic. Traditional and minimally invasive surgical treatment] / M.I. Prudkov, S.V. Piskunov, A.N. Nikiforov // Ekaterinburg: Izdatel'stvo Ural'skogo universiteta [Yekaterinburg: Publishing house of Ural University], 2001. – 40 p. [in Russian]
6. Pugaev A.V. Ostryj appenditsit [Acute appendicitis] / A.V. Pugaev, E.E. Achkasov // M.: Triada-X, 2011. - 168 p. [in Russian]
7. Fyodorov I.V. Laparoskopicheskaya appendektomiya: za i protiv [Laparoscopic appendectomy: for and against] / I.V. Fyodorov // Endokhirurgiya segodnya [Endosurgery today]. – 1995. – № 1. – p. 12-17. [in Russian]
8. Fedorov I. V. Elektrokhirurgiya v laparoskopii [Electrosurgery in laparoscopy] / I. V. Fedorov, V. Ya. Popov // M.: Triada-X, 2003. - 70 p. [in Russian]

9. Bregendahl S. Risk of complications and 30-day mortality after laparoscopic and open appendectomy in a Danish region 1998-2007; a population-based study of 18,426 patients / S. Bregendahl, M. Norgaard, S. Laurberg, P. Jepsen // Polski Przegląd. Chirurgiczny. - 2013. - Vol. 85. - №7. - P. 395-400.

10. Lee J. The Epidemiology of Appendicitis and Appendectomy in South Korea: National Registry Data / Lee J., Park Y.S., Choi J.Ch. // J. Epidemiol., 2010. - Vol. 20. - №2. - P. 97-105.

**PANCREATIC BLOOD PERFUSION IN VASCULAR MODEL  
OF ACUTE PANCREATITIS VERSUS ABDOMINAL ORGANS BLOOD PERFUSION  
AFTER DEEP ISCHEMIA EPISODE**

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**Abstract.** In this article, the rate of volumetric blood flow in various organs of the abdominal cavity at the early stages of ischemia/reperfusion was studied. It is shown that unlike the small intestine and liver in the pancreas there is no transient hyperemia in response to ischemia / reperfusion, which was due to the development of pancreatic edema in the early stages.

**Key words:** ischemia, blood flow, reperfusion, pancreas, abdominal organs.

**Introduction**

The starting point in the development of many diseases of the internal organs is critical ischemia. The pancreas is no exception, moreover, supra-spinal ischemia directly leads to the development of an inflammatory reaction, which is a distinctive feature in the reaction of pancreatic tissue from other internal organs [2, 5, 6, 7, 9, 12].

Such an important role of ischemia in the formation and spread of primary and secondary pancreatic necrosis zones is the result of impaired metabolism of mitochondria of pancreatic cells due to decreased perfusion of pancreatic tissue, which was noted not only in studies of specialists dealing with pancreatic diseases, but also by cardiac surgeons. Thus, the development of the so-called hypoperfusion pancreatitis was revealed during cardiac surgery with the use of artificial blood circulation devices [4, 8, 10, 11].

Thus, it becomes clear the direct correlation between the rate of blood flow in the microcirculatory bed of the pancreas and direct damage to the parenchyma of the organ in acute pancreatitis.

We have previously studied the velocity and volume parameters of blood flow in the microcirculatory bed of the pancreas in acute pancreatitis of canalicular Genesis. A significant decrease in blood flow in the pancreas was revealed, reaching a peak by 1 day, which led to pronounced destructive changes [1, 3].

The next stage in the study of mechanisms of implementation of the pathological effects of ischemia was the determination of microcirculation in the vascular model of acute pancreatitis.

### **Materials and methods**

The study was performed on 24 white rats (females), which are before surgery in conditions of hunger with constant free access to water and separate content, weighing 280-300 g.

All interventions were performed under General anesthesia (zoletil 100 at a dose of 60 mg / kg + chloral hydrate at a dose of 125 mg / kg intraperitoneally).

Acute pancreatitis was modeled by clamping pancreatic arteries for a period of 30 minutes.

Reperfusion was reproduced by resuming blood flow in the pancreatic arteries for 30 minutes.

The rate of volumetric perfusion was measured by laser Doppler flowmetry invasive needle sensor TSD144 using equipment manufactured by Biopac system, software module AcqKnowledge 4.2.0, microcirculation values were expressed in perfusion units (PE).

### Results and discussion

During the preliminary study, we repeatedly noted a significant variability in the rate of volumetric blood flow of the pancreas depending on the conditions of detention, feeding of animals, the composition of the feed and the phases of digestion. There was also a variation in volumetric perfusion rates within the freely available food group.

Under the conditions of 2-day fasting and separate keeping of animals, we were able to standardize the rate of volumetric blood flow at the level of  $418.09 \pm 39.11$  PE, which allowed us to take this indicator as the initial one. Under conditions of constant sufficient access to food, perfusion rates reached  $1500 \pm 276.34$  PE.

The previously obtained data also indicate a significant spread of microhemodynamic parameters depending on the distance of the studied zone from the Central blood flow [3].

For the convenience of perception and evaluation, we determined the integral index as the resulting microcirculation of zones in the gastrointestinal-splenic and duodenal parts with the determination of the average value.

The study of the rate of volumetric perfusion in the vascular model of acute pancreatitis was carried out during the complete cessation of blood flow in the vessels of the pancreas for a period of 30 minutes, on the 1st, 3rd, 7.5-th, 15-th, 30-th and 60-th minutes of resumption of blood flow.

In the course of the study, the difference between the reaction of the pancreatic microcirculation to ischemia was established. In the intact group, the initial rate of volumetric blood flow was  $418.09 \pm 39.11$  PE, by the end of the first minute of ischemia it decreased to undetectable values, remaining at this level until the end of the entire episode of 30-minute ischemia.

At the first minute of blood flow restoration, the volume perfusion rate increased to  $50.46 \pm 10.18$  PE, and by the 3rd minute of reperfusion it rose to  $87.15 \pm 12.83$  PE. At the period of 7.5 min from the moment of resumption of arterial patency, the growth of the volumetric blood flow rate to the level of  $103.749 \pm 10.47$  PE was observed, which increased to  $151.35 \pm 8.27$  PE by 15 minutes.

During the experiment, it was noted that the restoration of the volume blood flow rate occurs only up to the term of 30 minutes, and at the term of 60 minutes there is a decrease in the perfusion rate, amounting to  $333.21 \pm 26.32$  PE and  $266.69 \pm 18.79$  PE, respectively. The study of relative parameters revealed the maximum recovery of blood flow in the micro-circulatory bed to the level of 79.69% of the original at the 30th minute of reperfusion, followed by hypoperfusion at the level of 63.78% by the 60th minute of resumption of blood flow.

The damaging effect of 30-minute ischemia followed by reperfusion is confirmed by morphological changes already at 30 minutes of ischemia, the formation of interstitial edema of the pancreas, disorganization of the structure of the lobules, diffuse dystrophic changes in acinar cells, pronounced venous fullness and the formation of hemorrhages in the interlobular stroma. In reperfusion, there is an increase in damage, despite the restoration of blood flow, which is manifested by the disorganization of lobules, homogenization of the cytoplasm of acinar cells, vacuolation of the apical parts of acinar cells and the formation of pronounced edema of the interlobular stroma.

### **Conclusions**

Obtained in the course of the work data show the lack of episode postischemic hyperemia in the vessels of the microvasculature that fundamentally distinguishes the reaction vessels of the pancreas from the threshold of ischemia from that in the liver and small intestine, which in our opinion is a consequence of evolving the 30 minute interstitial edema of the pancreas, which is registered both visually and with a standard morphological study.

### **References**

1. Alekhin S. A., Emelyanov R. A., Pokrovskaya T. G. Studying the dynamics of microcirculation in pancreatic tissue in rats when modeling acute pancreatitis. Universitetskaya Nauka: a look into the future.- collected papers of the 71st scientific conference of KSMU and session of the central-black-earth scientific center of RAMS. - 2006. - Vol. 1, no. - Pp. 206.

2. Alekhin S. A., Nazarenko P. M., Lopatin D. V. " et al.". Genomic and ex-tragenomic mechanisms in the realization of ischemic and reperfusion ruptures in abdominal surgery // Nauchnye Vedomosti BELGU. - 2012. No Vol. 22(141), No. 20/3. - Pp. 5-12.

3. Emelyanov R. A., Alekhin S. A., Nazarenko D. P. " et al.". Investigation of microcirculation by laser Doppler flowmetry in the pancreas in acute experimental pancreatitis // Kuban scientific medical Bulletin. - 2007. - T. No. 1-2. Pp. 50-51.

4. Aho H. J., Nevalainen T. J., Aho A. J. Experimental pancreatitis in the rat. Development of pancreatic necrosis, ischemia and edema after intra-ductal injection of sodium taurocholate // Eur Surg Res. - 1983. - Vol. 15, No. 1. - P. 28-36

5. Anderson M. C. Venous stasis in the transition of edematous pancreatitis to necrosis // JAMA. - 1963. - Vol. 183. - P. 534-7.

6. Anderson M. C., Bergan, J. J. Significance of vascular injury as a factor in the pathogenesis of pancreatitis // Ann surg. - 1961. - Vol. 154. - P. 58-67.

7. Gullo I, Cavicchi I, Tomassetti P"et al.". Effects of ischemia on the human pancreas // Gastroenterology. - 1996. - Vol. 111, No. 4. - P. 1033-8.

8. Haas G. S., Warshaw A. L., Daggett W. M., Aretz H. T. Acute pancreatitis after cardiopulmonary bypass // Am J Surg. - 1985. - Vol. 149, No. 4. - P. 508-15.

9. Hoffmann T. F., Leiderer R., Waldner H. " et al.". Ischemia reperfusion of the pancreas: a new in vivo model for acute pancreatitis in rats // Res Exp Med (Berl). - 1995. - Vol. 195, No. 3. - P. 125-44.

10. Kishino T, Nakamura K., Mori H. " et al.". Acute pancreatitis during haemodialysis // Nephrol Dial Transplant. - 2005. - Vol. 20, No. 9. - P. 2012-3.

11. Klar E., Messmer, K., Warshaw A. L., Herfarth C. Pancreatic ischaemia in experimental acute pancreatitis: mechanism, significance and therapy // Br J surg. - 1990. - Vol. 77, No. 11. - P. 1205-10.

12. Obermaier R., Benz, S., Kortmann B."et al.". Ischemia/reperfusion-induced pancreatitis in rats: a new model of complete normothermic in situ ischemia of a pancreatic tail-segment // Clin Exp Med. - 2001. - Vol. 1, No. 1. - P. 51-9.

## COMPARATIVE ANALYSIS OF THE METHODS INDIRECT REVASCULARIZATION IN TREATMENT OF THE CRITICAL ISCHEMIA LOWER EXTREMITIES

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**Abstract.** AIM. To compare the efficiency transplantation cells of the autologous bone marrow with the lumbar sympathectomy in the treatment of critical lower limb ischemia. MATERIAL AND METHODS. The complex examination and treatment of 66 patients with critical lower limb ischemia, divided into 2 statistically homogeneous groups, was analyzed. In the first group, lumbar sympathectomy was performed, and in the second, transplantation cells of the autologous bone marrow. RESULTS. After 1 year, in patients of the second group, compared with the first, the clinical status increased by 51.5%, the number of amputations decreased by 3%, the physical component of health increased by 7.9%, the psychological component - by 17.7%. CONCLUSION. The cells autologous bone marrow transplantation is pathogenetically substantiated and effective.

**Keywords:** chronic critical ischemia, lower limbs, sympathectomy, transplantation cells of the autologous bone marrow.

**Introduction.** One of the problems of vascular surgery is the treatment of critical lower limb ischemia in patients with absence distal bloodflow, when it is impossible to perform direct reconstructive operations on the



main arteries [1]. The number of such patients in Russia reaches 50 thousand, and the results of treatment remain unsatisfactory. Most patients have a high amputation of the lower limb [2]. In these cases, methods of indirect revascularization of the ischemic limb are used, which can be divided into 3 groups: 1) revascularizing osteotriphalangectomy and longitudinal compactosteotomy of the tibia, the effectiveness of which is proved only in II B subcritical ischemia [3]. 2) Operations on the sympathetic nervous system (lumbar sympathectomy and periarterial sympathectomy), which eliminate spasm of small arteries and arterioles, pre- and postcapillary sphincters of the microcirculation system, contribute to the disclosure of arteriovenous anastomoses [4]. According to other authors, the efficiency of operations ranges from 25.2% to 68.2% [5, 6]. 3) Operations aimed at creating neovasculogenesis in the ischemic limb. Single publications devoted to local administration of bone marrow cells in patients with chronic obliterating diseases of the arteries lower extremities do not allow to give a definite answer about the effectiveness of this method treatment [7, 8, 9].

The subject of discussion is the choice of the method of indirect revascularization in patients with critical ischemia of the lower extremities in the absence distal bloodflow. Which of the methods of indirect revascularization is more appropriate for the treatment of patients?

**Purpose** - to compare the efficiency of implantation of the autologous bone marrow cells with the efficiency of the lumbar sympathectomy in the treatment critical lower limb ischemia of the stage III in patients with the absence of distal bloodflow.

**Material and methods.** The analysis of complex examination and treatment of 66 patients with critical ischemia of the lower extremities on the basis of atherosclerotic lesion of the femoral-popliteal-tibial segment was carried out. Men were 62, women - 4, the age of patients ranged from 48 to 76 years. The average age was  $63.7 \pm 2.1$  years and the duration of the disease was  $6.5 \pm 0.5$  years. All patients suffered from various somatic diseases: hypertension-49 (74.2%), coronary heart disease-33 (50%), diabetes - 12 (18.2%), chronic nonspecific lung diseases - 15 (22.7%), gastric ulcer or duodenal ulcer - 8 (12.1%), urolithiasis 6 (9%), ischemic brain disease - 4 (6%).

Patients according to the treatment technology were divided into 2 statistically homogeneous groups of 33 people each. The groups were statistically homogeneous by sex, age, concomitant diseases, degree of femoral-popliteal-tibial segment lesion, state of distal bloodflow ( $p>0.05$ ). Patients in the first group underwent standard lumbar sympathectomy, and in the second group underwent mini-invasive treatment using the original technology. Zones of insufficiently functioning collaterals along the deep femoral and popliteal arteries were determined under ultrasound control. In the operating room, patients under spinal anesthesia were palpated to determine the localization of the medial tibial condyle. At the selected point, the needle for intraosseous puncture to a depth of 1-2 cm was inserted percutaneously into the spongy part of the tibia. Aspiration of autologous bone marrow cells with a total volume of 40 ml in 2 syringes with a volume of 20 ml, with the presence in each of them of 1 ml of saline and 5 thousand units of heparin was performed. From 5 points on the outer and from 5 points on the inner surface of the lower and middle third of the thigh, every 3-4 cm, 2 ml of autologous bone marrow cells were intramuscularly injected, with a total volume of 20 ml. Similarly, 2 ml of autologous bone marrow cells were implanted in each of the 10 points on the outer and inner surface of the upper and middle third of the tibia. Aseptic dressings were applied to the injection sites, the patient was transported to the ward.

The diagnostic program was traditional and included functional (rheovasography, photoplethysmography), ultrasound (dopplerography, angioscanning) and x-ray (arteriography) methods. Changes in the intensity of arterial blood flow after surgery were recorded by the dynamics of rheovasographic index (RI) and ankle-brachial index (ABI); and microcirculation – by the dynamics of photoplethysmographic index (FI). In addition, the distance of pain-free walking before and after the treatment was determined. The condition of the outflow pathways (distal bloodflow) and the results of treatment were evaluated on the scales Ruterford et al., which are recommended as a standard by the Russian society of angiologists and vascular surgeons [10]. In accordance with international recommendations, the assessment of the "quality of life" patients before and 12 months after treatment, based on a questionnaire survey of patients using the questionnaire MOS SF-36, normalized for vascular patients.

The quantitative results of the study were processed statistically using the analytical package of the ExcelOffice 2010 application.

**Results.** Quantitative characteristics of peripheral hemodynamics and microcirculation in patients of the control and study groups before and after indirect revascularization are presented in table 1.

**Table 1**  
**Dynamics of indicators of the arterial bloodflow and microcirculation**

| Indicators                           | Group 1 (n=33)   |                        |                        |              | Group 2 (n=33)   |            |             |               |
|--------------------------------------|------------------|------------------------|------------------------|--------------|------------------|------------|-------------|---------------|
|                                      | Before operation | In 1 month             | In 6 months            | In 12 months | Before operation | In 1 month | In 6 months | In 12 months  |
| RI                                   | 0,17±0,07        | 0,40±0,02 <sup>#</sup> | 0,38±0,06 <sup>#</sup> | 0,21±0,04    | 0,2±0,02         | 0,22±0,01  | 0,38±0,01*  | 0,45±0,05* ** |
| ABI                                  | 0,31±0,05        | 0,51±0,03 <sup>#</sup> | 0,49±0,02 <sup>#</sup> | 0,39±0,05    | 0,32±0,03        | 0,35±0,03  | 0,50±0,04*  | 0,56±0,06* ** |
| FI, %                                | 21,7±0,8         | 29,7±1,3 <sup>#</sup>  | 29,2±0,8 <sup>#</sup>  | 27,1±1,8     | 21,7±1,6         | 23,8±1,5   | 28,2±1,1*   | 34,7±1,3* **  |
| Walking distance without pain, meter | 45±4,5           | 53±6,5*                | 49±5,7*                | 46±3,3       | 44±5,2           | 49±5,5     | 62±6,8*     | 73±7,1* **    |

# -p<0,05 in comparison with indicators before operation in the first group

\* -p<0,05 in comparison with indicators before operation in the second group

\*\* -p<0,05 in comparison with indicators of the first group

In the first group, 1 month after lumbar sympathectomy, the volume blood flow according to RI significantly increased by 2.4 times, the main blood flow according to ABI-by 1.6 times, the level of microcirculation according to FI-by 8%, walking distance without pain by 8±2 meters. After 6 months, there were no statistically significant changes in the indicators compared to the monthly period. After 12 months, there was a negative trend compared to the 6-month period: RI decreased by 0.17±0.02, ABI by 0.1±0.03, FI by 2.1±0.4%, walking distance without pain by 3±2.4 meters.

In the second group, 1 month after autotransplantation of bone marrow cells, hemodynamic and microcirculation indicators remained almost unchanged. After 6 months, the weakly positive dynamics of indicators was noted: RI increased by 1.9 times, ABI by 1.6 times, FI by 6.5%, walking distance without pain by 18±meters. After 12 months, the positive dynamics remained. Compared with the 6-month period, RI increased by 0.07±0.04, ABI - by 0.06±0.02, FI - by 6.5±1.2%, walking distance without pain - by 11±0.3 meters.

**Table 2**  
**Dynamics of the clinical status of patients**  
**after the carried-out treatment**

| Points | Efficiency                 | Group 1 (n=33) |             |              | Group 2 (n=33) |             |              |
|--------|----------------------------|----------------|-------------|--------------|----------------|-------------|--------------|
|        |                            | In 1 month     | In 6 months | In 12 months | In 1 month     | In 6 months | In 12 months |
| +3     | Considerable improvement   |                |             |              |                |             |              |
| +2     | Moderate improvement       | 22(66,7%)      | 10 (30,3%)  | 6 (18,2%)    | 3 (9,1)        | 9 (27,3%)   | 16 (48,5%)*  |
| +1     | Minimum improvement        | 9 (27,3%)      | 19 (57,6%)  | 8(24,2%)     | 14 (42,4%)     | 22 (66,6%)  | 15 (45,5%)*  |
| 0      | Without changes            | 2 (6%)         | 1 (3%)      | 8 (24,2%)    | 14 (42,4%)     | -           | -            |
| -1     | Minimum deterioration      | -              | 2 (6%)      | 5 (15,1%)    | 2 (6%)         | -           | 1 (3%)       |
| -2     | Moderate deterioration     | -              | -           | 3 (9%)       | -              | -           | -            |
| -3     | Considerable deterioration | -              | 1 (3%)      | 3 (9%)       |                | 2 (6,1%)    | 1 (3%)       |

\* -  $p < 0,05$  in comparison with the first group in 12 months by criterion No 2 Pearson.

When comparing the indicators of the first and second groups 1 month after surgery, it turned out that sympathectomy has a more positive effect than transplantation of autologous bone marrow cells. RI in the first group was higher than in the second by  $0.18 \pm 0.01$ , ABI-by  $0.14 \pm 0.01$ , FI-by  $5.9 \pm 0.7\%$ , walking distance without pain -by  $4 \pm 1.1$  meters ( $p < 0.05$ ). 6 months after surgery, hemodynamics and microcirculation in patients of the first and second groups did not differ statistically. After 12 months, on the contrary, the indicators were higher in the second group than in the first: RI-  $0.24 \pm 0.01$ , ABI- $0.17 \pm 0.01$ , FI- $13 \pm 0.3\%$ , walking distance without pain -  $27 \pm 4.2$  meters ( $p < 0.05$ ).

The results of the assessment degree of change in the clinical status of patients in relation to the period before surgery are presented in table 2.

During the first year after surgery, no significant improvement occurred in either group. In the first group, 1 month after surgery, 31 (93.9%) patients showed a positive change in clinical status: the severity of pain syndrome decreased, the skin of the foot and lower leg warmed, the distance of pain-free walking increased. Only 2 (6%) had the ineffective sympathectomy. In patients of the second group at this time after implantation of autologous bone marrow cells, a positive result was noted in 17 (51.5%), the clinical status did not change in 14 (42.4%), and in 2 (6.1%) - increased pain at rest, decreased pain-free walking distance. Monthly clinical efficacy of sympathectomy was 93.9% and implantation of autologous bone marrow cells 51.5%.

After 6 months after surgery, the positive dynamics of the first group of patients remained in 29 (87.9%) patients. However, 10 (30.3%) patients from the category with moderate improvement moved to the category with minimal improvement. Negative dynamics was observed in 3 (9%) patients: 2 (6%) relapsed pain syndrome at rest, and 1 (3%) developed gangrene of the foot, which required a high amputation of the limb. At this period in patients of the second group, a positive change in clinical status was registered in 31 (93.9%) patients. 2 (6%) patients of the phenomenon of ischemia progressed, which required amputation of the thigh. The six-month clinical efficacy of sympathectomy was 87.8% and bone marrow cell implantation 93.9%.

After 12 months after sympathectomy, patients of the first group showed a further decrease in clinical status. 4 (12.1%) moved from the category with moderate improvement to the category with minimal improvement, in 8 (24%) patients the clinical picture returned to the preoperative level. Negative dynamics of clinical status was observed in 11 (33.3%) patients, which required amputation in 3 (9%) patients. 1 year after autotransplantation of bone marrow cells in patients of group 2 increased by 21.2% the number of patients with moderate improvement compared to 6 months, and with minimal improvement decreased by 27.1%. The progress of ischemia was registered in 2 (6%) patients, which required amputation of a limb in 1 patient. The one-year clinical efficacy of sympathectomy was 42.4% and bone marrow cell transplantation 93.9%. The limb was preserved in 29 (87.9%) patients in the first group and 30 (90.9) in the second group.

The results of the assessment " quality of life " the patients 12 months after surgery are presented in table. 3.

In patients with critical lower limb ischemia, preoperative quality of life indicators were statistically significantly reduced on all scales. Integral indicators of quality life in patients after lumbar sympathectomy significantly increased in comparison with preoperative PHCH by 11.6%, PSCH by 8.1%, and after transplantation of autologous bone marrow cells-by 19.5% and 25.8%, respectively. In patients of the second group, integral indicators of quality life compared to the first were higher: PHCH by 7.9%, PSCH by 17.7%.

**Conclusion.** Compared with standard lumbar sympatectomy, 12 months after implantation of autologous bone marrow cells into the ischemic limb, the clinical status of patients increased by 51.5%, the number of amputations decreased by 3%, the physical health component increased by 7.9%, the psychological component-by 17.7%.

Table 3  
Quality of patients life

| Scale SF-36 | Healthy population residents of Russia | Patients before operation (n=66) | Group 1 (n=29)        | Group 2 (n=30)         |
|-------------|--|----------------------------------|-----------------------|------------------------|
| PF          | 96,0±1,7                               | 30,8±2,1 <sup>#</sup>            | 40,7±3,1 <sup>*</sup> | 51,0±2,7 <sup>**</sup> |
| RP          | 90,2±1,8                               | 31,3±3,9 <sup>#</sup>            | 41,1±2,2 <sup>*</sup> | 41,6±4,6 <sup>*</sup>  |
| BP          | 89,4±2,1                               | 27,7±1,5 <sup>#</sup>            | 40,1±3,3 <sup>*</sup> | 59,2±2,5 <sup>**</sup> |
| GH          | 73,2±1,9                               | 25,4±5,6 <sup>#</sup>            | 39,8±2,1 <sup>*</sup> | 41,3±3,1 <sup>*</sup>  |
| VT          | 60,2±2,8                               | 29,3±3,9 <sup>#</sup>            | 36,7±1,9 <sup>*</sup> | 55,0±2,0 <sup>**</sup> |
| SF          | 84,2±3,2                               | 28,1±5,8 <sup>#</sup>            | 37,6±1,1 <sup>*</sup> | 60,0±2,4 <sup>**</sup> |
| MH          | 62,4±1,2                               | 35,8±2,1 <sup>#</sup>            | 42,3±1,8 <sup>*</sup> | 56,3±2,5 <sup>**</sup> |
| RE          | 61,1±1,7                               | 43,1±1,3 <sup>#</sup>            | 52,1±2,1 <sup>*</sup> | 52,2±4,4 <sup>*</sup>  |
| PHCH        | 87,2±1,9                               | 28,8±3,3                         | 40,4±2,7              | 48,3±3,2 <sup>**</sup> |
| PSCH        | 67,0±2,2                               | 34,1±3,3                         | 42,2±1,7              | 59,9±2,8 <sup>**</sup> |

Notes:

# - p < 0,001 in comparison with indicators at healthy faces.

\* - p < 0,05 in comparison with indicators before operation.

\*\* - p < 0,05 in comparison with indicators of the first group. Before the operation, the quality of life was assessed in all 66 (100%) patients, and in 12 months after the operation in 59 (89.4%) patients. 7 (10.6%) people who underwent limb amputation refused to be interviewed.

## References

1. Belov YU.V., Komarov V.V., Vinogradov O.A., Salekh A.Z., Dzyundzya A.N., Ul'yanov N.D., Lukich M.V., Nagornyy M.N. Bilateral video endoscopic lumbar sympathectomy in chronic lower limb ischemia //Surgery. 2015. No 8. P.70-73.
2. Majstrenko D.N., ZHerebcov F.K., Osovskih V.V., YAKovleva E.K., Krasil'nikova L.A., Generalov M.I., Krotova O.A., Al' Dejmer S.YU., Granov D.A., SHnejder YU.A., Grinev K.M., Rutkin I.O. Modern diagnostic technologies in determining the tactics of treating patients with atherosclerosis obliterans of the lower extremities // Bulletin of Surgery. 2009. No2. P.41-46.

3. Chervyakov YU.V., Staroverov I.N., Borisov A.V. i dr. Long-term results of up to three years of using indirect methods of revascularization in patients with chronic lower limb ischemia // Bulletin of Surgery. 2015. No 2. P.84-88.

4. Zheng Z Liu V Zhu J Huang W Cheng Lumbar sympathectomy reduces vascular permeability, possibly through decreased adenosine receptor A2a expression in the hind plantar skin of rats. Clin Hemorheol Microcirc. 2018. Vol.68, No 1. P.5-15.

5. Zechlinski JJ, Hieb RA. Lumbar Sympathetic Neurolysis: How to and When to Use? Tech Vasc Interv Radiol. 2016 . T 19, No 2. P.163-168.

6. Kohan E.P., Pinchuk O.V. Reflections on lumbar sympathectomy. Years and practice. On the 90th anniversary of the application of the method in Russia // Angiology and Vascular Surgery. 2017. Vol.23, No 2. P.186-190.

7. Bulgin D.V., Andreeva O.V. Therapeutic angiogenesis using growth activators and bone marrow cells: biological foundations and prospects for clonic use // Bulletin of transplantology and artificial organs. 2015. V. 17, No 3. P. 89-1114.

8. Lawall H., Bramlage P, Amann B. Stem cell and progenitor cell therapy in peripheral artery disease. A critical appraisal. Thromb. Haemost. 2010. Vol.103, No 4. P.696-709.

9. Gabr H, Hedayet A, Imam U, Nasser M. Limb salvage using intramuscular injection of unfractionated autologous bone marrow mononuclear cells in critical limb ischemia: a prospective pilot clinical trial. // Exp Clin Transplant. 2011. Vol.9, No 3. P.197-202.

10. National recommendations for the management of patients with diseases of the lower extremities Moscow: Medicine, 2013.-67p.

11. Sukovatyh B.S., Knyazev V.M. The effect of various methods of the indirect revascularization on the quality of the life patients with critical lower limb ischemia // Bulletin of Surgery. 2008. V. 167, No 2. P.44-47.



## SEARCH STRATEGY FOR NEW DRUGS FOR THE TREATMENT OF COGNITIVE IMPAIRMENT AND PATIENT REHABILITATION

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**Abstract.** Approaches to the synthesis of tricyclic derivatives of 3, 7-diazabicyclo [3.3.1] nonane have been developed, according to docking data that have well bind to allosteric sites of the AMPA receptor. Based on a study of the spatial model of the AMPA receptor, its complexes with known AMPA modulators, and the results of their molecular docking, it was shown that compounds based on tricyclic derivatives of 3,7-diazabicyclo [3.3.1] nonane bind to AMPA receptors in a fundamentally different place than ampakines from other known groups. While studying compounds capable of positively modulating the function of AMPA receptors, it was found that positive allosteric AMPA modulators have a number of useful properties that improve memory and cognitive functions of humans and animals. These compounds are true modulators, and not agonists, since they themselves do not cause synaptic currents in any concentrations. Their unique property is the ability to slow down (inhibit) or block the transition of the receptor to a desensitized state, this ability mediates the improvement of learning and memory by activating BDNF and NGF.

**Keywords:** AMPA-receptors, derivatives of 3, 7-diazabicyclo [3.3.1] nonane, BDNF, NGF, positive allosteric modulators, rehabilitation of patients after brain damage.

### Introduction

Nootropic drugs is a special group of neuropsychotropics which possess the possibility to enhance memory and cognitive processes, improve learning ability, and positively affect intellectual capacity of both healthy individuals and those suffering from various disorders. Throughout the literature sources, "smart drugs" and "cognitive enhancers" are often used as synonyms for nootropics [1].

These medicinal products are used for treatment of class V disorders – mental and behavior disorders. Nootropics have widespread list of indications: ageing cognitive problems, psychoorganic syndromes of neurodegenerative or vascular origin (including Alzheimer's disease), acute or chronic cerebral blood circulation disturbance (including those after stroke or encephalopathy), craniocerebral injuries, neuroinfections, acute and chronic fatigue, chronic fatigue syndrome, stress, pain syndrome, diseases caused by prolonged alcohol and drug intake, conditions due to prolonged central nervous system (CNS) depressants administration (anxiolytics, antipsychotics, etc.), asthenic, astheno-depressive, and depressive syndromes, neurotic disorders, vegetovascular dystonia, dizziness. In pediatric practice nootropic medicinal products are used for treatment of cerebroasthenic and encephalopathic disorders, memory defects, mental and lexical retardation, perinatal CNS damage consequences, and attention deficit hyperactivity disorder (ADHD). Healthy individuals usually use nootropics in case there is a certain need to increase mental capacity, improve mental alertness, work productivity, planning and decision-making ability, and speed up processes of memory recall [2].

The aim of this work was study of systematic analysis of the ampakine nomenclature for the treatment of cognitive impairment and rehabilitation of patients undergoing acute brain hypoxia due to ischemia.

### Results and Discussion

The strategy for the search for new drugs for the treatment of cognitive impairment and rehabilitation of patients undergoing acute brain hypoxia due to ischemia or other brain injuries includes the search for substances with synaptic plasticity and the ability to increase the production of neurotrophic factors. Many substances with neuroprotective

activity either act in large doses or have increased toxicity. Of undoubted interest are substances of a relatively new class of ampakines (ampakines™), which in their physiological effect are positive allosteric modulators of AMPA receptors (PAM AMPA) [3, 4]. About 500 abstracts and full-text versions of patents were selected, selected for various options of queries using the most comprehensive European Patent Office database, in the Worldwide search collection, as well as electronic patent databases of the Russian Patent Office, Patent Office US USPTO: Searching Full Text, Patents (Since 1976) and USPTO Patent Application Full-Text and Image Database (AppFT) and other available databases included in the search policy [5]. 81 patents were selected for a more detailed development.

When analyzing the submitted patents, it should be noted that the selected patents belong to such countries as the USA, Japan, Germany, Luxembourg, Denmark, France, Poland, Norway, Canada, Great Britain. These countries have submitted international and European applications. Should be also noted that there is significant number of patenting countries, which indicates the high need and importance of research in this area.

As a result of a patent search were not found analogues of the proposed product. The difference between the proposed works and innovative research from existing projects is that in the proposed project a drug based on derivatives of 3,7-diazabicyclo [3.3.1] nonane to restore motor and cognitive functions after brain damage. The presented data indicate the relevance of the chosen research path and the high competitiveness of the proposed drug. During the patent search process, it was confirmed that there are no foreign and Russian objects of technology similar to the developed technologies in the world, no applications were registered that would consider the prospects for the potential use of 6- [4-methoxy-3- (1H-pyrazol-1-ylmethyl) benzyl] -1,11-dimethyl-3,6,9-triazatricyclo [7.3.1.1] tetradecane-4,8,12-trion as a pharmacologically active pharmaceutical substance or as part of dosage forms. No applications were found that reflected the possibility of using tricyclic derivatives of 3,7-diazabicyclo [3.3.1] nonane for the restoration of motor and cognitive functions after brain damage [4, 6].

Thus, the priority of this topic is currently fully owned by the participants in this project. An innovative drug with the chemical name 6- [4-methoxy-3- [1H-pyrazol-1-ylmethyl] benzyl] -1,11-dimethyl-3,6,9-triazatricyclo [7.3.1.1] tetradecane-4, 8, 12-trion is synthesized by project participants.

An important issue in the study of new pharmacologically active compounds is the determination of their potential toxicological activity. Thus, the test substance from a number of ampakines of an innovative class of tricyclic derivatives of 3,7-diazabicyclo [3.3.1] nonane (bispidine) is promising as a "candidate" for the development of an innovative drug with a "cognitive effect", including those prescribed for rehabilitation cognitive and motor functions after brain damage caused by trauma and acute ischemia.

As a result of studies carried out by the developers of the project, computer modeling and optimization of 260 new ampakine structures - derivatives of 3,7-diazabicyclo [3.3.1] nonane and 4,4'-biphenyl, potentially possessing positive modulatory activity with respect to AMPA receptors and the synthesis of the most promising of them (selected according to the simulation results) is carried out. Approaches to the synthesis of tricyclic derivatives of 3,7-diazabicyclo [3.3.1] nonane have been developed, which, according to docking data, bind well to modulator sites of the AMPA receptor. Based on the analysis of the spatial structure of the AMPA receptor, its complexes with the known PAM AMPA and the results of their molecular docking, it was shown that compounds based on tricyclic derivatives of 3,7-diazabicyclo [3.3.1] nonane bind to AMPA receptors in a fundamentally different place, then ampakines from other known groups of PAM AMPA [6,7].

### **Conclusion**

The synthesized derivatives of bispidine possess the properties of positive allosteric AMPA modulators due to the tricyclic framework, the bispidine scaffold was chosen due to the rigidity and high hydrophobicity of the molecule [8,9]. Tricyclic derivatives of 3,7-diazabicyclo [3.3.1] nonane are positive allosteric modulators of glutamate AMPA receptors,

or ampakines. Glutamate receptors are expressed at the synapses of neurons and are activated by glutamic acid, the most common neurotransmitter that transmits signals that stimulate nerve cells. PAM AMPA either slows down the rate at which the AMPA receptors lose their sensitivity to the prolonged exposure to glutamate, or they slow down the deactivation of the AMPA receptor after termination of glutamate exposure [3,7].

It is assumed that indications for the use of this drug, a positive modulator of AMPA receptors, but not an agonist or antagonist, will include acceleration and improvement of the quality of convalescence after brain disorders, since the acute phase and the phase of convalescence are provided by various pathogenetic mechanisms. For the developed innovative drug, a high safety of use and a "prognitive effect" are predicted to exceed the first-generation ampakines analogs from other structural classes, and the oral route of administration is in the form of capsules or coated tablets.

In addition, the combination of ampakines with antipsychotics and narcotic analgesics is expected to be very effective in order to mitigate the side effects of the latter (for example, respiratory depression without suppressing the analgesic effect of drugs). Possibly promising application of ampakines is in emergency care for received patients with overdose of drugs or barbiturates.

Thus, ampakines currently attract the interest of many scientists, the range of areas of research is very diverse. The mechanism of pharmacological effects of ampakines is associated with their ability to influence neuroplasticity and express neurotrophic factors BDNF and NGF by modeling AMPA receptors of the glutamatergic mediator system.

### References

1. Zakharov, V.V. Glutamatergic therapy in the recovery period after ischemic stroke/ V.V. Zakharov // Effective pharmacotherapy.- 2016.-No. 42.- P.6-14.2.Neurotrophic and metabotropic potential of nerve growth factor and brain-derived neurotrophic factor: Linking cardiometabolic and neuropsychiatric diseases / S.Yanev [et al.] // World J Pharmacol. - 2013. - Vol. 2. - No4. - P.92-99.
2. Lavrov, M.I. Novel AMPA receptor modulators: design and assessment. : PhD thesis (chemistry, 02.00.03, 02.00.16) / Mstislav Igorevich Lavrov; scientific advisers N.S.Zefirov, V.A.Palyulin. - Moscow, 2011.- P.150-169.
3. Tricyclic derivatives of 3,7-diazabicyclo [3.3.1] nonanes potentially possessing pharmacological activity, pharmaceutical compositions based on them and method of their use: RF patent No. RU 2480470 C2 / Authors: Zefirov NS, Palyulin V.A ., Lavrov M.I., Zapolsky M.E. - Publ. 04/27/2013 Bull. No. 12.
4. Federal Institute of industrial property: [electronic resource]. M., 1997-2012. URL: [www.fips.ru](http://www.fips.ru). (electronic resource: 18.09.2018).
5. Enomoto, T. Synthetic study toward ecteinascidin 743: concise construction of the diazabicyclo[3.3.1]nonane skeleton and assembly of the pentacyclic core / T.Enomoto, Y.Yasui, Y. Takemoto // J. Org. Chem. - 2016. - Vol. 75. - P. 4876-4879.
6. Cycloprolylglycine neuropeptide is an endogenous AMPA receptor positive modulator / T.A. Gudasheva [et al.] // Academy of Science Proceedings. - 2016. - Vol. 471. - No. 1. - P. 106-108.
7. Bispidine-Amino Acid Conjugates Act as a Novel Scaffold for the Design of Antivirals That Block Japanese Encephalitis Virus Replication/ V. Haridas [et al.] // PLOS Neglected Tropical diseases. - 2013. - Vol. 7.-No 1. - P. 1-11.
8. Synthesis, stereochemistry and in vitro antimicrobial evaluation of novel 2-[[2,4-diaryl-3-azabicyclo[3.3.1]nonan-9-ylidene]hydrazono]-4-phenyl-2,3-dihydrothiazoles/ R.Ramachandran [et al.] // Bioorganic & Medicinal Chemistry Letters. - 2015. - V. 21. - P. 6301-6304.

## MAIN PRINCIPLES FOR THE DEVELOPMENT OF BIOPHYSICAL RESEARCH

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**Abstract.** This article deals with the history of the development of science of biophysics, describes the background for the formation of biophysics. It is noted that the research of the German physicist and physiologist G. Helmholtz played a huge role in the development of biophysics. The importance of the works of physiologists such as E. Du-Bois-Raymond, I.M. Sechenov, R. Mayer, G. de Vries is also emphasized. The author pays great attention to the development of molecular biophysics, the development of various models of biological structures and processes. In particular, the model of nerve conduction, which was created by F. Lilly, is described. In addition, the article focuses on the creation of mathematical theory of a target, its essence and significance in the development of radiobiology is revealed. It is noted that target theory has played a huge role in the development of molecular biophysics. Further, the author points out that as knowledge of the nature and mechanisms of genetic information develops, molecular biophysics focuses on physics of nucleic acid. At the end of the article, the author makes the conclusion that the relationship of physics with biology was predetermined in the book of the German physicist E. Schrodinger "What is life from the viewpoint of physics?"

**Key words:** Piezoelectric effect, bioelectric potential, photosynthesis intensity, electric charge.

The interest of physicists in biology continuously increased in the XIX century. At the same time, their desire for physical research methods strengthened in biological disciplines. The latter widely penetrated into the most diverse areas of biology. Due to physics, the information capabilities of the microscope are expanded. In the early 30s of XX century an electron microscope appeared. Radioactive isotopes, increasingly improved spectral technology, X-ray structural analysis are becoming an effective tool for biological research. The scope of application of x-rays and ultraviolet rays is expanding; electromagnetic oscillations are used not only as a means of research, but also as factors affecting the body. Electronic equipment is widely used in biology and, especially in physiology [1].

Along with the introduction of new physical methods, the so-called molecular biophysics is also developing. Having achieved great success in understanding the essence of non-living matter, physics tries to decipher the nature of living matter based on the traditional methods. Molecular biophysics creates very broad theoretical generalizations with the involvement of a complex mathematical apparatus. On the basis of the tradition, the biophysicist tries to avoid a very complex ("dirty") biological object in the experiment and prefers to study the behavior of substances isolated from organisms in the possible purer form. The development of various models of biological structures and processes – electrical, electronic, mathematical, etc. is being developed. The models of cell movement (for example, a mercury drop in an acid solution that performs rhythmic movements like amoeba), permeability, and nerve conduction are being created and studied. In particular, a great attention is focused on the model of the nerve conduction created by F.Lilly. This is an iron wire ring which is placed in a solution of hydrochloric acid [2]. While put scratches, which destroy the surfaceoxide layer, there is an electric potential wave, which is very similar to the waves traveling along the nerves when excited. A lot of research is devoted to the study of this model (since the 1930s) using mathematical methods of analysis. In the future, a more advanced model on the basis of cable theory is created. The basis of its construction was a certain physical analogy between the distribution of potentials in an electrical cable and a nervous one.



The other areas of molecular biophysics are less popular. Mathematical biophysics should be emphasized among them. This part is closely connected with many areas of biology. It not only describes the quantitative regularities of such phenomena as growth, cell division, excitation in mathematical form, but also tries to analyze the complicated physiological processes of higher organisms.

The formation of biophysics was caused by the emergence of physical chemistry late in the XIX - early in the XX century, and the need to identify the mechanisms which were considered to be the basis of chemical interaction. This new discipline immediately attracted the attention of biologists by the fact that it opened up the possibility to know the physical and chemical processes in those "dirty" living systems with which it was difficult for them to work from the viewpoint of the physicist. A number of areas that originated in physical chemistry gave rise to the same areas in biophysics.

The application of physical methods in the study of biological objects requires consideration of their specificity. The main distinguishing feature of biological systems from other natural phenomena is the fact that information, resulted from evolution and contained in the genome, is used in their construction. This information is manifested in the structure of protein molecules and it is the cause of thermodynamic non-equilibrium processes occurring at all levels of the system. When macromolecules, cells or whole organisms appear, there are two ways for information consideration: direct and indirect. The direct way is to build a living organism according to a given program. This way is actually used in nature in the form of the development of a biological system from an embryo to an adult organism. At the same time, at each stage chemical and physical processes take place in accordance with the law of nature, but taking into account the information based in the genes. In the theoretical study of this way, the methods of the theory of self-organization of systems and mathematical modeling are used. The second way is to study individual elements of the biosystem, to analyze their structure and properties, and then to reconstruct the system as a whole. This method is widely used in modern medicine and

biophysics; the most modern physical research methods are involved in its implementation. In order to determine the structure of protein molecules and the structure of enzymes, the methods of structural analysis are widely used. Since the basis of the body is hydrocarbon molecules, the extremely fine physical methods are required for their study.

Other research methods are aimed at establishing the special features of relationships between molecules inside organic molecules. Optical and X-ray spectroscopy is used for this purpose. Indirect methods are of particular importance in the study of conformational transitions of molecules using the proposed methods, it is possible to determine the number of stages and energy states in conformational transitions. The main method of studying the structure of the cells and the mechanism of action of the membranes is electronic microscopy which enables to explore the structure of the cell, as well as the interaction between the elements of the cell [3].

Modeling is used at all levels of studying living systems from molecular biophysics, membrane biophysics, biophysics of cell and organ to biophysics of systems. The variety of objects in a living organism is so great that it is impossible to get a complete and detailed understanding of the behavior of such complicated system. Therefore, a variety of new diagnostic treatment methods adopt a simulation method, i.e. they replace a certain object, phenomenon, process, in combination with its complexity, model, i.e. an object like a natural, conscious simplification. There are different models in almost every section of biophysics. For example, the model of formation of the action potential, the model of the sliding thread in the description of muscle contraction, the model of the circulatory system and etc.

With the development of physics in the 20th century and the growth of interest to understanding the essence of life, the tendency to explain life phenomena in the language of physical laws increased. In the first half of the XVIII century the attempts were made to use the hydrodynamic laws of the flow of fluids through pipes to explain the laws of blood movement through the vessels of the circulatory system. The dis-

covery of the crystalline state and some analogies in the phenomena of growth and reproduction of crystals and living organisms was the basis for creating the theories of the crystalline state of living matter. This trend began to develop particularly rapidly after the existence of molecular ordering in liquid systems was discovered and there was a great idea that living matter was a liquid crystal. The discovery of the piezoelectric effect, the ability of crystals to change their volume when electrical potential is applied – had led to attempts to explain contraction of striated muscle through this phenomenon. Even a physical muscle model was created.

The researches of the German physicist and physiologist G. Helmholtz were of great importance for the development of biophysics. He found out the mechanism of the eye operation as an optical system and for the first time determined the speed of stimulation spreading along the nerve with mathematical accuracy. In the middle of the XIX century there were also attempts to analyze some pathological biological phenomena by means of mathematical methods [4]. The second source of biophysics was physiology which studied physiological processes and it was aimed at revealing the internal mechanisms based on the elementary physiological functions taking into account the principles of physics and chemistry. This desire was clearly manifested throughout the history of physiology.

The Italian L. Galvani, who published "A Treatise on the forces of electricity in muscular movement" in 1791, tried to explain the muscle contraction by the fact that its outer surface is negatively charged, and the inner surface is charged by positive electricity, that is, the muscle is Leyden can, and a nerve is a conductor through which an electrical discharge passes. His opponent, a physicist A. Volta, who initially denied the presence of animal electricity, later proved that bioelectric potentials are determined by the presence of galvanic cells in the tissues. He explained the powerful electrical discharges at the stingrays by the existence of a battery of such elements. This idea received overall recognition. Thus, the problem was posed - how these chemical elements are arranged and in which part of the body they are placed in organisms.

### References

1. Maidanov A.S. (1993). *Iskusstvo otkrytiia: Metodolohiia i lohika nauchnoho tvorchestva* [The Art of Discovery: Methodology and Logic of Scientific Creativity]. Moscow: Repro [in Russian].
2. Stepin V.S. (1976). *Stanovlenie nauchnoi teorii* [The formation of a scientific theory]. Minsk: Izdatelstvo BGU [in Russian].
3. Chudinov E.M. (1986). *Problema ratsionalnosti nauki i stroitelnye lesa nauchnoi teorii* [The problem of rationality of science and scaffolding scientific theory]. *Priroda naýchnogo otkrytiia – The nature of scientific discovery*. Moscow: Nauka [in Russian].
4. Kuptsov V.I. (1986). *Priroda nauchnoho otkrytiia* [The nature of scientific discovery]. Moscow: Nauka [in Russian].

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## THERMAL ANALYSIS METHOD FOR THE STUDY OF CONDENSED MATTER

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**Abstract.** The installation of thermal analysis based on the TPM136 measuring regulator with the ability to connect and use a personal computer together with an IP camera for analyzing data, plotting the studied compositions and visual monitoring of measurements was developed. The setup allows real-time data to be obtained in digital format from six thermocouples simultaneously, which makes it possible to fully automate the collection of experimental data and their processing. The installation was tested and implemented at the Institute of Physics and Technology of the Russian Academy of Sciences. Studies were conducted with samples including ice and ice-containing aqueous solutions of sodium carbonate of different concentrations. The advantage of this development is its low cost, the lack of cumbersome tooling, as well as the ease of maintenance and management.

**Keywords:** thermal analysis, data processing, software, temperature measurement, phase transitions.

### Introduction

Modern methods of thermal analysis are based on high-precision instruments that allow measurements to be taken over a wide temperature range and in various environments. A significant drawback of the currently used equipment for thermal analysis, manufactured mainly by foreign manufacturers (derivatographs, differential scanning calorimeters, etc.), is its very high cost, which makes such equipment practically inaccessible to most researchers studying the properties of materials in depending on temperature [1, 2]. Such equipment can only be purchased by large research centers because of its high cost: from several thousand euros and above. The aim of this work is to create a simple and at the same time functional thermal analysis installation (TAI), which can be assembled with a minimum of financial costs, which makes it possible to conduct research in low-budget institutions with a minimum configuration of equipment.

Thermal methods are a group of methods of physicochemical analysis in which a physical parameter of a system is measured as a function of temperature [3]. The thermal properties of materials reflect their behavior during heat transfer (supply or removal of heat), at which a temperature change occurs. Thermal analysis is based on the interpretation of heating and cooling curves with the identification of characteristic sections on them, corresponding to changes in temperature with time [4].

Most physical and chemical processes are accompanied by thermal effects, i.e., absorption or evolution of heat; therefore, methods of thermal analysis are applicable to a very large number of systems.

Depending on what property of the material are being determined, the corresponding types of thermal analysis are used: the visual method (the appearance or disappearance of visible changes in the sample), the method of heating and cooling curves (temperature versus time), differential thermal analysis (temperature difference between the sample and the reference) etc. In addition, the methods of thermal analysis include measuring the optical, electrical, magnetic and other properties of materials depending on temperature [5].

Due to its technical characteristics and low cost, the universal TPM136 meter-regulator is optimally suited for the thermal analysis of condensed matter by the method of heating and cooling curves. Connecting six input primary converters (sensors) to control the physical parameters of the object makes it possible to remove up to six compositions at a time.

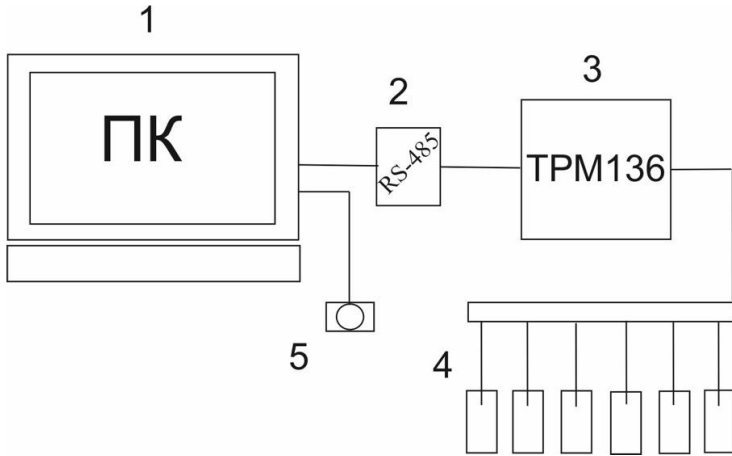
The TPM136 meter-controller measures the given input parameters (temperature, etc.) by sequential interrogation of the sensors involved and converts the received data into a digital form. Also, during the operation of the device, the received signals are filtered from interference with the subsequent correction of readings in accordance with the parameters specified by the user.

The interrogation of sensors, which consists in alternately connecting the received output signals to the meter using an AK-1 automatic switch controlled by a microprocessor according to a program specified by the user, takes place in a closed cycle [6]. This program includes a list of current serial numbers of all sensors connected to the work, taking into account their degree of priority during the survey. The device uses an integrated RS-485 network interface, which provides the following main features:

- programming the device over the network;
- registration on the PC of the parameters of the current state.

In our TAI (Fig. 1), designed to record the heating (or cooling) curves of various aqueous solutions of organic and inorganic compounds, two types of thermocouple cases are used. To measure temperatures from  $-40$  to  $+50$  °C, a housing made of fluoroplastic is used. The choice of fluoroplastic as a material for the thermocouple body at given temperatures is due to the following factors [7]:

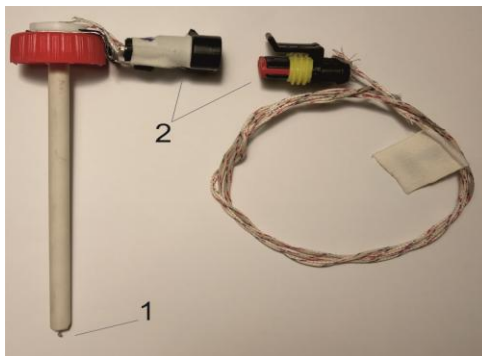
- resistance to many aggressive environments;
- low coefficient of friction coefficient;
- large temperature range of operation;
- biological inertness;
- low surface tension.



**Fig. 1. Functional diagram of a TA installation with digital data processing: 1 - personal computer; 2 - network interface RS-485; 3 - universal meter-regulator TPM136; 4 - block with thermocouples and samples; 5 - IP camera**

An important factor in using fluoroplastic for the thermocouple body is that fluoroplastic is not wetted by liquids and has low adhesion, which is especially important at temperatures below zero [8].

At temperatures above +50 °C, an open-type housing is used, since the adhesion coefficient in this case does not matter (Fig. 2).

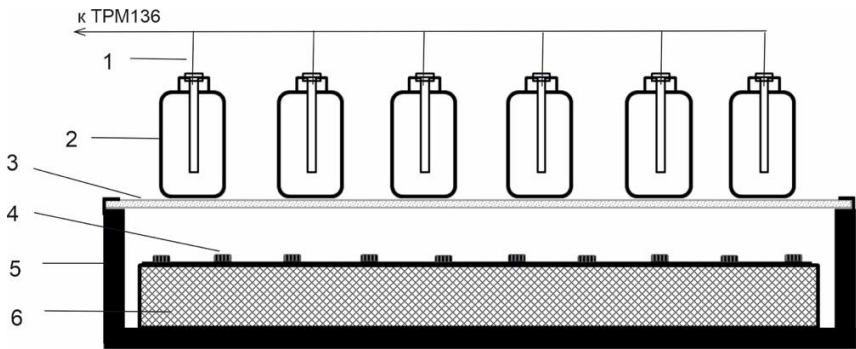


**Fig. 2. Open thermocouple body. 1- working junction; 2 - connector;**



Cases with thermocouples are installed in containers that can be made of both plastic and glass, depending on the compositions to be studied.

When testing the installation, ice and ice-containing aqueous solutions of calcium carbonate were chosen as samples [9]. Containers with aqueous solutions of sodium carbonate of various concentrations are placed in a freezer with a temperature of  $-15^{\circ}\text{C}$ . Then the containers are installed on a stand with height-adjustable LED backlight, designed for easy visual viewing, as well as high-quality video shooting (Fig. 3).



**Fig. 3. Block with thermocouples and samples.**

**1 - thermocouples; 2 - samples; 3 - glass; 4 - LEDs; 5 - block body;  
6 - height-adjustable platform for LEDs.**

The “Configurator” program is a native software delivered to the TPM136 device and by default not displaying real-time graphics. The “TPM136 v1.0” program we developed for installing the TA is a software shell for the Configurator program, which provides a more convenient and functional user interface [10, 11].

The “TPM136 v1.0” program receives data from the “Configurator” program and builds time-temperature graphs of the connected thermocouples in real time. In the program window, next to each graph, the thermocouple number and the current temperature are displayed. The horizontal axis represents the current time..

Selecting the "Exit" menu item in the program window terminates the program in real time and saves all the data in the form of a table in a text (txt) file and in an Excel file format (xlsx) [12].

Left-clicking on any point on the graph displays the number of the selected point, time and temperature on the top line. Selecting the menu item "Image"  $\Rightarrow$  "Save" saves the graph to a file in the current directory or to a directory selected by the user (Fig. 4).

The menu item "Edit"  $\Rightarrow$  "Select a range of values" allows you to select the display of data obtained when plotting previous graphs in a certain temperature range, indicating the left (lower) and right (upper) temperature limits.

When you click on the "Enter" button, a window with graphs built on the selected data is displayed, where the best time is calculated according to the selected temperature range (Fig. 5).

The software "TPM136 v1.0" developed by us for registering, outputting, processing and visualizing data is written in the programming languages Java and Python [13, 14]. Chromel-alumel thermocouples were used as primary converters. The accuracy of temperature measurement is  $\pm 0.5\%$ .

### Conclusion

Using the TPM136 universal measuring controller with the "TPM136 v1.0" software developed by us for a personal computer and connected IP camera allows you to fully control the process: record data from thermocouples in a table for graphical visualization and record the process on video for subsequent playback (Fig. 6). Using an IP camera allows you to monitor the progress of the experiment remotely (being outside the installation limits) and from any device (computer, laptop, smartphone) connected to the Internet.



Fig. 4. Conclusion of the graph for six thermocouples

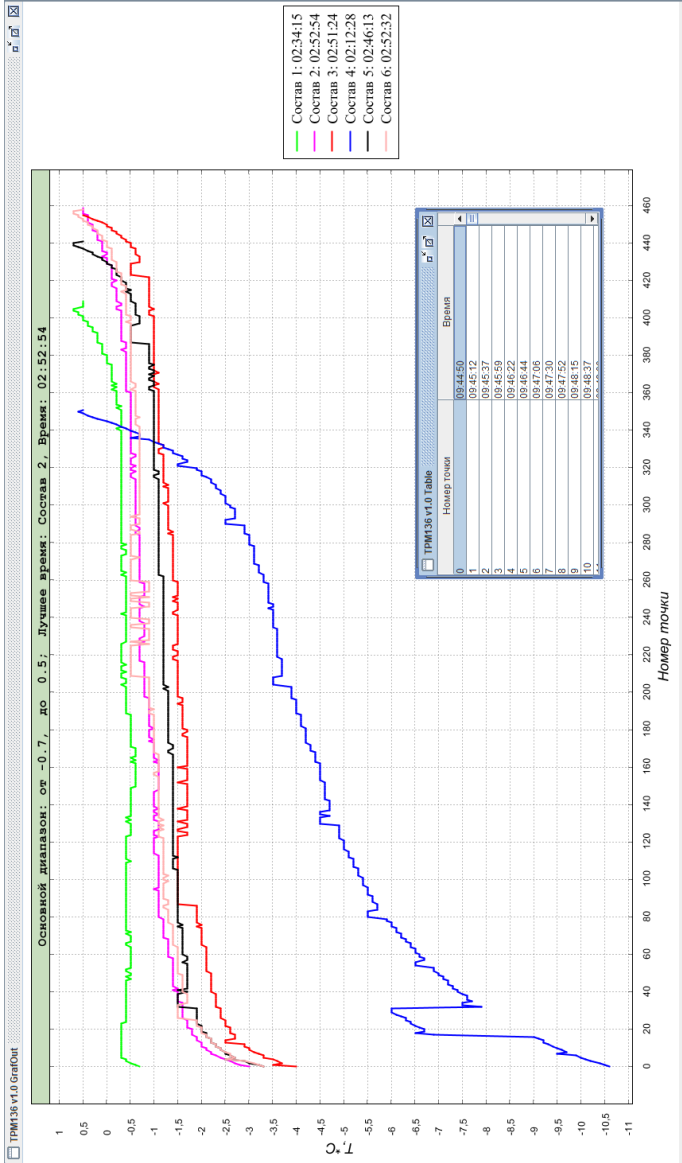


Fig. 5. Charts based on the data of the selected range

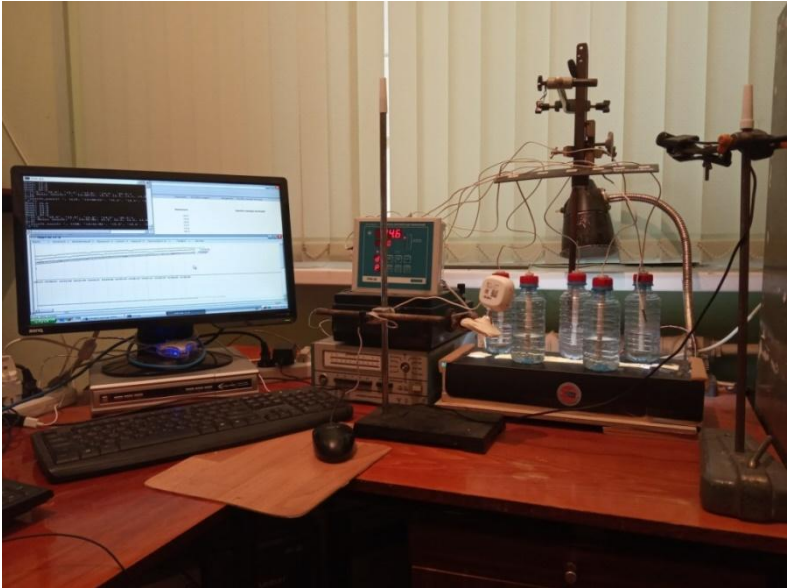


Fig. 6. Installation of thermal analysis

### References

1. Afanasyev V.V., Kovalev V.G., Orlov V.N., Tarasov V.A. The study of the physico-chemical properties of the gasification of local fuels. // Basic research. 2016. No 9. P. 227-232.
2. Representation of NETZSCH-GERAETEBAU GMBH in Russia. Application of thermal analysis methods for forecasting using specialized software // Plastics. 2010. No 2. P. 2-6.
3. Shestak Ya. Theory of Thermal Analysis: Physical and Chemical Properties solid inorganic substances // Per. from English - M.: Mir, 1987. - 456 P.
4. Mirenkov A. A., Sharshukov I. A. Thermal analysis of alloys // Methods of testing materials and machines. engineering technology. 2011. No 1. P. 123-128.
5. V.I. Ivlev, N.E. Fomin, V.A. Yudin, M.A. Okin, N.A. Pan'kin Thermal Analysis. Part 1: Methods of thermal analysis. - Saransk: University of Mordovia, 2017. - 44 P.
6. Bessekersky V.A., Popov E.P. Theory of automatic control systems. - 4th ed. - SPb.: Profession, 2007. - 752 P.
7. Rudenko P.V., Burmistr M.V., Budnik A.F. Improvement of the properties of fluoroplastomatrix carbon-fiber composites by influencing the parameters of the technology of their production. // East European Journal of Advanced Technology. 2009. No 7. P. 16-18.
8. Tazetdinov R.G. Physical and chemical bases of technological processes and processing of construction materials. - 2nd ed. - Moscow: INFRA-M, 2014. - 400 P.
9. Egochina V. I., Koposov G. D., Tyagunin A. V. Influence of physical conditions on moisture transfer from the ice surface over a dispersed medium at negative temperatures // Condensed media and interphase boundaries. 2018. No 4. P. 587-594.
10. Dibirov Ya.A., Iskenderov E.G., Aliev MM. Installation of DTA with analog-digital converter // XIV International Conference on Thermal Analysis and Calorimetry in Russia. - SPb.: 2013. - P. 397-404.

11. Dvoryanchikov V.I., Javatov D.K., Rabadanov G.A., Iskenderov E.G., Shikhakhmedova D.P. Isochoric heat capacity of a 1% aqueous solution of magnesium chloride // South of Russia. - 2016. - V.11. - No 2. - P. 121-131.

12. Iskenderov E.G., Verdiev N.N., Arbukhanova P.A., Zeynalov M.Sh., Dibirov Y.A., Dvoryanchikov V.I. Installation of thermal analysis based on the universal measuring regulator TRM136 // II Congress of Chemists of the Republic of Dagestan. Makhachkala: Publishing House of DGU, 2019.P. 169-171.

13. <https://www.oracle.com/technetwork/java/index.html>

14. <https://www.python.org>

## MODIFIED CARBON GRAPHITE ELECTRODE BY NANO PARTICLES OF MANGANESE DIOXIDE AND ITS ANALYTICAL APPLICATION

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**Abstract.** A composite electrode was made on the basis of carbon-graphite powder and manganese dioxide nanoparticles deposited on its surface, obtained during the reduction reaction of potassium permanganate with manganese (II) ions from aqueous solutions. Using the methods of scanning microscopy and X-ray diffraction analysis, the success of the modification of carbon powder with nanoparticles of manganese dioxide with sizes of 20-55 nm was proved. For bulk modification of the electrode, paraffin was used as a binder. Electrochemical studies of the behavior of the composite  $\text{MnO}_2 / \text{C}$  electrode were carried out using cyclic and differential-pulse voltammetry methods. The  $\text{MnO}_2 / \text{C}$  electrode showed electrocatalytic activity in the anode potential region in the presence of  $\text{H}_2\text{O}_2$  with a maximum current peak at pH 7.2–7.4. The optimal scanning speed of potentials in the range of -0.1 -1.0 V is 0.05-0.1 V / s. In this case, the anode peak appears at 0.72 V and the cathode peak at 0.68 V. The linear response of the electrode signal is observed in the concentration range of hydrogen peroxide of 0.1 - 3.0 mM. The detection limit of  $\text{H}_2\text{O}_2$  calculated by the 3  $\sigma$ -method taking into account the slope of the graph is 0.03 mM.

**Keywords:** composite electrodes, carbon paste electrodes, modification, manganese dioxide, hydrogen peroxide, voltammetric determination.



Carbon-containing paste electrodes are widely used in the electroanalytical determination of a number of inorganic and organic substances. Moreover, the modification of their surface or volume opens up new prospects for voltammetric analysis and biosensorics [1]. Particular attention of researchers is attracted by the possibility of such a modification of carbon-containing electrodes, which allows to obtain a catalytic response in the presence of a certain substance [2].

In this regard, metal oxide electrodes have a unique property compared to metal or carbon electrodes, since they are often able to exhibit catalytic activity due to redox processes due to various redox pairs of the metal state in the oxide, as well as practically absent hydrogen adsorption on their surface [3].

The purpose of this work is to obtain a composite  $\text{MnO}_2 / \text{C}$  electrode based on carbon graphite powder and manganese dioxide nanoparticles deposited on its surface, obtained during the reduction reaction of potassium permanganate with manganese (II) ions from aqueous solutions, and its testing in the determination of hydrogen peroxide.

### Experimental part

Modification of carbon powder with manganese dioxide was carried out by the "wet" method. The reaction  $3\text{MnCl}_2 + 2\text{KMnO}_4 + 2\text{H}_2\text{O} = 5\text{MnO}_2 + 2\text{KCl} + 4\text{HCl}$  was used as precursors to obtain  $\text{MnO}_2$  nanoparticles.

For this, solutions were prepared containing 0.1 M potassium permanganate and manganese chloride. Carbon-graphite powder was obtained by grinding carbon electrodes from spectral coal in a mill and sieved through a nylon sieve with a mesh diameter of 0.08-0.05 mm. Coal powder weighing  $4.570 \pm 0.010$  g was placed in a 150 ml glass, where 20 ml of the prepared  $\text{KMnO}_4$  solution and 30 ml of  $\text{MnCl}_2$  were simultaneously poured (this ratio of ingredients theoretically allows to obtain 0.435 g of manganese dioxide, which is ~ 10% of the total mass of the  $\text{MnO}_2 / \text{C}$  composite. The resulting mixture was stirred at a speed of 600 rpm for 1.5 hours, then the precipitate was separated by filtration in vacuo, washing the precipitate with filtrate and then bidistilled water. Dried at a temperature of 110 ° C for 2 hours, the  $\text{MnO}_2 / \text{C}$  precipitate carryover were mixed into a porcelain cup and ground using a glass rod.

Samples of the obtained  $\text{MnO}_2 / \text{C}$  composite were subjected to microphotographic and X-ray diffraction studies. The resulting composite in a mixture with paraffin, taken in a ratio of 50:50 wt.%, was used to make an indicator electrode for voltammetric analysis, according to the procedure described in [4].

### Results and discussion

Figures 1 and 2 show an electron micrograph of the  $\text{MnO}_2 / \text{C}$  composite and an X-ray diffraction pattern, which confirm the successful modification of the coal powder with nanoparticles of manganese dioxide with sizes of 20-55 nm.

On the manufactured  $\text{MnO}_2 / \text{C}$  composite electrode, its electrochemical behavior in the presence of hydrogen peroxide was studied. Cyclic voltammograms were taken in the range of -0.1 -1.0 V in buffer solutions with different pH at different scanning speeds of the potential.

In Fig. 3. Cyclic voltammograms on a composite electrode in phosphate buffer with a pH of 6.86 are shown. The peak on the anode branch of the cyclic VA was manifested at 0.72 V vs. Ag / AgCl electrode.

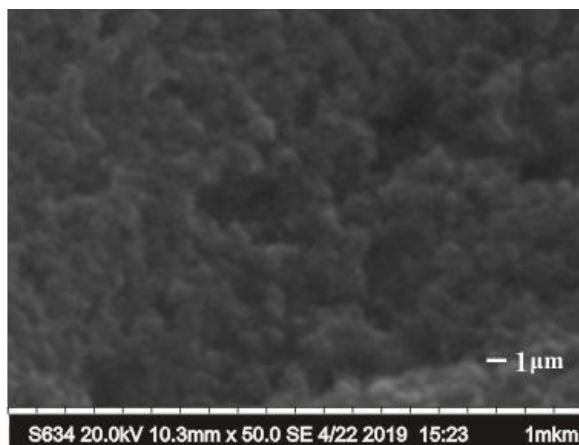


Fig. 1. SEM of the  $\text{MnO}_2 / \text{C}$  composite

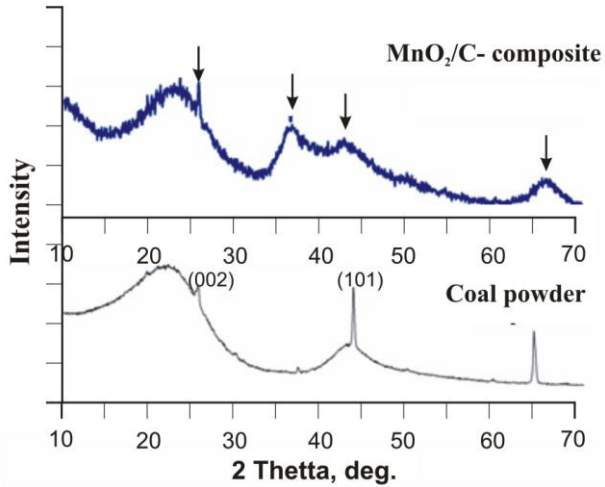


Fig. 2. X-ray diffraction patterns of coal powder and MnO<sub>2</sub>/C composite

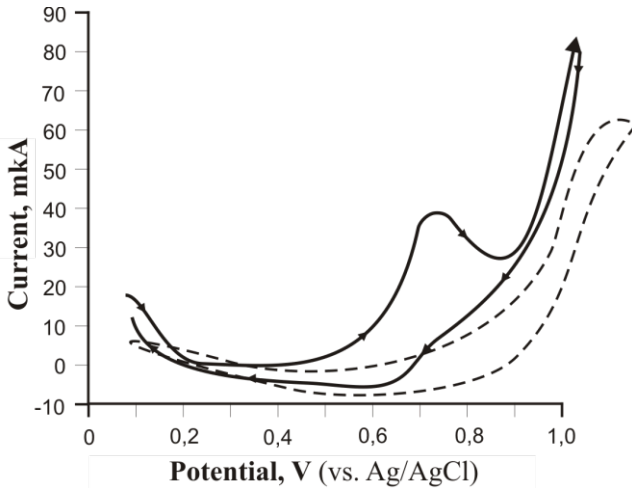
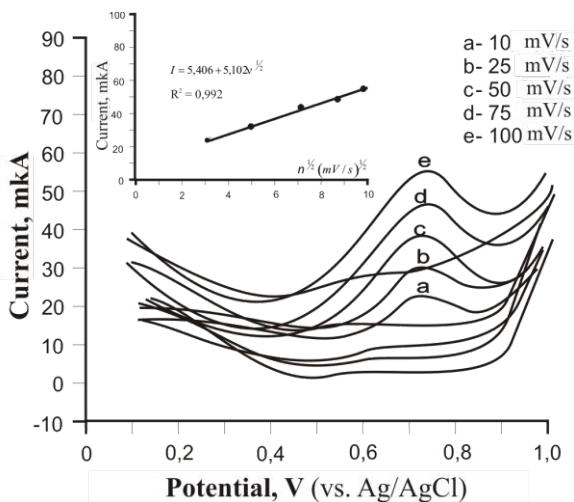


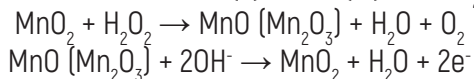
Fig. 3. Cyclic voltammograms on MnO<sub>2</sub>/C composite electrode in the background solution (0.25 M phosphate buffer with a pH of 6.86) - dashed curve and in a 0.5 mM hydrogen peroxide solution. Scanning speed 50 mV / s



**Fig. 4. Cyclic voltammograms of  $\text{MnO}_2/\text{C}$  composite electrode in a 0.5 mM solution of hydrogen peroxide in phosphate buffer (pH 6.86) at various scanning speeds of the potential. Inset: dependence of the analytical signal (Pia current) on the square root of the scanning speed**

The peak on the anode branch of the cyclic VA was manifested at 0.72 V vs. Ag / AgCl electrode. The cathode peak at 0.68 V. For the unmodified carbon graphite electrode, fuzzy peaks were also observed at almost the same potentials. In this case, the cathode peak was significantly smaller than the anode one.

A possible electrocatalytic mechanism of this process can be described by the following steps: adsorption of hydrogen peroxide on a composite electrode; catalytic decomposition of hydrogen peroxide on the surface of  $\text{MnO}_2$ , leading to a decrease in the oxidation state of Mn (IV) to Mn (II) or Mn (III); subsequent oxidation of Mn (II) or Mn (III) to  $\text{MnO}_2$ :



Based on the above assumptions, it can be assumed that upon anodic polarization of MnO ( $\text{Mn}_2\text{O}_3$ ), a new phase of manganese dioxide is reprecipitated on its surface, which leads to a densification of the working layer of the electrode and, as a result, to an increase in the resistance of the modified electrode. This assumption was confirmed during the experiment. The resistance of the  $\text{MnO}_2 / \text{C}$  composite electrode increased from 0.670 k $\Omega$  to 0.960 k $\Omega$  during 1000-1200 potential scan cycles. Moreover, as shown by microscopic studies, the surface of the electrode is smoothed.

The relationship between the oxidation peak current and the scanning speed of the  $\text{MnO}_2 / \text{C}$  potential of the electrode was investigated. The results are presented in Figure 4.

As shown, the peak oxidation currents were proportional to the square root of the scan rate in the range of 10 -100  $\text{mV s}^{-1}$ . This dependence is described by a linear equation.  $I = 5,406 + 5,102 \cdot \sqrt{v}$  The correlation coefficient was 0.992. which indicates that the process is controlled by diffusion. Moreover, the best forms of anode voltammograms were at a potential scanning speed of at least 50  $\text{mV / s}$ .

The study of the effect of pH on the analytical signal of the composite electrode in the presence of hydrogen peroxide showed that electrocatalytic activity is manifested in various electrolytes (pH 4.01 - 9.18), but a higher peak current was observed at pH 7.2 -7.4., Which consistent with the results obtained by other authors [5]. Peak currents and potentials change with changing pH values. With decreasing pH, the peak potential shifted to the positive potential region.

In this regard, in further studies, 0.25 M phosphate buffer with a pH of 7.4 was used, containing 0.15 M NaCl, which most fully meets the physiological standards of blood serum.

Figure 5 shows the differential-pulse voltammograms of the  $\text{MnO}_2 / \text{C}$  electrode for various concentrations of hydrogen peroxide. This experiment confirms the performance of the electrode in a wide range of hydrogen peroxide contents and the possibility of its determination by the additive method.

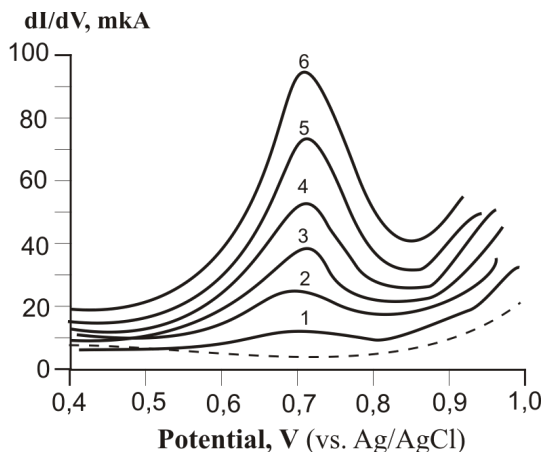


Fig.5. Differential-pulse voltammograms on a composite  $\text{MnO}_2 / \text{C}$  electrode in the presence of increasing amounts of hydrogen peroxide.

- 1 - 0.010 mM  $\text{H}_2\text{O}_2$ ; 2 - 0.025 mM  $\text{H}_2\text{O}_2$ ;
- 3 - 0.050 mM  $\text{H}_2\text{O}_2$ ; 4 - 0.10 mM  $\text{H}_2\text{O}_2$ ;
- 5 - 0.25 mM  $\text{H}_2\text{O}_2$ ; 6 - 0.50 mM  $\text{H}_2\text{O}_2$ ;

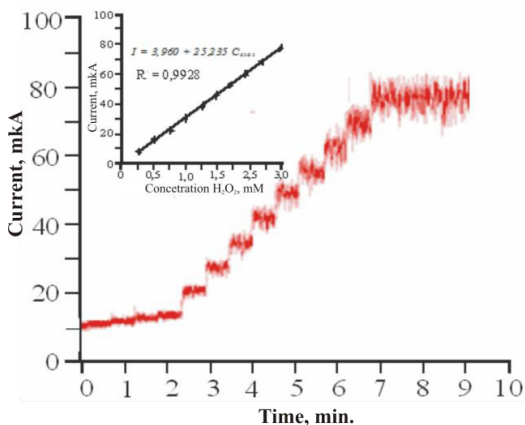


Fig.6. The dependence of the amperometric signal of the electrode with the sequential addition of 0.25 mm hydrogen peroxide.

The dotted line indicates the voltammogram of the electrode in a buffer electrolyte – 0.25 M phosphate buffer with a pH of 7.4, containing 0.15 M NaCl

The composite  $\text{MnO}_2 / \text{C}$  electrode was used to determine hydrogen peroxide by the chronoamperometric method, when the electrode potential was maintained at + 0.72 V relative to the saturated Ag / AgCl electrode.

In fig.6. The dependence of the amperometric signal of the electrode upon the sequential addition of 0.25 mM hydrogen peroxide with an interval of 40 seconds is shown.

The linear response of the electrode signal is observed in the concentration range of hydrogen peroxide of 0.1 - 3.0 mM. The detection limit calculated by the  $3\sigma$ -method taking into account the slope of the graph is 0.03 mM.

The composite  $\text{MnO}_2 / \text{C}$  electrode was tested in determining the actual content of hydrogen peroxide in a 3% aqueous solution of hydrogen peroxide, vitamin C and vitamin B<sub>2</sub> in pharmaceutical products sold to the population through a pharmacy network.

## **Conclusion**

A composite electrode based on carbon graphite powder and manganese dioxide nanoparticles deposited on the surface of potassium permanganate from manganese (II) ions from aqueous solutions was manufactured and tested in the voltammetric determination of hydrogen peroxide. The success of modifying carbon-graphite powder with manganese dioxide nanoparticles of 20-55 nm in size has been proved by scanning microscopy and X-ray diffraction analysis. For bulk modification of the electrode, paraffin was used as a binder.

Using cyclic voltammetry, the behavior of composite  $\text{MnO}_2 / \text{C}$  was studied. The electrocatalytic activity of the  $\text{MnO}_2 / \text{C}$  electrode in the anode region of potentials in the presence of  $\text{H}_2\text{O}_2$  with a maximum current peak at pH 7.2-7.4 was established. The anodic oxidation peak appears at 0.72 V and the cathodic peak at 0.68 V. The optimal scanning speed of potentials in the range of -0.1 -1.0 V is 0.05-0.1 V / s. The linear response of the electrode signal is observed in the concentration range of hydrogen peroxide of 0.1 - 3.0 mM. The detection limit of  $\text{H}_2\text{O}_2$  calculated by the  $3\sigma$ -method taking into account the slope of the graph is 0.03 mM.

The possibility of using the  $\text{MnO}_2 / \text{C}$  electrode in the determination of, in addition to hydrogen peroxide, vitamins C and  $\text{B}_2$  in pharmaceutical preparations is discussed.

### References

1. Budnikov G.K., Evtyugin G.A., Maystrenko V.N. Modified electrodes for voltammetry in chemistry, biology and medicine. M.: Binom. Laboratoriya znaniy, 2012.- 416 p. [in Russian].
2. Shaydarova L.G. Modified electrodes with catalytic properties in organic volamamperometry // DSc thesis: 02.00.02. - Kazan, 2009. - 350 p. [in Russian].
3. Romanova E. I. Electrodes modified with composites with nanostructured metal particles in organic electroanalysis // PhD thesis: 02.00.02. - Kazan, 2012. - 177 p. [in Russian].
4. Aronbaev S.D., Narmaeva G.Z., Aronbaev D.M. Bismuth modified carbon-containing electrodes for voltammetric analysis // *Universum: Himiya i biologiya: elektron. nauchn. zhurn.* 2018. # 5(45). [in Russian].
5. Langley C., Banks C.E., Paunkovic B.S., Compton R.G. Manganese Dioxide Graphite Composite Electrodes: Application to the Electroanalysis of Hydrogen Peroxide, Ascorbic Acid and Nitrite // *Analytical Sciences.* -2007. - 23(2): 165-170. DOI: 10.2116/analsci.23.165]



UDC 551.51

**WEATHER FORECASTS IN AVIATION AND THE USE OF MODERN METHODS OF TRANSMISSION OF WEATHER FORECASTS IN AIRPORTS AND AIRFIELDS. METAR, INTERNET AND OTHER TYPES OF WEATHER FORECAST TRANSMISSION METHODS**

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**Abstract.** This article is devoted to the analysis of the forecast of meteorological flight conditions of civil and extreme aviation in Russia, using modern methods of data transmission in the conditions of airports and airfields. Weather forecasting for civil aviation and experimental aviation is a set of activities carried out with the help of modern high-tech equipment and software. To make a decision on the departure of the aircraft, it is necessary to analyze weather conditions from the position of the possibility of performing a safe flight. To do this, it is necessary take into account the full range of available information on the state of weather conditions during the flight. We analyze the dynamics of the processes occurring in the atmosphere at the time of receiving the specific data from synoptic predictability on the time of flight for the entire route with the use of modern international codes, SIGMET, METAR, TAF.

**Key words:** SYNOPTIC analysis, forecast maps, meteorological flight conditions, international meteorological codes SIGMET, METAR, TAF.

**Introduction.** The preparation and execution of flights in civil and experimental aviation (CaEA) is carried out on the basis of international and federal rules, where the forecasting of meteorological flight conditions

(MFC) is one of the main tasks, the solution of which reduces the risk of possible negative phenomena that reduce flight safety. The regularity and timeliness of the provision of meteorological information to aircraft in the Russian Federation is carried out by Roshydromet, including through the recommendations of the World Meteorological Organization (WMO). This article is devoted to the analysis of the MFC forecast of civil aviation in Russia using modern methods of data transmission in airports and airfields.

**Main part.** Weather forecasting for civil aviation and experimental aviation is a set of measures carried out using modern high-tech equipment and software. The structural associations that carry out the preparation and provision of data for CaEA are the Federal State Budget Institutions (FSBI) of Roshydromet, which include special aviation meteorological centers and civil aviation meteorological stations (AMC, CMS). Today, Roshydromet has 257 AMC and ACMS, which are located at the airports of the Russian Federation and are part of 10 federal state budgetary institutions (FSBI) of Roshydromet. With the commissioning of automated AMC and CMS, the ability of meteorological stations at airports and aerodromes to continuously monitor the weather front and transmit data on the height of the lower boundary of clouds and their modification, the presence of ice or icing, horizontal, inclined and vertical visibility, atmospheric pressure, temperature and humidity, as well as wind speed and direction is increased. The frequency of tracking meteorological data was reduced in the range of 1, 3, 5 minutes, or 10 and 15. The capabilities of the equipment allow the information to be taken from the sensors almost at the time of its recording and transmitted using special software to air users.

For the processing of MFC data and its analysis, Roshydromet integrated computer systems are used, on which hydrodynamic objects are simulated in real time, weather conditions are analyzed and predicted. For the effectiveness of the forecast, the bases of the world forecasting zonal centers, as well as the centers of seismology and volcanology, are used.

Meteorological flight support (MFS) is a system that includes a set of actions that can be divided into 4 blocks: receiving and transmitting meteorological data, developing MFC forecasts and providing aviation users with meteorological information (Fig. 1).

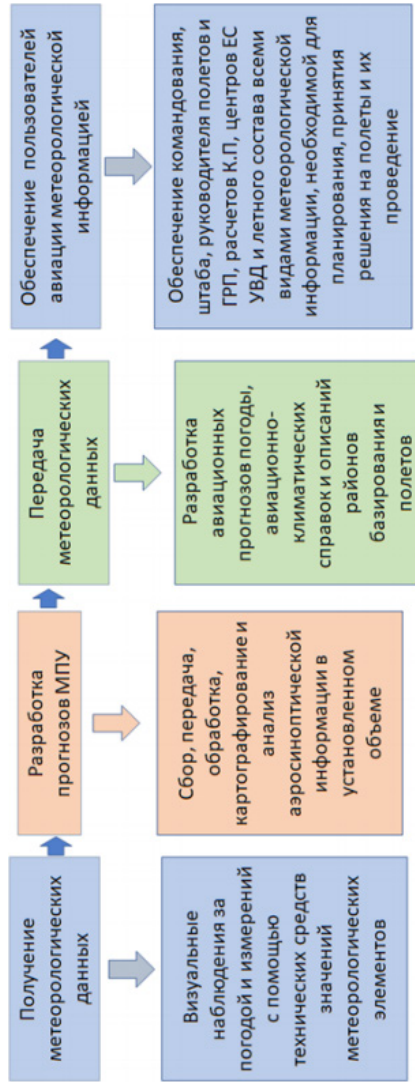


Fig. 1. The structure of meteorological support for flights

## Process Management and Scientific Developments

Meteorological support for flights at aerodromes and at airports is directly implemented by special meteorological services attached on the ground: meteorological aviation centers and AMC and ACMS stations with and without synoptic part. The functions of specialized meteorological organs with a synoptic part are as follows:

- monitor weather conditions at aerodromes and airports; - make synoptic weather forecasts;
- when the weather conditions worsen, they make warnings at the aerodrome or airport for air routes of flights;
- conduct consultations with flight crews;
- prepare flight documentation for air consumers according to weather forecast;
- train and conduct briefings with personnel and crews of aircraft in the competence of meteorological observations;
- carry out maintenance of meteorological equipment and instruments, including repair, installation and dismantling of meteorological equipment;
- oversee the information work of operational network units attached to AMC;
- control the flow of meteorological information to civil aviation users;
- study and monitor the weather conditions of the assigned territory for compiling climate maps and descriptions;
- compose sections of meteorological support in general flight operations instructions at aerodromes and airports;
- provide interested air traffic control authorities (ATC etc.) with information about seismic and volcanic activity, volcanic eruptions, cloud formation or volcanic ash; - compile information summaries using the international meteorological codes SIGMET (Significant Meteorological) or AIRMET;
- information transfer on broadcasting channels of VHF, ATIS and VOLMET;
- Transmission of meteorological information using the international METAR code (Meteorological Terminal Aviation Routine Weather Report).

An example of an informational message using the SIGMET and METAR codes is shown in Fig. 2.

**Примеры SIGMET**

WSAJ31 UBBB  
UBBB SIGMET 1 VALID 240430/240830 UBBB  
UBBB BAKU FIR EMBD TS OBS NE, E OF E049 TOP FL390 MOV E 20KT  
NC=

UBBB SIGMET 1 VALID 121330/121730 UBBB-  
UBBB BAKU FIR EMBD TS FCST TOP FL340=

UBBB SIGMET 6 VALID 112100/120100 UBBB-  
UBBB BAKU FIR EMBD TS FCST TOP FL340=

**Примеры METAR**

METAR UAAA 170930Z 35002MPS 320V070 9999 FEW050CB  
BKN200 24/01 Q1014 88CLRD65 NOSIG=

METAR UAFM 170930Z 36004MPS CAVOK 27/M02 Q1013 TEMPO  
27007G12MPS=

METAR OPKC 171000Z 24012KT 5000 HZ SKC 34/21 Q1001 NOSIG=

**Fig. 2. An example of an informational message using the SIGMET and METAR codes**

In order to make a decision to take off an aircraft, it is necessary to analyze weather conditions from the perspective of the possibility of performing a safe flight. For this, the whole range of available information about the weather conditions during the flight is taken into account. The dynamics of the processes occurring in the atmosphere at the time of obtaining specific data with synoptic predictability for the flight along the entire route, all available data on the weather condition, the nature and direction of the development of atmospheric processes that will lead to changes in weather conditions during the flight are analyzed. It is necessary to understand not only what weather conditions are observed in the area or along the route of the planned flight, but also to determine what these conditions are related to and how they can change in the future, i.e. imagine their future condition. This can be done by conducting an aerosynoptic analysis of the meteorological situation.

Aerosynoptic analysis is carried out by comparing and complex processing of meteorological data units. Table 1 presents the meteorological blocks that must be operated on to obtain an aerosynoptic forecast.

A comparative analysis of aerosynoptic materials with a greater degree of certainty assesses the development of processes occurring in the atmosphere, determines the genesis of pressure systems and the advancement of air fronts, and changes in air masses.

When considering in more detail the methods for transmitting weather forecasts at airports and aerodromes, it should be noted that there are several international meteorological codes of various specifications, such as METAR, SPECI, TAF, SIGMET, etc.

International Aeronautical Meteorological Code METAR. With the help of this weather code, actual or regular weather is recorded both in the conditions of airfields and at a single automatic weather station. The METAR code contains data on the time of the survey, the specific location, visibility, wind speed and direction, precipitation, cloud cover (especially with respect to cumulus clouds), atmospheric pressure, ambient temperature, dew point deficit. The main information of the report may also be supplemented by a near-synoptic forecast.

If the international METAR code contains records about the actual, current state of weather conditions, then the SPECI (aviation selected special weather report) code records weather changes in the conditions of the airfield or in a single automatic weather station or special reports.

Observations are carried out regularly and on special events. The bulk of the work is done by automatic meteorological stations (AMS), Fig. 3. The AMS collects and processes the incoming meteorological data, forms a summary taking into account the encoding, and passes it to aviation users (ATC and other interested parties).

Weather events are monitored regularly during the flight every 0.5 hours, a summary of the current weather condition (METAR code) or changes in weather conditions, deterioration in any indicators or improvements (SPECI code) is removed. In the absence of flights at the aerodromes, the AMS takes meteorological data every hour. If necessary, or on the instructions of ATC, reports on METAR or SPECI codes are removed by the AMC when requesting information to compile a predictive analysis of the dynamics of weather phenomena.

**Table 1**  
**Blocks of meteorological information for compilation**  
**of aersynoptic analysis**

| No | Meteorological information blocks for aersynoptic analysis compilation | Description of Actions  | Determinations   |
|----|--|---|--|
| 1  | Atmospheric weather monitoring   | Measurements and Observations   | Ground layers and altitudes of the free atmosphere   |
| 2  | Actual weather maps  | Synoptic mapping  | Ground layers of the atmosphere and altitude in flight conditions  |
| 3  | Aerological charts   | Estimate and graphic construction in a timely manner: 00, 06, 12 and 18 hours UTC | Temperature-wind sounding of the atmosphere at altitudes in flight conditions                                    |
| 4  | Maximum Wind Maps  | Radio sounding at 00, 06, 12 and 18 hours UTC                                     | The position of the axis of the jet stream (JS)  |
| 5  | Maps of the tropopause (spatial position)                              | Radio sounding at 00, 06, 12 and 18 hours UTC                                     | Pressure hPa, temperature ° C, dew point deficit   |
| 6  | Patterns of radar meteorological observations                          | Mapping Using Weather Locators  | Wind speed and direction, cloud movements, including cumulus activity, formation of cyclones, atmospheric fronts |
| 7  | Maps of nephanalysis   | Cloud mapping from satellite observations   | Key indicators of cloud cover: boundaries, quantity, structural features   |
| 8  | Predictive maps of special events                                      | Front Forecast Mapping  | Marks of the centers of cyclones and anticyclones  |
| 9  | Predictive maps of wind and air temperature                            | Compiled 4 times a day 00, 06, 12 and 18.00 UTC                                   | Drawing in numbers and conventional signs of meteorological information and data of synoptic analysis            |



**Fig. 3. Automatic meteorological station collecting and transmitting meteorological data**

The format of weather reports transmitted by AMC in accordance with international rules contains the following information:

- METAR or SPECI summary type header;
- aerodrome index code;
- accurate time of observation (MSC and UTC);
- wind speed and direction at the surface of the earth;
- current weather, its manifestations;
- number, shape and height of the lower border of clouds;
- ambient temperature and dew point;
- atmospheric pressure relative to sea level QNH (Question Nautical Height) and relative to the location level of the airfield QFE \$;
- phenomena preceding current weather (Rew'w');



- forecast for aircraft landing (trend line), taking into account the dynamics of phenomena;
- additional information on RMK (the presence of turbulence, icing, ice, cumulus clouds, thunderstorms, etc.). In fig. 4 shows the encoding scheme METAR and SPECI.

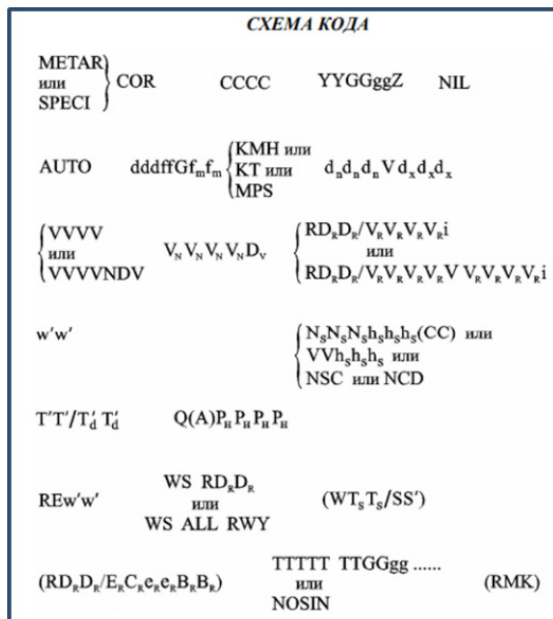


Fig. 4. The encoding scheme METAR and SPECI

For example:

- 25085G122KMh - wind direction 250 °, average speed 85 km/h, maximum speed (gusts) 122 km/h;
  - P49MPS - wind speed of more than 50 m/s and more; - P99KT - wind speed of more than 100 knots or more;
  - P199KMh - wind speed of more than 200 km/h.
- P (peak) - more (highest point, maximum).

International Aeronautical Meteorological Code TAF (terminal aerodrome forecast). With the help of this code, weather conditions relative to aerodromes or airports are forecasted. The name TAF must be displayed at the beginning of the forecast. The summary must necessarily show information about the wind, visibility of the RVR, cloud cover, weather events. The selection of code groups contains a different number of characters, if any element of the code is not predicted, then these symbols are not inserted into the general summary.

The TAF weather forecast lasts from 6 to 30 hours. Every 3 hours, regular current TAF forecasts are displayed.

**Conclusion.** The provision of meteorological safety for flights throughout the route, including at aerodromes and airports, is supported by the international meteorological codes of the world meteorological organization WMO and ICAO - the international civil aviation organization.

The main meteorological codes include METAR, SPECI, TAF and SIGMET, where METAR and SPECI - transmit information read by the AMS about the actual weather at the aerodrome and about its changes for the better or for the worse; TAF - transmits the weather forecast for the airfield; SIGMET - storm warning and warning about aviation weather hazardous events.

Using weather coding, it is possible to transmit meteorological reports of current weather and synoptic forecasts directly to aviation users throughout the flight route.

## References

1. Bogatkin O.G. Aviation weather forecasts. - SPb: BHV-Petersburg, 2010.288 p.
2. Bogatkin O.G. Fundamentals of Aeronautical Meteorology. - SPb: RG-GMU, 2009.339 p.
3. Bogatkin O.G., Enikeeva V.D. Analysis and weather forecast for aviation; 2nd ed. Leningrad: Gidrometeoizdat, 1992.272 p.
4. Seleznev V.P. Meteorological support for flights. - Moscow: LIBROCOM, 2018.190 p.
5. Bolelov E.A., Korablev Yu.N., Baranov N.A., Demin S.S., Yeshenko A.A. Integrated processing of meteorological information in aerodrome mobile complexes of meteorological location and sensing of the atmosphere // Scientific Herald of the State Scientific Research Institute of Civil Aviation (GosNII GA). 2018.Vol. 20. No 331.p. 82-92.
6. Zabolotnikov G.V., Veselkin M.G. Use of the international aeronautical meteorological codes METAR (SPECI) and TAF. - SPb: RSMU, 2006.33 p.
7. Leshchenko G.P. Aeronautical meteorology. Kirovograd, 2009.

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